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PROBLEMY EKOROZWOJU

PROBLEMS OF SUSTAINABLE DEVELOPMENT

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Dan Golomb (1928 - 2013)

Dan Golomb, member of our Editorial Board, passed away at the age of 84.

Dan Golomb of Waban was Professor Emeritus in the Department of Environmental, Earth, and Atmospheric Sciences at the University of Lowell.

Golomb was born in Wurzburg, Germany on August 4th, 1928. He grew up in Munich and Zagreb, Yugoslavia. In 1944 he was deported to Auschwitz and then to Muehldorf, a work-camp satellite of Dachau, from which he was liberated by American forces in April, 1945.

After the war, Golomb completed gymnasium in Subotica and began studies at the University of Belgrade. In 1948 he emigrated to Israel. In 1954 he married Claire Schimmel. In 1958 he completed a Ph.D. in Physical Chemistry at the Hebrew University.

In 1961 Golomb came to the U.S.A. to work with the Air Force at the Hanscomb Field Station (in the field of atmospheric research), then – in 1977 – moved to the EPA: Environmental Protection Agency in Washington, DC and the Massachussetts Institute of Technology in 1981. He joined the faculty of University Mass Lowell in 1989. In the years 2009-2013 he was also a member of Editorial Board of Problemy Ekorozwoju/Problems of Sustainable Development journal.

Some anti-crisis proposals, the voice in discussion on the report "Money and Sustainability: The Missing Link"*

Antykryzysowe postulaty, głos w dyskusji o raporcie "Money and Sustainability: The Missing Link"**

Lesław Michnowski

Long-term (1993-2011) member of the of the 'Poland 2000 Plus' Committee for Future Studies, Chairman of Sustainable Development Creators' Club, Co-founder of Sustainable Development Information Society Forum, member of the Polish Society of Cooperation With the Club of Rome and member of System Dynamics Society E-mail: leslaw.michnowski@gmail.com

World is in the global crisis. It is the result of a big 20th century' science-technology development without adjustment of social relations, including economics, to such new life-conditions (level of technology development, state of environment, accessibility of resources, and so on). Together with it world society have crossed, in pathological way, two main limits to growth: inertial and environmental. To create sustainable development of the world society it is necessary to get skill of elimination in pre emptive way of negative effects of inevitable, pacing quickly, moral (obsolete, outmoded) destruction of up to date proper forms of life (axiology, technology, economics, and so on) but not yet adequate to new life-conditions. For this end we *inter alia* need:

- 1. To get skill of forecasting and measure of complex effects of human activity and other changes in life–conditions.
- 2. To get skill of accumulating intellectual and material reserves, and big flexibility, for avoiding catastrophes not predicted properly.

Świat jest w globalnym kryzysie. Jest on skutkiem niedostosowania stosunków społecznych, w tym ekonomiki, do jakościowo nowych uwarunkowań życia (upowszechnienie techniki, dostępność zasobów naturalnych, stan środowiska przyrodniczego, i in.), które powstały w XX wieku w wyniku wielkiego rozwoju nauki i techniki. W efekcie tego niedostosowania światowa społeczność patologicznie przekroczyła dwie podstawowe granice jej wzrostu: inercyjną i środowiskowa.

Dla przezwyciężenia kryzysu i osiągnięcia *sustainable development* konieczne jest opanowanie umiejętności wyprzedzającego eliminowania negatywnych skutków nieuchronnej, coraz szybciej postępującej, moralnej destrukcji form życia (aksjologii, techniki, ekonomiki i in.) już niezgodnych z nowymi uwarunkowaniami życia. W tym celu jest m.in. potrzebne:

1. Opanowanie umiejętności przewidywania i wymiernego wyznaczania kompleksowych skutków ludzkiej aktywności i innych zmian w uwarunkowaniach życia.

^{*}The discussion was based on the lecture of co-author of the above Report, Dr Stefan Brunnhuber, on common meeting of *Poland 2000 Plus* Committee for Future Studies, Polish Economic Society and Polish Association for the Club, in Warsaw on 17th of October, 2013.

^{**}Dyskusja dotyczyła wykładu współautora tego Raportu, Dr Stefana Brunnhubera, na wspólnym zebraniu Komitetu Prognoz *Polska 2000 Plus* PAN, Polskiego Towarzystwa Ekonomicznego oraz Polskiego Towarzystwa Współpracy z Klubem Rzymskim, w Warszawie w dniu 17.11.2013 r.

- 3. To combine economic growth with real quality of life growth.
- 4. To combine access to wealth with ecosocially useful especially science and innovative creative activity of mature subjects of socio-economic life.
- 5. To substitute egoistic axiology for ecohumanistic one.

Ecohumanism means partnership-based cooperation for the common good/win-win of all people (rich and poor, from countries highly developed and behind in development), their descendants, and natural environment – commonly supported by science and high technology, as well as information culture.

Intensity of moral (obsolete, outmoded) destruction is growing up with science-technology development, that is essential for elimination of moral destruction negative effects.

To eliminate negative effects of such moral destruction we have to generate big ecosocial useful intellectual creative activity.

To achieve sustainable development of the world society it is especially necessary to change – in backcasting way – world monetary system.

I propose such long-term strategy vision of above system.

To stimulate economic activity we ought to substitute current inflation way of supporting market demand for *ecosocial useful deflation* way. It ought to allow not to spend moneys on superfluous, ecosocially cost consumption. The moneys saved would be used by new form of banks for credit ecosocially useful innovations. As a result, the market demand would be created by means of more ecosocially useful products of new generation.

In such new – sustainable development supporting – economy, wealth of any individual or collective subject would combine their wealth with elimination of moral destruction negative effects.

It would be quite new ecosocial justice principle.

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- Opanowania umiejętności gromadzenie rezerw zasobów intelektualnych i materialnych, oraz kształtowania wielkiej elastyczności metod działania, niezbędnych dla eliminowania zagrożeń odpowiednio wcześnie nie przewidzianych.
- 3. Łączenie wzrostu gospodarczego z realnym podnoszeniem jakości życia.
- Łączenie dostępności do bogactw z ekospołecznie użyteczną – szczególnie poznawczo innowacyjną – aktywnością twórczą dojrzałych podmiotów życia społeczno-gospodarczego.
- Zastąpienie aksjologii egoistycznej ekohumanistyczną.

Ekohumanizm, to partnerskie współdziałanie dla dobra wspólnego/win-win – wszystkich ludzi (bogatych i biednych, społeczności wysokorozwiniętych i w rozwoju opóźnionych) ich następców oraz środowiska przyrodniczego – powszechnie wspomagane nauką i wysoką techniką oraz kulturą informacyjną. Natężenie moralnej destrukcji wzrasta wraz z rozwojem nauki i techniki, który jest niezbędny dla eliminowania negatywnych jej następstw. Dla eliminowania tych negatywnych następstw niezbędna jest przeto wielka, lecz ekospołecznie użyteczna, aktywność twórcza.

Dla osiągnięcia *sustainable development* światowej społeczności jest szczególnie niezbędne przekształcenie – metodą wizyjnego programowania strategicznego/backcastingu – światowego systemu monetarnego.

Proponuję następującą dalekosiężną wizję powyższego systemu. Dla stymulowania aktywności ekonomicznej powinno się zastąpić obecną metodę inflacyjnej stymulacji popytu metodą stymulowania za pomoca ekospołecznie użytecznej deflacji. Spowoduje to eliminowanie zbędnej, ekospołecznie kosztownej, konsumpcji. Zaoszczędzone tak pieniądze powinny być wykorzystywane przez nowego rodzaju banki do kredytowania ekospołecznie użytecznej innowacyjności. W efekcie tego popyt byłby kształtowany poprzez podaż bardziej ekospołecznie użytecznych produktów nowej generacji. W ramach takiej, sustainable development podtrzymującej, ekonomiki bogactwo indywidualnych lub zbiorowych podmiotów byłoby uzależnione od ich skuteczności eliminowania negatywnych następstw moralnej destrukcji.

Byłaby to jakościowo nowy zasada sprawiedliwości ekospołecznej.

Sustainability research as inter- and trans-disciplinary activity: the case of German *Energiewende*

Inter- i trans-dyscyplinarne badania nad zrównoważonością: przypadek niemieckiej *Energiewende*

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Abstract

Sustainability research shall provide knowledge for action and is therefore deeply related with social and political issues such as regulation, behaviour, value-added chains, daily routines of users, consumption patterns, economic incentives, perceptions, attitudes and values. It needs cooperation with social actors in diagnosing sustainability deficits and challenges, in determining priorities for research and action, in defining indicators for measuring empirical developments and deciding on sustainability targets to go for, in setting the research agenda, in bringing knowledge and values of stakeholders and affected persons into the game and in looking for making sustainability strategies work in practice. This holds in particular for the transformation of the energy supply system to a more sustainable status. This transformation goes far beyond the substitution of traditional technology by new ones, because the energy system is not a purely technical system consisting of power plants, supply lines, storages etc. Rather it also includes a complex set of human actors such as users, regulators, decisionmakers, planners, innovators, employees in the supply companies, citizens affected by side effects of energy technologies and infrastructures and also citizens in their role as the democratic sovereign. The main thesis of this paper is that the energy system is a socio-technical system and that its transformation is a social transformation including technological change but going far beyond. The German Energiewende is used as an example. Energiewende means the (relatively) fast transformation of the German energy infrastructure to a more sustainable status based on a high share of renewables and strongly increased energy efficiency, including an accelerated nuclear phase-out after the Fukushima disaster.

Key words: sustainable energy supply, socio-technical systems, transition management, social learning

Streszczenie

Badania na zrównoważonością powinny dostarczać wiedzy praktycznej, powiązanej z takimi zagadnieniami społecznymi i politycznymi, jak: regulacja, zachowanie, wartości dodane, codzienne zachowania, wzory konsumpcyjne, zachęty ekonomiczne, percepcja, postawy i wartości. W diagnozie wyzwań zrównoważoności niezbędne jest uwzględnienie perspektywy społecznej, pozwalającej określić priorytety dla badań i praktyki, zdefiniować wskaźniki pozwalające zmierzyć rozwój i wyznaczyć cele, ku którym powinniśmy zmierzać. Należy ustalić program badań, uwzględnić wiedzę i wartości odnoszące się do interesariuszy i innych osób, które w tym procesie uczestniczą, a także poszukiwać strategii zrównoważoności, które sprawdzą się w praktyce. W szczególności odnosi się to do przekształcenia systemów zaopatrzenia w energię. Ta transformacja wykracza daleko poza zastąpienie tradycyjnych technologii nowymi, ponieważ system energetyczny nie ma charakteru jedynie czysto technicznego, złożonego z elektrowni, linii przesyłowych itp. Uwzględnić w nim należy także złożony zespół czynników ludzkich, takich jak użytkownicy, moderatorzy, decydenci, planiści, innowatorzy, pracownicy kompanii energetycznych i obywatele dotknięci efektami ubocznymi wynikającymi tak ze stosowania technologii energetycznych jak i rozwoju infrastruktury. Główna teza tej pracy jest następująca: system energetyczny jest systemem *społeczno-technicznym* i *jego przeksztalcenia* zachodzą na płaszczyźnie *społecznej* z uwzględnieniem zmian technologicznych, wykraczając jednak daleko poza nie. Niemieckie *Energiewende* może służyć za przykład. *Energiewende* oznacza (relatywnie) szybką transformację niemieckiego systemu energetycznego w kierunku zrównoważoności, co oznacza oparcie go na odnawialnych źródeł energii i silnie zwiększonej efektywności energetycznej, a także przyspieszonym po katastrofie w Fukushimie wycofywaniu się z rozwijania energetyki jądrowej.

Słowa kluczowe: zrównoważone zaopatrzenie w energię, systemy społeczno-techniczne, zarządzanie zmianami, edukacja społeczna

1. Introduction and overview

As is well-known for now about two decades, sustainability research must be highly inter- und transdisciplinary in nature in order to be able to successfully cope with the challenges of its very subject (Kates et al., 2000; Spangenberg, 2011, Grunwald, Kopfmüller 2012). Sustainability research shall provide knowledge for action and is therefore deeply related with social and political issues such as regulation, behaviour, value-added chains, daily routines of users, consumption patterns, economic incentives, perceptions, attitudes and values (Kowalski et al., 2007). It needs cooperation with social actors in diagnosing sustainability deficits and challenges, in determining priorities for research and action, in defining indicators for measuring empirical developments and deciding on sustainability targets to go for, in setting the research agenda, in bringing knowledge and values of stakeholders and affected persons into the game, and in looking for making sustainability strategies work in practice. This holds in particular for the transformation of large infrastructures such as energy supply, water supply, and transportation to more sustainable systems. Such transformation processes are only conceivable as processes of co-diagnosis of deficits, co-shaping of future alternatives, co-determining of the targets to be met, and co-designing solutions for the respective next steps of the transformation. In this way, the transformation towards a more sustainable society is an issue of culture (Banse et al., 2010, 2011; Banse, Parodi, 2011).

However, often the transformation of the energy system is regarded as - more or less - solvable by new and much more efficient technology including strong integration of renewables, assuming implicitly or explicitly that social issues will – again more or less – not be touched upon, except that that the new technologies needed must be accepted by society. Thus, the role of social sciences is frequently seen by managers and engineers in providing sociotechnological knowledge how to achieve this goal of acceptance (know-how). The aim of this paper is to criticise this technocratic approach as deficient and misleading, using the German Energiewende as an example. *Energiewende* means the (relatively) fast transformation of the German energy infrastructure to a more sustainable status based on a

high share of renewables and strongly increased energy efficiency, including an accelerated nuclear phase-out after the Fukushima disaster. This transformation goes far beyond the substitution of traditional technology by new and more sustainable ones because the energy system is not a purely technical system consisting of power plants, supply lines, storages etc. Rather it also includes a complex set of human actors such as users, regulators, decision-makers, planners, innovators, employees in the supply companies, citizens affected by side effects of energy technologies and infrastructures and also citizens in their role as the democratic sovereign. The main thesis of this paper is that the energy system is a socio-technical system and Energiewende is a social transformation including technological change but going far beyond¹.

The paper is structured as follows. First, some general issues of the recent debate on trans-disciplinary sustainability research will be recalled (Sec. 2). The interpretation of the energy system as a *sociotechnical* system (Sec. 3) is crucial for the analysis and conclusions presented. It will be argued that the many uncertainties involved – will force us to shape it as an ongoing societal learning process far away from any classical planning approach. The Helmholtz-Alliance ENERGY-TRANS will be introduced as a step in this direction (Sec. 4) opening up further perspectives for trans-disciplinary energy research.

2. Inter- and trans-disciplinary knowledge integration for sustainability

Sustainable development requires that societal processes – including consumption and production patterns, value-added chains and technology development – are re-orientated so as to ensure that present generations can satisfy their needs without endangering that the needs of future generations can also be fulfilled (WCED 1987). Thus sustainable development necessarily involves long-term and

¹ The arguments presented in this chapter have partly been discussed and developed in the Helmholtz Alliance ENERGY-TRANS (www.energy-trans.de). Some arguments build on earlier work (cp. primarily Schippl, Grunwald 2012). I would like to express thanks to Jens Schippl and my colleagues cooperating in the Helmholtz Alliance.

normative considerations (von Schomberg, 2002). It includes taking into account aspects of the distant future, of the impact of our present use of technology and concepts of society on this future, and considering the impact of such reflections on our present-day individual and collective behaviour. The transformation of current social realities to more sustainable ones will have to take into account complex pieces of knowledge about current trends and developments, about systems and their driving forces, about orientation *where* to go to in order to reach a more sustainable world, and about measures *how* to go there. It is evident that scientific research and advice is needed to support this really *grand* transformation (WBGU, 2011).

The necessity of crossing the borders between scientific disciplines on the one hand, and between science and society on the other, in order to be able to contribute significantly to problem solutions in the real world, e.g. in the field of sustainable development, has long been a subject of scientific and public debate. This necessity is primarily related with the very subject of study. Obviously, real world challenges such as the transformation to a more sustainable energy system cannot be dealt with successfully within individual scientific disciplines. Problem-oriented research orients itself on the scope of social challenges and problems, not on discipline-immanent research programmes (Bechmann, Grunwald, 2002), and must therefore be inter-disciplinary in nature.

Beyond inter-disciplinarity, the issue of transdisciplinarity enters the field at different occasions, for example by responding to the challenge how the problem is identified and shaped, and who will and should contribute to shaping the problem and designing research to meet its need (co-design), by taking knowledge and perspectives of stakeholders, civil society and other extra-scientific actors into account in the knowledge production (coproduction), and by creating specific measures and strategies of implementation together with relevant actors in the respective field (co-creation): Thus in transdisciplinarity, the sources of intelligence are extended to include non-scientific knowledge (...), the research question is defined together, and the quality of the work is checked by both groups, as those affected are the experts for relevance, while scientists are the exports for rigour (Spangenberg, 2011). Accordingly, the issue of integration is at the heart of trans-disciplinarity:

Transdisciplinarity is a critical and selfreflexive research approach that relates societal with scientific problems; it produces new knowledge by integrating different scientific and extra-scientific insights; its aim is to contribute to both societal and scientific progress; integration is the cognitive operation of establishing a novel, hitherto non-existent, connection between the distinct epistemic, socio-organizational, and communicative entities that make up the given problem context (Jahn et al., 2012).

For providing integrative orientation and strategies for sustainable development research has to operate with different types of knowledge from various scientific disciplines and, on demand, also from outside science. This knowledge can be categorized in the following way (extended after Weber, Whitelegg, 2003; Grunwald, 2004):

- Systems Knowledge: Insight into natural and societal systems, as well as knowledge of the interactions between society and the natural environment are necessary prerequisites for successful action in the field of sustainable development. Explanatory knowledge about relevant systems, in particular in the form of cause/effectrelationships, is the knowledge, the production of which is the familiar object of scientific disciplines. This type of knowledge is often provided in the form of models (e.g. Schellnhuber, Wenzel, 1999).
- *Prospective knowledge*: The time dimension of sustainable development, in particular the issue of taking over responsibility for future generations (Jonas, 1979), requires considering possible, probable or desirable future developments, based on today's knowledge and assessments. Prospective knowledge allows for imagining where current developments could develop to. A lot of research-based methods such as scenario techniques and model-based simulation techniques are available to provide prospective knowledge (Rescher, 1998).
- Orientational knowledge: The appraisal of societal circumstances and developments, of global trends, and of measures must build on sustainability goals, criteria and targets which permit reliable and transparent differentiation in *sustainable* and *non*-or *less sustainable*. These must be based on good reasons which operate on the basis of normative premises. Orientation knowledge serves as a *compass* to identify sustainability deficits, to determine priorities, to find out the direction where to go to and to distinguish between alternative paths of action (e.g. Kopfmüller et al., 2001; Ott, Döring, 2004).
- *Strategic knowledge*: To the tasks of sustainability research indispensably belongs contributing to the *therapy* of sustainability problems. In the final analysis, science for sustainability aims at coherent and integrative action-guiding knowledge for politics and society by elaborating on pos-

sible measures and strategies, taking into account the uncertainty and incompleteness of the knowledge produced (Grunwald, 2004, 2007; von Schomberg, 2002).

Research for sustainable development usually aims at *transformation* and is thus *transformative research* (WBGU, 2011). Therefore, all of the types of knowledge alluded to are indispensable to be able to do this: explanations of cause/effect chains provide the cognitive basis for every sort of action; orientating criteria are equally indispensable for diagnosis as for therapy, prospective knowledge shows possible future developments and in strategic knowledge for action, they combine. Now, regarding the sources of these different categories of knowledge it is obvious that:

- a) interdisciplinary integration must take place. Positive sciences such as geography, ecology and climatology but also social sciences do provide systems knowledge; normative sciences such as ethics and legal sciences do contribute to orientational knowledge, and actionoriented sciences such as political and economic sciences deal with measures to reach specific targets. Beyond these necessities of disciplinary integration,
- b) knowledge from outside science must be integrated at different places, e.g. by perceptions and values entering the field of orientation and by stakeholder's and citizen's views on future developments in the field of prospective knowledge.

However, the most relevant entry points of and needs for trans-disciplinarity do concern the entire field and are related with questions such as:

- How can the problem under consideration be understood adequately and what does *adequate* mean in that case?
- Which knowledge is required to understand the challenge and to elaborate on strategies of response?
- Which targets should be addressed with high priority?
- Which disciplines and outer-scientific activities are needed to provide the knowledge required?

Accordingly, trans-disciplinarity has to address the overall constellation, beginning with framing and understanding the problem at hand, determining processes and actors of knowledge acquisition and reaching up to defining strategies or response to the identified sustainability deficits. To choose a strong formulation: trans-disciplinarity is the *conceptual, pragmatic and integrative medium* of interdisciplinary and disciplinary sustainability research.

This conclusion does not imply that each research project aiming at contributions to sustainable development must be inter- or trans-disciplinary in nature to a maximum extent. In particular, explanatory systems knowledge often can be created by

disciplinary research and modelling, e.g. on specific eco-systems, or by inter-disciplinary projects without cooperation partners of society. Accordingly, there might be mono- or interdisciplinary projects contributing considerably to sustainable development issues without any trans-disciplinary parts. However, these projects should be integrated in an overarching framework of sustainability assessments and diagnoses which should have been established in a trans-disciplinary way. Mono- or interdisciplinary research should be embedded in a common and thus trans-disciplinary agenda of sustainability research. This constellation will allow for providing integrative products combing the knowledge types mentioned above in order to meet specific sustainability challenges. It also provides orientation how to arrange methods in order to arrive at the envisaged common product. It will also be possible to argue that particular disciplines using particular methods will have to address specific disciplinary subjects for contributing to reaching the common goals (in my eyes, the following quote also holds for the trans-disciplinary integration of extra-scientific knowledge):

Science for sustainability can be monodisciplinary or multidisciplinary, but it must be at least *interdisciplinarity-ready*, conducted with the broader picture of sustainability in mind, and therefore ready for integration with results from other disciplines (Spangenberg, 2011).

As a side-effect it becomes clear that, by developing and exercising inter- and trans-disciplinary sustainability research, science leaves the niche of formerly presumed value-freedom and takes on a politically relevant role in the identification of problems, in making assessments and diagnoses and in determining the range of adequate options for response: It may be basic or applied research, but it must be purpose-bound, as opposed to the 'value-free' stance of natural sciences (Spangenberg, 2011; see also Funtowicz, Ravetz, 1993 and the consecutive debate on *post-normal science*). Science in this sense works inevitably with evaluative premises, which influence the societal processes of assessment of sustainability and its political realization. It must therefore carefully reflect the borderline between knowledge and evaluation, in order to be able to uphold its legitimisation as a knowledge-providing societal subsystem and to retain its constitutive role as a producer of specific knowledge (Luhmann, 1990). The application of value judgements is inevitable but must not lead to the situation that science appears in the sustainability discussion in the role of a *stakeholder* among many others. In this case, science would loose its specific character and legitimisation. Specific attention is required to re-define issues of scientific independence beyond positivistic claims of valueneutrality. Experiences from the field of technology assessment with a strong need for transparently uncovering normative issues (Grunwald, 2009) could be of use also in the field of sustainability research.

Historically speaking, inter- and trans-disciplinary knowledge integration is a counter-movement compared to the self-dynamics of scientific progress. Scientific progress can over centuries be regarded as successful processes of differentiation, specialisation and fragmentation. Disciplines, subdisciplines, sub-sub-disciplines and specialised small communities developed and stabilised themselves by more and more specialised journals, specialised languages and formalisms, conferences and university courses. Even stronger it appears that disintegration in this sense is one of the main reasons for scientific advance. Accordingly, inter- and trans-disciplinary integration works against this historic trend and, therefore, requires high and continuous effort.

Beyond the efforts to be taken there is an additional element which seems to be strange to science in its traditional understanding: the mission of transdisciplinary research is an *extra-scientific one*, e.g. a need from outside science, from the political system or from society such as in the case of sustainable development. Because of that external influence trans-disciplinary integration also touches upon the issue of scientific autonomy. To really engage in sustainability research implies a partial renunciation of independence, in particular concerning determining the scientific agenda - sustainability research is not free in determining its own agenda but must respond to identified problems in the real world. Also the degree of freedom in the determination of methods and subjects could be reduced by the external diagnoses, expectations and boundary conditions. In order to be *relevant* in the sense of contributing to sustainable development in the real world science has to accept that its own agenda has to be *co-designed* with other actors².

3. The energy system as a subject to change³

In the light of the accelerated nuclear phase-out and the political decisions to initiate a more sustainable energy supply – including an extensive reduction of the usage of fossil energy carriers and an ambitious increase of energy efficiency in order to meet the international agreed CO_2 goals – the energy system in Germany, and certainly many other countries, will have to change radically. Today, fossil and nuclear energy carriers account for 85% of the primary energy supply. Until 2050, this share shall be reduced to a maximum of 20% in Germany, specifically to prevent major climate change and to decrease the dependence on geopolitically problematic resources.

Currently, the key to reach these ambitious goals is primarily seen in developing and implementing innovative technologies increasing the efficiency in energy conversion, transport and use, and increasing the share of renewable energy carriers. In the triangle of sustainability strategies of efficiency, consistency, and sufficiency (Huber, 1995) the focus is put clearly on efficiency and consistency while sufficiency is not addressed at all. Also social and political boundary conditions influencing the chances of reaching the efficiency and consistency goals are not debated; instead there is a strong focus on technical and economic issues only. The impression was created by policymakers and mass media that society, in particular energy consumers and the population at large would almost not really be affected by *Energiewende* – with the exception that society would have to *accept* new technologies and infrastructures changing landscapes, life-worlds, and the environment. New high-voltage transmission lines, onshore wind-power plants, agroindustrial biomass production for energetic purposes, geo-thermal drilling and new infrastructures for e-mobility will probably deeply influence the daily life of parts of the population. Concerns are currently been expressed that missing acceptance, e.g. in the field of transmission lines, could endanger the further transformation process. More participation frequently is regarded as appropriate means for increasing the acceptance level – which is in line with the technocratic thinking considering Energiewende as a more or less technological endeavor. There are high expectations that the population simply should accept those new technologies including management strategies lowering their degree of autonomy as would be the case in the socalled *demand side management*⁴.

To address these complications, social sciences frequently are asked for providing mechanisms of creating acceptance. Asking for the involvement of social sciences could be seen, on the one hand, as progress, because it includes conceding that natural and engineering sciences alone will not be capable to support and enable the energy transformation. However, on the other hand it is clear that the role of creating acceptance attributed to the social sciences is at least problematic: this role is neither feasible nor does it belong to the self-understanding of social sciences as being research-oriented rather than to be a kind of public relations activity. Social sciences are able to conduct acceptance *research* but will neither be able nor willing to *create* ac-

 $^{^2}$ The new international research programme on sustainable development *Future Earth* will be arranged in line with the idea of co-design.

³ The ideas presented in this Chapter refer to the common point of departure of the Helmholtz-Alliance ENERGY-TRANS. (see www.energy-tans.de).

⁴ By the way, this approach also ascribes responsibility in a specific way: people rejecting particular measures are made responsible for an eventual failure of the entire *Energiewende*.

ceptance. Accordingly, this constellation would not allow for inter-disciplinary knowledge integration but would rather embed the social sciences into a technological or technocratic picture of the entire energy transformation.

However, this technology-oriented, partially technocratic picture primarily drawn by managers, politicians and some scientists is dramatically oversimplified. It suffers from shortcomings in at least two respects:

- 1) the assumed *mind-model* of the energy system is one-sided and undercomplex. It focuses on technology, controlling and organization and regards the transformation of the energy system as a more or less technical task, involving some organizational aspects.
- 2) *governance* is assumed to be topdown with the political system, managers and engineers being decisive while energy consumers and the population at large including people affected are seen as passive and are expected to be adaptive to what has been decided upon in a top-down manner. Bottom-up engagement is regarded as more or less disturbing.

Of course, my picture described above is oversimplified in itself, and in reality there are many nuances and grey tones. But nevertheless, for analytical reasons it seems adequate to sharpen alternatives and to make the basic bifurcations and underlying concepts as clear as possible in order to increase clarity.

In the remainder of this section I would like to paint a different picture of the energy system and its transformation. In order to do this I will start from some more general considerations on infrastructures which are not single technologies or single artifacts but:

(a) grids of technologies forming highly interconnected technological systems. Their transformation requires high effort already because of technical and economic reasons as is easily imaginable looking at the infrastructures of transportation, water supply, telecommunication, and energy, for example.

But (b) the challenges and difficulties go far beyond the technical and economic sphere (Elzen et al., 2004; Rohracher 2008). Infrastructures shape and even dominate strongly not only economic value added chains and business models but also social processes of usage and human behavior. For example, the extremely stable availability of rather cheap electricity and gasoline all the time allows comfortable patterns of behavior which developed to an essential part of our current culture and of social life – obviously it would be very difficult to change those patterns deeply inscribed to modern lifestyles and behavior. Infrastructures are so closely interlinked with routines and patterns of social life and culture that the transformation of an infrastructure simultaneously affects those routines and patterns – and this is, due to my thesis, the really ambitious challenge in transforming infrastructures.

This observation is neither present in public debate nor in research on the energy transformation. Mostly, the impression is communicated that transformation processes should not - and more or less will not – affect end users. One example is the debate on fuels from biomass some years ago. If fuels from biomass would simply replace fuels from fossil oil, then end users would not have to change anything. Change would only affect the production chain of gasoline. And in the initial debates on German Energiewende, directly after the Fukushima disaster, there was an overwhelming consensus related with a hidden conviction that again there would be almost no effect on end users, even not concerning the energy price (things changed in the meantime, and the consensus is no longer that overwhelming). Because of the extremely close relations between

infrastructures and social and economic issues it seems adequate to model them as socio-technical systems (Ropohl, 1979). They can only fulfill their function if supply and demand are balanced, if adequate regulation and incentive mechanisms take care for stability, if the required changes can be integrated into the existing societal processes, or if new routines can be established in a legitimate way. Taking this observation seriously the energy system is not, as frequently described by engineers and managers, a system of power plants, power lines, control and steering elements, storages and cables. Far beyond being a purely technical system the energy supply infrastructure also includes elements such as regulatory mechanisms, existing or missing acceptance, business models, power constellations, user behavior, geopolitical issues, partial globalization, national policies, economic competition, and probably much more (Schippl, Grunwald, 2012).

Because of the socio-technical nature of the energy infrastructure it is not enough to replace today's dominant technologies (such as coal-fired or nuclear power stations) with renewable energy sources. The new energy carriers can only provide a reliable and socially-compatible supply if the accompanying infrastructure solutions, their management, and the demand behavior are adjusted accordingly into their social context (HGF, 2013). Energy supply and distribution technologies as well as other elements of the infrastructure are not automatically embedded but rather processes of embodiment need special attention.

Therefore, not only is technical competence necessary for the analysis and design of future (sustainable) energy infrastructures, but so are insights into organizational and societal circumstances such as political-legal framework conditions, economic boundary conditions, individual and social behavior patterns, ethical assessment criteria, participation needs, and acceptance patterns. This is the basic motivation to consider energy research, or better: research for supporting the transformation of the energy system, to be necessarily interdisciplinary, involving social and political sciences as well as humanities together with technical sciences.

Several arguments for the necessity of research to be trans-disciplinary in the field of sustainable development have already been mentioned in Section 2. In addition to those arguments I would like to make a further point. The uncertainty and incompleteness of our current knowledge about the future transformation process and its results make it impossible to pursue Energiewende by means of traditional planning in the sense of rational comprehensive planning (Camhis, 1979). The transformation to a more sustainable energy system has to be conceptualised and implemented under conditions of uncertain knowledge and of provisional assessments. Ex ante we cannot know for certain whether and to what extent a political measure, a technological innovation, the economic competitiveness or a new institutional arrangement will support Energiewende. Every complex transition process has to confront this situation and must become - in a certain sense - experimental (Braybrooke, Lindblom, 1963; Geels, 2012).

This diagnosis implies, first, that the hope to establish a general master-plan leading us directly to reaching the goals of the German energy transformation by simply follow the plan cannot be fulfilled because of the non-eliminable uncertainties involved. Current lamenting in politics and the mass media about the absence of a master-plan ignores this epistemologically grounded observation. It seems that society is still not ripe to cope with an open future in the sense that we today cannot know where the decisions on *Energiewende* will lead us in detail in some future.

Second, this diagnosis makes clear that there is no chance for a technocratic approach looking for a *one best solution* facing the many alternatives of developing *Energiewende* further. In traditional scientific thinking, e.g. in energy systems analysis, the energy system should be mapped to a mathematic model which then could be used for simulations and scenario-building allowing for identifying the *optimal* path into the future. However, for the same reason as above this approach is not feasible and would only lead to many and diverging pictures of the future, depending on premises and presuppositions (Grunwald, 2011).

What remains is to model the energy transformation as a collective learning process. There is no masterplan but only a more *soft* orientation towards sustainable development. This orientation does not allow for direct deduction of the adequate steps of the transformation but only can help orientating the selection of the respective next steps. By implementing these steps and monitoring their consequences new knowledge is created which then can be used to enrich the determination of the next steps, and so on. In this way the energy transformation is an open and incremental *but oriented* process preventing it from becoming arbitrary or random (this model was named *directed incrementalism*, Grunwald, 2000).

At this point the announced further argument in favor of trans-disciplinarity can be presented. All the steps of Energiewende mentioned are interventions into real-world systems rather than only options to be calculated in model worlds. They influence social life, economic relations, and political structures. Shaping interventions must not be left to science alone, even it may be interdisciplinary. Shaping interventions has, instead, to involve stakeholders, practitioners, citizens and people affected, in order to integrate their knowledge and their perspectives into the intervention process. This is necessary from the perspective of deliberative democracy as well as simply with regard to prudency. Transdisciplinary research is therefore needed as part of the overall transformation process which should be modeled as a complex interplay of observation and intervention, reflection and action, monitoring and evaluation - and thee may be further tandems of activity types which have to be brought together in transformative research (Schneidewind, 2010; WBGU, 2011) and which is necessarily inter- and trans-disciplinary.

4. The Helmholtz Alliance ENERGY-TRANS

Generally, and particularly in Germany, there has been a lot of research into the energy supply side, reaching from considerations and assessments of new energy technologies to analyses of future challenges to the grid and possible technical solutions to face those challenges. However, until now there was little research into the demand side and the contextual conditions related to energy generation, distribution and consumption. In the traditional energy system the demand side played only a minor role while the transformation to a new energy infrastructure based on increased efficiency, innovative co-production of electricity and heat and the decentralized use of renewable energy sources makes a huge difference. The novel perspective of the Helmholtz alliance (HGF, 2013) is that the energy system is not primarily viewed from the supply side, the provision of technical artifacts (machines, power stations, pipelines, control elements, etc.), but above all from the societal demand and user side (Rohracher, 2008). The focus is on the links between supply options and demand requirements, between services offered and social or individual requests, between performance potential and actual performance. This perspective requires clarification and categorization of the many interfaces and interrelations between social and technical aspects. The alliance (HGF, 2013):

- investigates the interface between energy supply systems and demand considering the societal and political objectives and targets and taking into account the boundary conditions under which these systems operate or will operate in the future;
- analyses the interconnections between the services provided by future energy supply systems and the service requirements by industrial or private users;
- contributes to the understanding of society's capability to adapt itself to a new energy infrastructure and the willingness of consumers to change their own behavior;
- designs promising transformation strategies and transition management processes using innovative technologies and services, including new governance models that provide participatory opportunities for stakeholders and the affected population.

In summary, the alliance aims:

- a) at providing *knowledge for action* by applying an integrative research approach to the transformation of the energy system and to the governance of this process, and
- b) allows for testing that knowledge to some extent, e.g. through regional modeling and related empirical research.

That means that scientifically sound knowledge shall be created, according to the familiar excellence criteria of scientific work. This knowledge will then be the point of departure for drawing consequences for decision-making and action at the different governance levels of the transformation process considered, as well as a springboard for future technology development (in the sense of Constructive Technology Assessment, Rip et al., 1995). In this sense, the entire alliance might be considered as a type of *mode 2* science (Gibbons et al., 1994) or *post-normal science* (Funtowicz, Ravetz, 1993) while parts of the research proposed are designed to be mainly disciplinary.

Different scientific disciplines and fields of research are involved: philosophy and ethics, social and political sciences, economics and psychology, energy systems analysis and foresight methodologies, sustainability research and innovation research, risk and governance research. All these disciplines and fields are working in a so to speak *lose connection* defined by the common working program. Within the common frame disciplines do follow their own strategies and methodologies to respond to the questions ahead. The quote on the *interdisciplinarity-readiness* which has already been cited above (Spangenberg, 2011, 277) reads in my words after replacing the *inter* by *trans* and two complements: Science for sustainability can be monodisciplinary, inter-disciplinary or multidisciplinary, but it must be at least *transdisciplinarity-ready*, conducted with the broader picture of sustainability in mind, and therefore ready for integration with results from other disciplines and from outside science.

In this way, the alliance is highly inter- but not really trans-disciplinary. The research agenda has been agreed upon among the contributing researchers and disciplines without perspectives from outside science. During conducting the research a lot of exchange with policymakers, stakeholders, civil society organisations and people affected is foreseen or has already been realised. By doing this, the *transdisciplinarity-readiness* of the alliance is proven as well as improved. As a desire, however, it remains an open chance to really engage in specific transformation processes, thereby making use of the *trans-disciplinarity-ready* knowledge which has been provided so far. It seems that this could be done best in an engagement at the regional level.

5. Concluding remarks

Strategic knowledge for sustainable development consists of combinations of orientation-, prospective, explanatory, and action-guiding knowledge. The generation of this strategic knowledge is a challenge to the traditional science system. The classical structure and development of the sciences in the direction of increasing specialization has to be complemented by a new *culture* of integrative research, which crosses disciplinary borders; which treats questions of values transparently, but without contact anxieties; which is open for the integration of knowledge and perspectives from outside science; which involves social actors; and which extends from distant research and observation to concrete intervention.

While traditionally energy research is regarded as a domain of natural and engineering sciences the transformation of a *socio-technical* system requires (a) strong interdisciplinary involvement of social sciences and humanities.

Furthermore, research must (b) go even beyond inter-disciplinarity because the future and by intention more sustainable energy system must be the result of trans-disciplinary processes of co-creation and co-construction of knowledge and actions paths among researchers, decision-makers and all the other groups of actors being involved in the energy system in very different roles and at very different places.

Science provides, in view of the provisional nature and the uncertainty of sustainability-relevant knowledge, *strategic knowledge for an experimental sustainability policy*. This knowledge has, in case it should actually be implemented, influence on societal practice, which then, in its turn, becomes a subject of scientific research, the results of which, again, should enter into continuing measures (Voss et al., 2006; Grunwald, 2007). Transdisciplinary sustainability research is, therefore, no matter of simply implementing scientific knowledge, but rather of establishing a learning cycle, which comprises elements of normative premises, political stipulations, empirical analyses with regard to monitoring, and theoretical investigations. It is in itself part of an emerging culture of sustainable development (Banse et al., 2010).

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Sufficiency and subsistence – on two important concepts for sustainable development

Wystarczalność i samozaopatrzenie – w sprawie dwóch ważnych dla zrównoważonego rozwoju idei

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Abstract

Since in 1992 the United Nations Conference on Environment and Development (UNCED) has been held in Rio de Janeiro, efforts to achieve sustainable development appear to have made insufficient progress, as the results of the 2012 follow-up conference show. One reason for this is that among the various paths to sustainability being discussed, the strategies enjoying greater support are those that continue to be committed to economic and material growth, this as opposed to those that question the growth paradigm. Among the latter are the sufficiency and subsistence approaches. The sufficiency approach delves into the causes and (supposed) boons of a continuous increase in material and immaterial goods. With the demand that individuals not always be forced to always want more, it points out a way to a structural transition in society. The subsistence approach, on the other hand, seeks to draft a path to greater autonomy and quality of life by strengthening regional, local or individual self-provisioning. To be in harmony with sustainability, it must be possible to freely choose the two ways of life; they must not be mandated by the authorities.

Key words: sufficiency, subsistence, sustainable development, degrowth, feminist approaches

Streszczenie

Od 1992 r., kiedy w Rio de Janeiro odbyła się konferencja ONZ na temat środowiska i rozwoju, ludzkość zmierza w kierunku zrównoważonego rozwoju. Jak jednak pokazała kolejna konferencja z 2012 r., działania te są niewystarczające. Jedna z przyczyn tego stanu związana jest z tym, że wśród różnych dyskutowanych ścieżek, które mają prowadzić do zrównoważoności, największe wsparcie otrzymują te, które nadal bazują na tradycyjnej koncepcji wzrostu ekonomicznego. Ale istnieją także inne ścieżki, odwołujące się do wystarczalności i samozaopatrzenia. W ramach tej pierwszej analizie poddaje się przyczyny i (domniemane) dobrodziejstwa związane z tworzeniem dóbr materialnych i niematerialnych. Wskazuje się na to, że ludzie nie zawsze muszą chcieć więcej, co oznacza strukturalną przemianę odnoszącą się do społeczeństwa. W ramach podejścia odwołującego się do samozaopatrzenia poszukuje się sposobów na osiągnięcie większej autonomii i lepszej jakości życia poprzez wzmocnienie regionalnej, lokalnej i indywidualnej samowystarczalności. Aby zapewnić zgodność ze zrównoważonością, musi istnieć możliwość wolnego wyboru drogi życiowej, nie może być ona narzucona z góry.

Słowa kluczowe: wystarczalność, samozaopatrzenie, rozwój zrównoważony, anty-wzrost, podejście feministyczne

Introduction

The results of the most recent UN summit on sustainable development, which took place in Rio de Janeiro in June of 2012, were seen by Ernst Ulrich von Weizsäcker as being tantamount to zero (von Weizsäcker, 2012). This raises the question as to why the sustainability process is currently roadblocked and where perspectives for the future might be found.

We see one blockade in the inadequate implementation of the *Local Agenda 21*. The intention there is for sustainable development processes to be embedded in local policies, and be shaped and supported by local operatives (UNEP, 1992). But how can the claim to *genuine* participation in *Agenda 21*¹ be realized if the familiar faces and the powerful operatives are to sit down around the table with the unknown faces of *socially weaker groups*, with equal entitlements in the discussion but without any reflection whatsoever on the distribution of power in society?

We see a further blockade in the fact that the Rio Conference of 1992 put forward a linkage of sustainability and development that was in line with the economic growth model. As a consequence, other approaches which highlight the preservation of livelihoods², instead of the more efficient domination of nature, receive almost no attention (Wichterich, 2002). Therefore it is important to strengthen an understanding of sustainable development in which the measurement of progress exceeds that of conventional economics and includes proxies for social justice and equity and for planetary boundaries, like the ongoing discussions about degrowth or beyond GDP.

That is why we seek, both theoretically and conceptionally, paths and approaches toward sustainability which, in the post-Rio-processes, were more repressed than acknowledged. What distinguishes sufficiency approaches from other sustainability approaches and why are the former devalued when compared with the latter (Section 2)? To what extent does sufficiency make reference to subsistence and what impact do the sufficiency and subsistence approaches have upon the processes aimed at achieving sustainable development (Section 3)?

Sufficiency as a path to sustainability

Sufficiency continues to be an alien and cumbersome concept in Germany. In some languages, however, it is used without thinking twice. In Italian, \dot{E} sufficiente tells us that we have enough of something. And in France one even talks about *Ça suffit!* whenever there is quite certainly enough!

In the debate on sustainability, sufficiency is the concept that insists on boundaries – regardless of whether these are boundaries for the (excessive) use of the environment or boundaries on individual consumption. The situation must not and may not be that everything simply grows unchecked. Quite the opposite, excessive and multiple consumption have to be curbed. At the international level, the sufficiency approach was adopted as a concept by Ernst Friedrich Schumacher (1977) and by Herman Daly (1991). In Germany, the term Suffizienz was introduced into the debate by Wolfgang Sachs (1993) and was compared and contrasted with the concept of Effizienz.

The efficiency approach, by comparison, marks out a different paths toward sustainability: More wealth at less resource consumption; this was the plan put forth by Ernst Ulrich von Weizsäcker, Karlson Hargroves and Michael Smith (von Weizsäcker et al., 2010). Those lights can stay on because higher-efficiency lamps use less electricity. The refrigerator can be just as large as ever, because it is more energyefficient than its predecessor was.

Ultimately, the consistency approach represents a path to sustainability that puts its faith in using different physical materials and substances. Thus it is not a question of limiting quantity, but instead of aligning quality with environmental requirements (Huber, 2001). The lights can stay on and the refrigerator can be large because the energy source has been replaced through the transformation from coal and oil – finite resources and producers of CO_2 – to a regenerative basis.

The insistence – in line with sufficiency concepts – that not everything has to be bright and large – has been pushed aside by the efficiency and consistency approaches. Sufficiency is quite heavy-handed in terms of standards, is morally rigid, and carries a connotation of the *ethics of sacrifice*. Thus the sufficiency approach threatens to discredit, in terms of both society and politics, the concern that CO_2 reduction is important. Sufficiency is not a basis upon which a government can be established or environmental and sustainability policies implemented.³

If sufficiency stirs up so much anger and resistance, then this is due to the fact that the global North (and the Occident) has little cultural background that would encourage such an approach. *It is essential*

¹ Critical to the effective implementation of the objectives, policies and mechanisms agreed to by Governments in all program areas of 'Agenda 21' will be the commitment and genuine involvement of all social groups (UNEP, 1992: Preamble to Section III).

² Development Alternatives with Women for a New Era (DAWN), a network of women from the global South, argues in favor of *sustained livelihood*, i.e. for sustainably

ensuring the bases for living and for sustainably generating a means of subsistence (von Winterfeld, 2012).

³ This attitude is advocated in the world of science, for example, by Hartmut Grassl, a meteorologist and climate researcher in Hamburg, and in politics, for instance, by the Minister of the Environment in the State of Baden-Württemberg, Franz Untersteller.

that the mechanical arts prevail in competition with nature (Bacon, 1990 [1620]). Francis Bacon formulated this guideline in 1620, in his treatise Novum Organum Scientiarum, and thus laid it in the cradle of the modern era. The limits imposed by nature are to be overcome by the mechanical arts, by technology. If today, for instance, research is conducted on the over-fertilization of the seas and experiments are carried out, then this is in the spirit of Bacon. It is all a question of technology gaining mastery over nature.

His compatriot Thomas Hobbes presented a more political argument a few decades later. In the thirteenth chapter of Leviathan, he asserts that anyone who is modest and satisfied with moderate wealth will not long survive, since all the others - in the pursuit of property, glory, power and fame - strive to subdue the entire earth (Hobbes, 1980 [1651]). Of course Hobbes, the theoretician of the social contract, makes this statement with a view toward the natural state (the status in which no social contract has yet been concluded and in which a civil society has not yet come into existence), but his words mirror the principle of competition in the market economies then forming. No one who is modest can survive. When seen through these glasses, which Thomas Hobbes laid in the cradle of the modern era, sufficiency appears to threaten continued existence; not wanting a new computer appears to be suicidal or in the best case ludicrous.

A good century after the appearance of *Leviathan*, Adam Smith based his *Wealth of Nations* (Smith, 1978 [1776]) on the precept that each individual should, with a minimum of hindrance, pursue his or her own advantage and that the task of the state is to impose fair rules on the competition which results. Sufficiency is not envisaged in these modern economic premises. Quite the contrary. Having an advantage means that someone receives something *in advance*, before sharing or dividing begins. An *advantage* implies being in a better position than others. If people then declared themselves satisfied with what had already been achieved – or even less, then the entire game would be challenged.

In the works of Francis Bacon, Thomas Hobbes and Adam Smith, it is possible to see which paradigms are inherent to modern thought. But as a cultural accoutrement, they are not of much use neither for the sufficiency approach nor for tackling the *great sustainability challenge*. This is because the precept of sustainability includes the necessity of considering the consequences for future generations, which means nothing more than considering the welfare of something that we cannot yet know. This cannot be achieved by anyone who is in competition with nature, wrestling for scarce (material and immaterial) goods, and pursuing his or her own advantage.

When accepting the challenge implied in sustainability, all the paths to sustainability – including those based on efficiency and consistency – are of significance. A sufficiency approach, however, opens up an ethical and political foundation rather than the two other approaches.

However, the challenge and the laying of the groundwork would be missed if the sufficiency approach were to be presented without its political aspects and as an appeal for individual abstention from consumption. It is not as though this would be entirely unimportant. But this presentation could get tangled up in the art of correct behavior within the wrong structures (von Winterfeld, 1993). In this instance, individual behavior - but not structural change within the society – appears to be the solution to the environmental and sustainability problem. But how, for instance, are individuals to exercise proper consumption when, collectively, production is improper? How is individuals' willingness to use less supposed to become established in the face of political adherence to the growth paradigm?

The melody of sufficiency becomes audible above all when it is clear that sufficiency does not fit with the existing mindset – be it the cultural, the political or the economic orientation and the society's constitution. Instead, it points beyond that mindset. Sufficiency is not in line with a culture of domination over nature, nor with politically motivated promises of wellbeing and wealth, nor with profit expectations. Thus the political issue associated with sufficiency is that it cannot be used to win elections. Rather, it points to the necessity for a fundamental and thoroughgoing transformation in society: securing the basis for life instead of efficient domination of nature and instead of efficient management of the environment; a right to participation without incurring any obligation to growth; orientation on what is necessary for the good life⁴ instead of on profit. The sufficiency approach is also an approach to alternative solutions. Jorgen Randers refers to the need of new policies, legislation and societal institutions for creating a better future (Randers, 2012⁵).

In spite of that, sufficiency itself can become a problem, especially when it is mandated by the authorities. Basically, this happens all the time, even though the term *sufficiency* is not heard. This may be because it is necessary to save money, because dips in business activity require some belt-tightening and moderation of expectations, because the social welfare state has proven to be too expensive and the social claims thus become unrealistic and objectionable. This is where a fundamental conflict appears. At

⁴ The concept *Caring Economy* is based on three principles of action: care, cooperation, and orientation of that which is necessary for the *good life* (Netzwerk, Vorsorgendes, Wirtschaften, 2013).

⁵ 40 years after the first Report about *The Limits of Growth*, Randers as one of the authors has made a forecast of what will happen over the next forty years.

governmental level, there is a continuous call for the populace to exercise moderation (e.g. in regard to expectations for increases in wages or retirement benefits), and these calls are in fact cast in legislation. At the same time, the same political class is collared – both morally and materially – by the global capitalistic growth imperative.

In this way, however, any thoughts about sufficiency are discredited – because it is forced upon the people by the authorities or because political appeals for sufficiency become implausible since the political and social environment is fixated on growth.

This obsession with growth however loses sight of the connection between sustainability, sustainable development and *The Limits of Growth*. A new Report from the Club of Rome exposes the systemic flaws in the money system and the missing link between money and sustainability. The unsustainable money system is outdated and needs an update. A monetary ecosystem has to quit the current monopoly system and to enter a monetary system with complementary currencies (Lietaer et al., 2012).

In respect thereof sufficiency is not only *less* but also less of the existing monopoly and more of a sustainable diversity within the monetary system.

Sufficiency also becomes a problem if it is stated in morally rigorous terms. It then appears to be a sermonizing and chiding catalog of rules for behavior. It is not as though this would not be inappropriate or unimportant. There are instructive debates about environmental ethics and strong sustainability (Ott, 2010). But this path leads us astray if it is imposed on individuals as the primary way to achieve sufficiency. This is because there is virtually no consideration of the social structure of the conditions surrounding the situation. One possibility to overcome the dilemma of isolated individual behavior without the possibility of empowering action is the approach of Political Social Ecology (Bookchin, 1997) where individual practice is contextualized in the surrounding framework of structures, norms and incentives.

Furthermore sufficiency is able to unfold its critical and analytical potential above all when it is couched in a negative manner.

When sensed in a negative connotation, sufficiency asks about the causes and the inconveniences of *too much*; it asks about the disruptions imposed by *better*, *more*, *faster*, *higher and further*. Why has government-run pension insurance become so distressed that a *better* system would seem to be possible only by way of the private-sector capital markets? Why do people always have to work *more* in order to earn a living? And who or what has unbridled the efficiency of work to the extent that it is always necessary to work *faster* in order to accomplish the tasks at hand? Why do crop yields always have to be *higher*, so that a farm can continue to exist at all? And why are the distances we have to cover to satisfy daily needs always *further*?

If one poses such questions, using sufficiency as the compass, then the unreasonable demands of the growth-oriented society become clear; the existing mores – and the attractiveness of the better, more, faster, higher and further mindset – become dubious. Thus, however, the exact point is that sufficiency is not ordered by the authorities but, on the contrary, politics and the economic system are questioned critically from the sufficiency viewpoint. It is against this background that sufficiency can also be formulated as a protective right: No one should ever have to always want more (von Winterfeld, 2002). And part and parcel of sufficiency-oriented human rights would be what Christine and Ernst Ulrich von Weizsäcker once formulated with a view toward the future of labor: The right to do one's own work instead of a mandate for growth (von Weizsäcker, von Weizsäcker, 1979). The approach to one's own work can be traced back to Ivan Illich and follows this maxim: doing it oneself (by permission) instead of buying (due to compulsion). At this point one's own work is related to subsistence and could be understood as the right to take care of one's own needs (including local and regional provision) instead of the hegemony of the agro-industry.

Subsistence as a path to sufficiency

The meanings of the terms subsistence and subsistence economy are explained in one dictionary as being self-provisioning or as an agricultural system which produces entirely or largely for self-provisioning (Wissenschaftlicher Rat der Dudenredaktion, 2000). The relationship of subsistence, the subsistence economy and sustainability proves to be just as varied and multifaceted as the relationship between sufficiency and sustainability. There are indeed similarities in the way in which sufficiency and sustainability – and subsistence and sustainability – contradict each other or make reference one to another. In addition, subsistence and sufficiency can be set in relationship to each other in various ways. If subsistence production, which is perceived as being small-scale production, is felt to be an economy of poverty, as a way of life not voluntarily chosen (i.e. by people who would rather produce in a different way), then subsistence and sustainability are in contradiction one to the other. This is because sustainability is obliged to observe the imperatives of justice and fairness; having to be poor while others are able to be rich appears to be anything but just. Subsistence, in this interpretation, would have to be understood as the compulsion to achieve sufficiency. If subsistence production is, however, understood specifically as economy focused on the local area, as something which is inherently alternative and resistive because people show that production can be undertaken in a different fashion and can function quite well, even beyond the capitalistic market, then subsistence certainly references sustainability. In this interpretation, subsistence belongs to a sufficiencyoriented path to sustainability.

In the Bielefeld subsistence approach, which will be introduced in greater detail later, the ambivalence inherent to subsistence production is analyzed and found to be a disparity between subsistence production and commodity production and is expanded to form a critical theory of society. The approach was developed in the 1970s and 80s by Veronika Bennholdt-Thomsen, Maria Mies and Claudia von Werlhof. Since the 1990s and in the context of critical comments on globalization and debates on sustainability, it has received renewed attention. The reference points for the approach are, on the theoretical level, Marxist theory in particular and its further development by Rosa Luxemburg. In empirical terms, these are based on case studies in Latin America (Bennholdt-Thomsen and von Werlhof) and India (Mies).

In the spirit of a feminist-materialistic theory, the subsistence approach asks above all which functions subsistence production, understood as utility-oriented work, directed at the creation and maintenance of livelihoods, has for the capitalistic mode of production (Baier, 2004, p. 73). Here the representatives of this approach take umbrage at the assumption that subsistence production is a legacy element of traditional societies, one that would gradually die out. Instead, they assume that, in spite of the decline of autonomous, regional subsistence economies, subsistence production as the creation of the immediate necessities of life cannot disappear. Instead, it will only change in character when it is subordinated to capitalistic commodity production (Baier, 2004; Bennholdt-Thomsen, 1999).

The approach was applied when conducting a critical examination of the relationship of subsistence production and commodity production. In this respect the researchers in Bielefeld, referring to the so-called housework debate, focus on the character and the economic significance of unpaid work rendered by women (Hofmeister, 2013). In their analysis of these non-remunerated labor and production relationships, and in their reference to wage labor and the accumulation of capital (Baier, 2004), they determine that capitalism does in fact not recognize female subsistence efforts as work and, accordingly, does not place an economic value on the same; capitalism is, nonetheless, dependent on this work. This process, in which capitalism appropriates housework, is designated in the Bielefeld subsistence approach as housewife-ization. The researchers in Bielefeld expand their critique by determining that it is not just women who are exploited by the capitalist mode of production. Those people who work as peasant farmers in the so-called Third World are exploited in the same way and the area thus becomes a subsistence region in the world economy (Baier, 2004). Following the Bielefeld subsistence approach, this housewife-ization of women's work and the colonization of the countries of the South are directly linked one with another. In both cases, it is a question of creating an exploitative relationship between subsistence production and commodity production as a result of the capitalist takeover.

In spite of this critique of the interconnection of subsistence production and capitalistic commodity production, there is a visionary potential associated with the subsistence perspective⁶. Subsistence production can be seen as the starting point for current and future resistance (Baier, 2004). This resistance is based on the ambivalent character of the subsistence perspective, according to which subsistence is both the opposite of and the ongoing basis for the modern industrial society (von Werlhof, 1991). Accordingly, subsistence is understood by the proponents of the Bielefeld approach as an approach to the bottom-up economy, as a living and survival economy (...), as a way in which 'many little people' can quite consciously take their day-to-day provisioning into their own hands once again (Bennholdt-Thomsen, 1999). The representatives of the Bielefeld subsistence approach assume that a subsistence orientation will bring among other things independence, quality of life and autonomy. Thus subsistence is more than self-provisioning; it represents a cultural mindset and access to the world (von Werlhof, 1991). Making the potential inherent to subsistence orientation visible and viable, in the spirit of a liberated subsistence (von Werlhof, 1991), is the transformative intention pursued by the Bielefeld subsistence perspective.

The Bielefeld subsistence perspective has been and is being reflected upon as an eco-feminist approach (e.g. Lenz, 1987; Knapp, 2007 [1988]; Hofmeister, 2013). The heart of the critique is, firstly, the essentialist assumption that women are closer to nature and, secondly, the associated stabilization of dominance-oriented divisions, such as woman vs. man, subsistence vs. commodity production, or nature vs. civilization.

In spite of – or in recognition of – these critical estimates, the Bielefeld subsistence approach offers docking points for the debates about sustainable development and for the formulation of positions that are critical of globalization (Adler, 2010; Hofmeister, 2013). However, the theoreticians of subsistence do not place their concept in the context of the sustainability discussion, which they criticize due to the fact that it can be co-opted by interests promoting growth-oriented economy (Adler, 2010). In the currents of the sustainability discussion, where an explicitly growth-critical position is taken, the subsist-

⁶ Bennholdt-Thomsen (1999) decidedly opposes designating subsistence as a utopia (e.g. von Werlhof, 1991) and emphasizes that in the subsistence perspective it is

not an action oriented on the future but rather that it is action in the present.

ence perspective is quite certainly accepted and furthered. Here sufficiency and subsistence combine and represent, for example, the core elements of a degrowth economy (Paech, Paech, 2011). The combination of sufficiency and subsistence thus opens new perspectives for a good life that is in fact not equated with a continuously rising living standard (Adler, 2010). In this perspective the local aspects – and here in particular the regional economies – gain increasing significance for the *good life*, both in the city and in the country (Müller, 1999; Baier et al., 2005; Paech, Paech, 2011).

Conclusion

Discussed in this article are approaches – sufficiency and subsistence – which are more likely to be dismissed than acknowledged in the discourse on sustainability. The questions raised at the beginning – regarding the differences between sufficiency and other sustainability approaches and regarding the connections between sufficiency and subsistence – can now be answered against the background of the theoretical-conceptional considerations.

It was possible to show that the relationships between sufficiency, subsistence and sustainability are ambivalent. Wherever sufficiency and subsistence are imposed from above, they are unable to contribute to sustainable development. But where they come into being as a voluntarily chosen cultural, political and economic alternative, they can unfold a critical and visionary potential for sustainable development. Their critique is found in that they question, categorically, a growth paradigm that is generally felt to be certain. Their vision is found in trying out the paradigm of the *good life* and thus in contributing to a critical-emancipatory understanding of sustainability. Here sufficiency and subsistence are achieved at smaller scale, are embedded in the locality, and make reference to each other in that sufficiency is understood to be a right to self-provisioning and - vice versa - subsistence can be a way to realize a sufficient way of life.

Liberating oneself from the culturally, politically and economically imposed compulsion and urge for material growth and nonautonomous acting appears to be one of the greatest challenges for capitalist societies of the northern hemisphere. This will be possible, however, only if questions aimed at defining *the good life* are actively and assertively posed, and if sufficiency and subsistence can be esteemed economic, ecologic and social contributions to sustainable life plans that are chosen voluntarily.

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Understanding socio-technical barriers to sustainable mobility – insights from Demonstration Program of EVs in China

Społeczne i techniczne bariery dla zrównoważonego transport – wdrażanie programu promującego samochody elektryczne w Chinach

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Abstract

It is widely accepted that EV (electric vehicles) is one of the several green technologies to address environmental issues associated with the transport sector and promote the transition to sustainable mobility. In spite of this, a number of barriers still need to be overcome before EVs achieve widespread market penetration. This paper is a contribution to understanding the key tools and strategies that might support the take-up of EVs by adopting a social-technical approach to explore the main barriers encountered in the Chinese EV Demonstration Program. The key findings of the research are that interest conflict between different stakeholders and the inaction of related actors are the key barriers inhibiting the further development of EVs. So the policies that put much pressure on the current auto regime are necessary.

Key words: electric vehicles, social-technical approach, barriers

Streszczenie

Nie budzi wątpliwości, że samochody elektryczne należą do grupy zielonych technologii stanowiących alternatywę w kontekście kwestii środowiskowych związanych z sektorem transportowym, wspierając przejście do zrównoważonej mobilności. Istnieje jednak wiele barier na drodze do rzeczywistego upowszechnienia się takich samochodów. Niniejszy artykuł wskazuje na kluczowe narzędzia i strategie, zakładające przyjęcie podejścia społecznotechnicznego, które pozwalają na wskazanie głównych barier w rozwoju samochodów elektrycznych na przykładzie Chin. Okazuje się, konflikt interesów pomiędzy interesariuszami i bierność stanowią główne wyzwania. Wprowadzenie polityki, która zdecydowanie skuteczniej niż teraz wywierałaby presję na tradycyjny rynek samochodowy to konieczność.

Slowa kluczowe: samochody elektryczne, podejście społeczno-techniczne, bariery

1. Introduction

Today, we face fundamental wicked problems in several domains such as depletion of natural resources, air pollution and greenhouse gas (GHG) emissions, etc. (Shan at al., 2012). Most countries in the world have taken attempts to make development more sustainable in order to address these persistent problems. It seems that sustainability involve so many aspects of our civilization that sustainable development has become an inherent societal characteristic and nowadays period can be named as a sustainable development revolution (Pawłowski, 2003, 2009).

Actually, most of unsustainable problems are due to the extensive use of fossil energy (Pawłowski, 2011, 2010). Transport sector, heavily dependent on oil consumption and responsible for 22% of global CO₂ emissions (IEA, 2012), has been worldwide accepted as a priority area in sustainability discussion. Given that most of the problems are related to internal combustion engine vehicles (ICEVs), the question whether the existing transport system can be transformed into something more sustainable, therefore, has great relevance with vehicle use. However, lowering CO₂ emissions by controlling the volume of transport seems to be unlikely (International Transport Forum, 2010), so electric vehicles (EVs) as a promising green technology are increasingly favored by policy-makers (Yeh, 2007).

EV achieving widespread diffusion has never been an easy thing and they have failed to compete with ICEVs over the last century. Previous research mainly argues that battery technology limitations and high battery cost are the major obstacles to the development of EVs (Egbue at al., 2012). However, we find that this view does not reveal key areas of resistance to EVs. Actually, mobility is a complex and adaptive system. To achieve sustainability requires a more systemic thinking. More specific, influencing technological change toward a sustainable direction (EVs) not only involves technical change but also changes in for example fuel infrastructures and policies (Geels, 2002).

The socio-technical approach conceptualizes road transport systems as a socio-technical system, which is defined as a configuration of a set of elements including technology, policy, markets, consumer practices, infrastructure, etc. necessary to fulfill societal functions, and highlights co-evolution and interactions between these elements, as shown in Figure 1 (Geels, 2004). Once the socio-technical system consistent with ICEV technology is established, it is stable and hard to transform. This stability and lock-in is mainly due to the interrelation and complementarity between the elements. The elements depend on each other to fulfill their functions. In addition, some elements, such as plants and fuel infrastructure, have a certain hardness, making them difficult to change. Once made, they are not easily abandoned and changed. Moreover, vested interests of the current automobile regime are resistant to major change, which is another important source of inertia.



Figure 1. Socio-technical Configuration of Road Transport.

This system stability is a powerful obstacle for the widespread diffusion of EVs. However, technologists and policymakers usually separate technical concerns from social concerns while describing EV development. Indeed, the *social* barriers many pose as much of a problem as the *technical* (Egbue at al., 2012). So it is necessary to adopt the socio-technical approach to identify the barriers in the development of EVs. In this research, we take the Chinese EV demonstration program as a case to determine potential socio-technical obstacles to EV adoption. Insights gained from the results of this research will shed more light on policy-making.

2. Electric Vehicle Demonstration Program in China

2.1 Background of EV Development in China

China, one of the fastest growing economies, has witnessed an accelerating growth of the automobile industry in recent years. By 2012, the total vehicle population in China had reached 120 million (Xinhuanet, 2013), which in turn result in huge oil demand. The annul fuel consumption by road transport now accounts for approximately 60% of China's domestic oil consumption (Xue at al., 2013). On the contrary, China's domestic oil production capacity is limited. The amount and dependence of and on import oil has continued to increase in recent years, as shown in Figure 2 (NBSC, 2002-2012a, 2002-2012b).



Figure 2. Import Amount and Dependenc of Oil in China from 2000 to 2010.

In the meantime, the air pollution and emission of CO₂ caused by oil consumption used in autos have become more serious problems in China. Chinese cities are suffering from poor air quality increasingly attributable to vehicle tailpipe emissions. The mean annual concentration of PM10 between 2003 and 2010 from the 32 Chinese cities is all far over the WHO basic guideline of 20 μ g/m³ (WHO, 2011). He (at al., 2005) even predicted that the vehicle-related CO2 emissions will be 1146 million tons by 2030 under the current development pattern. In this context, the Chinese government recognizes NEVs as a key direction to decarbonize the transportation sector and to provide sustainable mobility. Of the various NEV technologies, EV has gained the most attention lately.

2.2 EV Demonstration Program in China

In China, the development of EV policies mainly involves four ministries under the State Council: National Development and Reform Commission (NDRC), Ministry of Industry and Information Technology (MIIT), Ministry of Science & Technology (MOST) and Ministry of Finance (MOF). In February 2006, the term *NEV* is first mentioned in the official policy issued by the State Council *The National Medium- and Long-Term Program for Science and Technology Development (2006-2020)* (State Council, 2006). From then on, much more polices about EVs are developed and EVs have been determined as the transformation direction for Chinese automobile industry.

In February 2009, MOF and MOST jointly issued the *Notice on the Demonstration Program of Promoting Energy-saving and New Energy Vehicles* (hereafter referred to as the *Notice*) and launched a four-year demonstration program (MOF, 2009). Of all polices about EVs, this demonstration program is the only practical demonstration project and has the most profound influence for EV diffusion. At first, 13 cities (Batch I) were approved to carry out the demonstration. Following that, MIIT and NDRC joined the program and approved 7 additional pilot cities (Batch II) in May 2010 and five more cities (Batch III) in August 2010.

This demonstration program mainly focuses on financing EVs used in the public service sectors such as buses, taxis, governmental fleet. Since the widespread adoption of EVs ultimately depend on private purchase, the four ministries jointly issued the *Notice* on the Pilot Project of Subsidies for Private Purchase of New Energy Vehicles (hereafter referred to as Pilot for Private Purchase) in May 2010 and selected five cities (Shanghai, Changchun, Shenzhen, Hefei, Hangzhou) among the 25 pilot cities as dual pilot cities (MIIT, 2010). Private purchase in these five dual pilot cities can also get subsidy MOF.

One target of the demonstration program is that each pilot city deploys 1000 EVs by 2012. Nevertheless, the pilot cities are not satisfied with this low target and all make their own plan, about 10000 to 30000 EVs for each. Additionally, the four ministries think this demonstration program can act as a leading role and stimulate the development of EVs in other cities, so they set another ambitious target that the national scale of EVs could account for 10% of the automotive market by 2012. However, significant problems and barriers have been exposed in the demonstration, not only technical barriers but also the socio, which result in the failure. By 2012, only 27400 EVs are on the road in the 25 pilot cities (MOST, 2013), far below the overall targets set by them. In addition, 19 million vehicles were sold in China in 2012, among which the sale number of EVs is only 12800 (CAAM, 2013a), far below the target of 10% market share.

3. Social-technical Barriers in the Demonstration

Barriers exposed in the demonstration would hinder the further introduction and widespread adoption of EVs. So it is necessary to analyze them in depth in order to achieve the commercialization of EVs. Based on the socio-technical configuration of road transport (as shown in Figure 1) and the demonstration practice in China, this paper addresses the barriers from the following six elements: production and industry structure, policies and regulations, fuel infrastructure, technology, market and consumers, culture and symbolic meaning.

The survey supported by the Shanghai Excellent Academic Leaders Plan of Science and Technology Commission of Shanghai Municipality was conducted in the summer of 2012. Within the transport realm, qualitative methods are more commonly used for inductive purposes. So interviews with EV experts, related stakeholders and filed research in some pilot cities including Shenzhen, Shanghai, Jinan, Hangzhou, Hefei, Dalian are the main survey methods. In addition, we also collect second-hand information from the internet and official documents. The results of this study are representative for all the pilot cities in the demonstration and provide a good overview of the barriers faced in the introduction of this radical innovation, and how far the Chinese auto market still needs to go from ICEVs to EVs.

3.1 Barriers in auto production and industry structure

Auto manufacturers, who are responsible for R&D and production of EVs, hold an important position in the EV industry. However, major Chinese automobile manufacturers are extraordinarily cautious when introducing EVs. Recommendation List of Vehicle Types for the Demonstration program of Promoting Energy Conservation and New Energy Vehicles (hereafter referred to as Recommendation List) is one prerequisite that EVs must satisfy so as to enter the demonstration program and receive the financial subsidies (MIT, 2009a). From August 12, 2009 to March 21, 2013, the first forty-three parts of the list have been announced by MIIT and total 681 EV types produced by different car companies have been included (MIIT, 2009b, 2013). However, the biggest five automobile groups in China only account for 19.6% among the total types and the proportion of each group is no more than 6 percent as shown in Figure 4. In contrast, these five automobile groups produced and sold 13.83 million vehicles, which constitute 71.6% of total domestic auto sales in 2012 (CAAM, 2013b). Reasons for such a phenomenon are multiple. Here we mainly discuss two major reasons from the perspective of auto manufacturers themselves.



Figure 4. Proportion of EV Types of the Biggest Five Automotive Groups in the Recommend List.

3.1.1 Inherent inertia of production systems

To the Chines automobile manufacturers, their organizations are aligned with ICEVs. Sunk investments in plants, machinery and skills create vested interests for industry stakeholders. So they are reluctant to introduce EVs without external pressure and big consumption market. Additionally, Chinese auto industry now is under consolidation stage. Major car manufacturers prioritize R&D and production of ICEVs rather than EVs in order to maintain their dominant market positions. Many auto manufacturers even express in our interview that they are reluctant to sell EVs because poor performance of EVs may destroy their brand and reputation, which in turn affect the sales of ICEVs. For them, EV is more like a political task.

3.1.2 Auto industry structure

The Chinese auto industry contains about 200 car enterprises, most of which are stated-owned, especially the top-tier car companies. So the performance of these state enterprises is subject to the assessment from government. MIIT is responsible for assessment and one key assessment indicator is annual sales. In this case, most general managers pay more attention on how to achieve sales targets by selling more ICEVs during their short tenure so as to get promotion, rather than promoting EVs.

3.2 Barriers in government policy and regulatory framework

Socio-technical approach highlights the role of government in promoting the development of EVs, especially in the initial phase. Chinese governments are committed to environmental protection and sustainable development. However, some policy barriers still exist, which hamper the industrialization of EVs.

3.2.1 Competition between local governments

One of the important reasons for the limited EV diffusion scale is the competition between local governments. In the process of deepening economic decentralization, local protectionism is prevalent in China. Many local governments tend to protect local companies so that the local government performance appraisal indicators, such as local GDP, investment scale local and industrialization degree can have good results. In this demonstration program, almost all pilot cities have their own EV manufacturers and most local governments tend to give priority to support local EV industry. They only subsidize and purchase EVs produced by local manufactures, which leads to regional segmentation and the failure to achieve optimal allocation of resources, preventing the widespread adoption of EVs.

3.2.2 Unclear policy messages

NEVs include many different green technologies, such as EVs, fuel cell vehicles (FCVs), and other non-traditional fuels (ethanol, biogas, and biodiesel). Even EVs also contain different types, PEVs, HEVs, and PHVs. Among these green technologies, which one will dominate the future auto market is uncertain. Volatility and ambiguity of the policy focus further deepen the uncertainty. Initially, there was no clear policy preference in China. Then HEV technology became a high interest during the 10th Five-Year Plan period (2001-2005). Following that, FCVs became more promising. Recently, PEV has become the focus and its top priority is determined by the Development Plan. Despite of this, many manufacturers still worry about the uncertain future market and are cautious in investment.

3.2.3 Lack of visions

Socio-technical approach advocates that sustainability visions help to influence or shape expectations about what might happen (Rotmans at al., 2001). Only by shaping and articulating expectations, can attention and resources be attracted as well as new actors, and which is essential for EV diffusion. However, this EV demonstrations program is carried out more or less ad hoc, without a coherent future vision. The Chinese government has not set and effectively communicated inspiring and future-oriented visions about sustainable mobility to the public. During our survey we find that many consumers actually have no idea about EV or just hear of it. All the target set by the governments are short-term and quantitative. Unfortunately, even the quantitative target has not been achieved. This failure further influences the public confidence about EVs.

3.2.4 Invalid incentives

High purchasing price of EVs is often considered to be an important barrier to large-scale diffusion. It is quite a disadvantage in Chinese automobile market, where the majority of consumers regard the price as one key decision indicator.

In order to overcome this barrier, the four ministries jointly issued the Pilot for Private Purchase and chose five cities to implement this policy. According to this subsidy policy, once private consumers in the five pilot cities purchase or lease PEVs and PHVs, or just lease batteries, central government will provide subsidies to the EV manufacturers or battery leasing companies. The subsidy standards are made according to the power energy of the battery pack, 3000 yuan / kWh. The maximum subsidy for a PHV is 50,000 yuan and 60,000 yuan for a PEV (MIIT, 2010). Influenced by this subsidy policy, many local governments also began to subsidize individual EV purchasing. For example, Shenzhen announced to subsidize auto manufacturers with maximum 30,000 yuan for a PHV and 60,000 yuan for a PEV.

However, it seems that subsidies fail to stimulate private purchase. By 2012, only 4400 private EVs are on the road in the 25 pilot cities (MOST, 2013). One of the main reasons for this failure perhaps is that this financial policy does not directly go to consumers. Although many companies lower the sale prices in order to attract consumers and get the subsidies, the results appear to be unsatisfactory. Additionally, this failure shows that only low purchasing price is not enough to persuade consumers into buying EVs. Many other factors such as the EV performance, convenience of refueling also need to be improved. Incentives that ignore these factors would have limited stimulation.

3.3 Refuelling infrastructure

In the mobility system, the risk of lock-in is particularly high because the vehicle technologies are infrastructure-dependent. High infrastructure investment costs and the presence of network externalities make it difficult to escape the lock-in of ICEVs. Over the demonstration period, only 174 charging (and swapping) stations and 8107 charging piles was established in the 25 pilot cities, which is far enough (CAAM, 2013c). Several barriers and problems result in this insufficiency.

3.3.1 'Chicken and egg' conundrum

This conundrum refers to an intractable situation where infrastructure providers are reluctant to invest too much money in refuelling infrastructure for EVs when there is no critical level of demand, and customers are reluctant to purchase EVs for which refueling infrastructure is not enough.

Although the construction of charging infrastructure has achieved great progress, this is not enough, especially when compared to the gas stations. So it is very difficult to persuade consumers into buying EVs. Yet at the same time, many Chinese enterprises think it is too risky and a financial burden to further conduct large-scale construction when the number of EVs in the nation's vehicle fleet is insufficient and the diffusion rate is very slow. So it seems that to get further progress is very hard.

3.3.2 Entry barrier

In China, major operators of existing charging infrastructure are oligopolistic energy suppliers, including the power suppliers China Southern Power Grid (CSPG) and State Grid (SG), the oil/gas suppliers CNOOC, Sinopec and Petro China, and information technology companies China Potevio. All of these operators are state-owned companies. Private enterprises are not admitted to enter the charging infrastructure domain. Although there is heated debate about who has the eligibility for the infrastructure construction, all discussions are just centered about which one of the oligopolistic companies mentioned above should be granted the monopoly right and private capital is barred altogether.

This entry barrier results in the lack of competition and the inaction of these oligopolistic enterprises. For these enterprises, it is actually a motion that encircles the ground in the market of charging infrastructure so as to get the first-mover advantage. What they only care about is reaching agreements with the governments and get the construction permit. Once they the permits, they are less concerned about the construction rate. This leads to a strange phenomenon that on one hand many companies announced their ambitious planning about infrastructure construction, on the other hand only a few charging facilities were built. For example, CSPG aims to deploy as many as 89 charging stations in Shenzhen by the year 2012. Unfortunately, only 4 charging stations had been built in Shenzhen by CSPG. Although multiple reasons contribute to such a huge gap between planning and reality, the inaction and inefficiency of the companies should not be ignored.

3.3.3. Lack of cooperation

The development of charging infrastructure need close cooperation among related stakeholders. However, during the demonstration each company only focuses on maximizing its own profit, which leads to the disorderly development of charging market and the lack of related standards. Firstly, there is intensive competition between SG and CSPG. The two companies build charging facilities with different standards and both try to lobby the government to set their own standards as national and industry standards so that they can monopolize the charging market. Secondly, the competition between auto manufactures leads to the different standards relating to battery size and charging interface. Each manufacturer wants to make its own production parameters prevalent so at to get more profit. The incompatibility of batteries and charging interfaces in turn makes the incompatibility of charging facilities. Thirdly, there still exist interest conflict between the power suppliers and the oil/gas enterprises. In China, CNOOC, Sinopec and Petro China occupy the dominant positions of gas station market and they want to sustain this dominance in the charging market by utilizing its advantage in the fueling network. On the other hand, power companies believe that this is an important opportunity for them to occupy the dominant position in the charging market by utilizing its advantage in the electricity domain. Although cooperation between them can integrate the advantages of both sides and accelerate the development of charging infrastructure, the interest conflict makes it unlike to happen. Fourthly, the SG wants to utilize its advantage on power supply not only to gain the dominant position in the charging market, but also in the whole industry chain. So it advocates the batteryswapping business model, by which it can control the key part of EVs-battery. However, the major auto manufacturers, however, wish to keep their current dominant positions in the auto industry chain and advocate the batter-charging business model. This imposes a great barrier for the further development and standardization of charging facilities.

3.3.4. Land use and urban planning

According to the socio-technical approach, the development of EVs involves not only the auto industry, but also need cooperation from other domains such as urban land planning. One major issue emerging in the demonstration is that the land-intensive feature of charging stations creates new challenges for urban planners. How to acquire enough land to house EV facilities, especially in the high density cities, is considered as a major challenge. In our survey, we find that many cities like Shanghai and Beijing construct charging stations in remote outskirts of the city, which is obvious a temporal solution and not suitable for further development of EVs.

3.4 Barriers in technology

The Chinese government regards the development of EV technology as an opportunity to leapfrog the auto industry to become globally competitive. During the 2001 to 2010, MOST invested 2 billion yuan in the R&D of EVs (MOST, 2013). However, many experts in our interview argue that Chinese auto manufacturers have already been left behind by foreign EV manufacturers. The core technology including battery and electronic control has not been mastered by the majority of Chinese auto manufacturer. EV

technology has not been developed from an academic or industrial prototype to full mass-scale production. In addition, the technology level of domestic parts production equipment manufacturers is low. Some key EV parts are heavily dependent on imports, for example 80% of the key parts of batteries rely on import (Xinhuanet, 2010).

3.5 Barriers in consumers

Consumer acceptance is important as it is essential to the commercial success (or failure) of EVs, even if the other criteria that we have previously mentioned are met. Unfortunately, this demonstration indicates that the majority of consumers are resistant to EVs. Many reasons can explain this resistance.

3.5.1 Perceived risks

Consumers often resist new technology that is considered unproven and risky. This perception of risks is an important barrier to consumer acceptance of EVs. The perceived risks in the demonstration mainly involve three aspects: insecurity, inconvenience to charging and lack of after-sale service.

The most important concern that consumers show is the vehicle safety. This is mainly rooted in the media reports and spread of the unsafety of EVs, especially of the two EV battery accidents during the demonstration. In April 2011, an EV taxi in Hangzhou was on fire because of the wrong installation of battery and in March 2012, another EV taxi in Shenzhen had an accident and the battery exploded. Such accidents greatly influence consumers' perception about EVs and cause many consumers to lose confidence. Since the EV market is very sensitive, it is extremely difficult to remove consumers' suspicion, once it is formed.

As to the refuelling availability, current fuelling and charging infrastructure is generally inadequate in Chinese urban locations and not available along major urban arterial routes, which lead to a perception that EVs are not suitable for long journeys, particularly where vehicles have limited driving range before charging is required. Consumers, therefore, are reluctant to take the risk of being faced with inconvenient local refuelling and limited driving ranges for long distance trips.

After-sale service is playing an increasingly role in determining consumer's purchase behavior. In terms of vehicles, it means that the convenience and quality of repair and maintenance (R&M) is critical. In the demonstration project, however, no pilot city pays attention to building the R&M network for EVs. Professional R&M service and 4S shops for EVs are lack, which greatly influence consumers' perceived value of purchasing EVs. Additionally, the cost of R&M is also an important concern for consumers. In China, the average cost of ICEV use is becoming increasingly higher and a major reason is the high cost of R&M. Guided by this cognitive rule, most consumers hold the view that R&M cost of EVs

would be higher, because of frequent battery repair and replacement.

3.5.2 Lack of interpersonal communication channels Other's influence is an important determinant of an individual's purchase intention and behavior. Susceptibility to influence by others is manifest in Chinese auto market. Many consumers' perception of vehicles is influenced by their surrounding persons such as friends and families and most consumers get information about vehicles either through the social network of friends or make inferences based on the observation of the behavior of others. However, the diffusion scope of EVs is rather narrow now and very few persons buy or even know EVs, which means that little information flow happen among individuals and there are no observation objects for consumers. All of these lead to the diffusion barrier for EVs.

3.6 Culture and symbolic meanings

In China, it is only after 2000 year that cars really began to enter domestic families. This is a very short period compared to the developed countries. So cars are still symbols of status and wealth in Chinese contemporary culture. However, EVs are often considered inferior products by the public because of the poor performance/price ratio. So buying EVs seems to be conflict with cars' symbolic meanings in China. Additionally, the automobile has become an icon of the modern life-style due to its high speed and convenience for travelling at any given time. According to the study by Climate Policy Research Center of Tsinghua University, convenience, freedom and comfort are the three most important purchase drivers for Chinese consumers and environmental-pursuing is the least important driver. Unfortunately, EVs are more environmentally friendly and less convenient for daily use. This has greatly affected consumers' purchase behavior.

4. Conclusions and implications for policymakers

The introduction of EVs is confronted by several barriers that inhibit a larger market penetration under current conditions. Evidence provided in our study emphasizes the need to address socio-technical barriers facing EVs. Consistent with many other studies, we find that some reasons such as inherent technical limitations of EVs, high initial cost and insufficient charging facilities in this study exemplify the immature status of EV commercialization.

However, our study finds some social barriers that are not mentioned in other studies or not consistent with other study results. Interest conflict among auto manufacturers, infrastructure operators seems to pose a large barrier and leads to many problems such as lack of standards and the delayed charging infrastructure construction. Major automobile manufacturers have poor sense of social responsibility and the inaction phenomenon is prevalent among them. Private enterprises are often been ignored and many benefits are obtained by state-owned enterprises, which result in a possibility of monopoly. Local governments only care for their own local interest and set local market entry barriers, which result in inefficient allocation of resources. Therefore, the central government should pay more attention to top-level design and overall plan of EV industry. The central government should take a more comprehensive strategic perspective, coordinate the interest from various aspects, and fully recognize the systematic and holistic characteristic among these social-technical barriers. Governments should not only develop policies focusing on the EV niche, but also need to make much more policies that can put pressure on the current ICEV regime.

Our study also finds that current incentives to subsidize the cost of EVs have little effect. Consumers have low confidence in EV technology. Therefore, certain measures need to be taken including education, infrastructure, and strong warranties on the EV batteries. Since public opinion can be influenced through media and social networks, policy makers can use this medium to influence the public appreciation for non-financial benefits of adopting EVs.

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Theory of sustainable development and social practice

Teoria zrównoważonego rozwoju a praktyka społeczna

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Abstract

The paper shows, that the hopes associated with globalisation, which were also supposed to overcome the effects of the ecological crisis, have not been fulfilled. This situation is associated with the fact that nowadays the biggest influence on the functioning of the global ecosystem is by man himself, who exists simultaneously in two environments: social and cultural. According to the author, all crises are global and furthermore embrace both environments in which man functions. Therefore, people are most at risk to pay for every crisis, including the ecological one. Human communities would be able to function in any environment, if they accept and implement sustainable development, which includes the functioning of the anthroposphere and the biosphere at the same time. Communities which were unable to do so, collapsed and even disappeared. In conclusion, the author claims that even today there is such a requirement. Today's advocated sustainable development ensues from our species' historical experiences. The implementation of sustainable development could provide the best optimal development conditions for both mankind and the natural environment.

Key words: eco-development, sustainable development, anthroposphere, biosphere, ecological crisis, safety, strategies of crisis' overcoming

Streszczenie

Autor wskazuje, że nadzieje związane z globalizacją, która miała doprowadzić także do przezwyciężenia skutków kryzysu ekologicznego, nie spełniły się. Taki stan rzeczy wiąże z faktem, że współcześnie największy wpływ na funkcjonowanie ziemskiego ekosystemu ma sam człowiek egzystujący równoległe w dwóch środowiskach: społecznym i kulturowym. Zdaniem autora wszystkie zjawiska kryzysowe mają zasięg globalny, a ponadto obejmują oba środowiska, w których funkcjonuje człowiek. Dlatego każdy kryzys, w tym i ekologiczny, jest dotkliwie od-czuwalny zwłaszcza przez ludzi. Społeczności ludzkie potrafiły funkcjonować w każdym środowisku, jeśli były w stanie przyjąć i realizować jakąś postać zasady zrównoważonego rozwoju, która obejmowała zarazem funkcjo-nowanie antroposfery i biosfery. Społeczności, które tego nie potrafiły, upadały a nawet ginęły. Autor w konkluzji stwierdza, że również obecnie istnieje taki wymóg, a zatem propagowana współcześnie zasada zrównoważonego rozwoju jest konsekwencją doświadczeń historycznych naszego gatunku i najlepszą drogą dla zapewnienia optymalnych warunków rozwoju zarówno dla ludzkości jak i środowiska naturalnego.

Slowa kluczowe: ekorozwój, zrównoważony rozwój, antroposfera, biosfera, kryzys ekologiczny, bezpieczeństwo, strategie pokonywania kryzysu

Introduction

It was widely anticipated that after the fall of the Berlin Wall the world would become a safer place and the international community would finally be able to resolve the global problems afflicting humanity. It seemed then that the most important and indisputable task would be to overcome the consequences of the ecological crisis. However, these hopes were quickly dispelled on 11th September 2001. In the face of the crisis afflicting the whole world today, the hopes of that time seem even more remote, and this is accompanied by a noticeable drop in social sensitivity to ecological problems. The change in sentiment is undoubtedly well reflected in the motto Zmierzch epoki ekologii (Twilight of the ecology age), chosen for the wide-ranging discussion carried out on the pages of an influential Polish monthly magazine Znak (Sign). However, it is worth considering whether in fact social priorities have changed. It is the author's belief that it is only an illusion related more to the patterns by which the mass media sphere is guided, than to social practice. In order to explain this phenomena, the problems of our civilization should be considered from a different perspective, than the one presented by the media. Knowledge of the rights governing the development of civilisation has an interdisciplinary nature, which is provided by all sciences without exception. Taking care of the state and the future of our planet is the most important issue for science. In this task, philosophy plays an important role, since the modern world is faced with the problem of formulating a new, more sustainable vision of the development of human civilisation (and perhaps even survival), which would reconcile social aspirations, but at the same time maintain the threatened geo-ecosystems the basic elements necessary for the existence of civilisation on the unique 'spaceship' called Earth (Pawłowski, 2011). Indeed, not only does philosophy have the possibility, but it also has the obligation to make such a synthesis. Nevertheless, this task does not necessarily mean the creation of projects targeted with major rebuilding of our civilisation, as it will most likely be sufficient to rationally use past experiences and unrestricted access to information concerning the condition of our planet, including our own species.

Conditions for the development of civilisation

For science, a difficult question to answer is why the crisis, one of many which humanity had experienced in the past, challenged in some way the implemented development model of our civilisation? After the experiences of recent years, it has turned out that the answer to this question will not be provided by economics or political science. However, knowledge drawn from philosophical anthropology might turn out to be helpful here. In fact, a man lives simultaneously in two environments, a natural hitherto found biosphere, which is developing relatively independently of a man but of which he is an integral part; and an anthroposphere, an environment created by a man himself (an artificial environment). The latter environment is created exclusively for humans, and hence the presence of other living organisms is strictly controlled. However, from the moment when living conditions deteriorate, people try to compensate for the associated losses with an increased exploitation of natural resources. Highlighting the events of the crisis in only one sphere is therefore a misguided treatment for the reason that human exist-

ence is already dependent on the state of both the biosphere as well as the anthroposphere. In this context, a purely ecological or a purely economic vision of the crisis does not seem to be accurate. In fact, we are dealing with a growing general crisis which affects all people, regardless of whether they have contributed to it or not. Therefore, the undertaken deliberations do not only apply to the symptoms of the social crisis, because it is expressed in the same terms, in which the ecological crisis is expressed. A characteristic of any crisis is a decline in an individual's sense of security. It does not matter whether it is a crisis in the anthroposphere, or the biosphere. In this context, an argument should be put forward, that sustainable development should be associated with an increase in the overall sense of security for the inhabitants of our planet. Therefore, the idea of sustainable development appears to involve the balance between environmental security and social security. Mankind has gained this type of knowledge and experience over the millennia, which is reflected in the sustainable development concept. There is no need to study scientific research papers to become convinced, it is sufficient just to look in the documents issued by the United Nations, which have been accepted for implementation and are dedicated to provide all humanity with a rational development direction.

International treaties on environmental issues if not abide by, they should usually put specific sanctions but it is not always the case. In terms of the future of our planet there is no choice. In principle every law aiming to improve the state of man's natural environment, sooner or later, is approved by individual societies. It is necessary to associate this with a growing awareness that ecological threats have no borders. It is possible, that in the foreseeable future each country will experience the effects of carelessness or lack of adequate safeguards in another country. Furthermore, public opinion is very sensible to these issues and closely monitors all activities which are even a potential threat to the deterioration of the natural environment or the social environment.

However, the care of the second environment, the anthroposphere constitutes a separate issue. On the one hand, the problem lies primarily in the fact that universal rules, which are applicable to all countries and nations of the world, cannot be easily established in this case. Here, more can be demanded from the rich, than from the poor. On the other hand, it is in the interest of developing countries to improve their environment, since they will quickly feel the negative effects of this state of affairs through the exodus of its citizens to countries that put more effort in this respect. Yet it is difficult to measure parametrically the state of the environment because the citizens' subjective sense of well-being is more important here than the size of GDP per capita. However, if such an exodus is approaching, its direction is very

easy to predict. Therefore, it seems that instead of spending millions on building barbed wire entanglements and fences separating the world of the rich from the poor, it is better to spend it on equalising the difference or at least on creating development opportunities for the poor. It is this lack of development prospects and the inability to change one's situation, which lead people to migrate. The most important thing is that entrepreneurs and the highly educated migrate from the underdeveloped regions. Thus, after their departure, most ecological slogans do not bring results because the ecological awareness of the remaining inhabitants in such regions has not had the time to form yet.

It is no wonder that the international regulations embrace a common sense concept of *sustainable development* which in the documents of the United Nations has been defined as follows: The sustainable development of Earth is development that meets the basic needs of all people and preserves, protects and restores the health and integrity of the ecosystem earth, without jeopardizing opportunities to meet the needs of future generations and without exceeding the limits of long-term capacity of the Earth's ecosystem (Pawłowski, 2011).

On the basis of publications on sustainable development that are available, it can be noted that authors often accept hidden assumptions that solving natural environment problems solves at the same time all the remaining ones. Meanwhile, the reasoning is only partially true, because mankind is already our planet's destiny (Morin, 1999) and it seems that without solving its problems it is difficult to expect any spectacular achievements in the field of improving the state of the natural environment. Thus today, taking care of the anthroposphere is equally important as caring for the natural environment. This is the result of mankind's long liberation from the surrounding natural environment, which allowed us not only to adapt to it, but also to find effective ways to prevent natural disasters. The objectives of activities in both environments must be identical because an attempt to create an entirely artificial (unnatural) environment intended only for man is impossible, similarly to considering human existence exclusively as one of the elements of the natural environment. The existence of a completely artificial environment is not possible, especially while taking into consideration the fact that the human body, for its proper functioning, must live in symbiosis with hundreds of species of micro-organisms which live inside, or on the surface of the body. We realise the fact that they are important to us when, for example, after a long-term course of antibiotics, we administer special medicines, and rebuild our internal microbiota with great difficulty. Likewise, a man would lose the whole of the previous generations' legacies, if upon return he completely became a child of nature.

Considering sustainable development, we should think about what would happen if the human race suddenly disappeared from our planet. Would it really be such a good solution for the biosphere, as it is proclaimed by the neo-naturalism supporters? Earth without humans would look entirely different but that does not mean that it would ipso facto fulfil the dreams of the radical environmentalist supporters. In such case all deliberations about sustainable development would be meaningless for this concept, that contains the idea of the non-deterioration of the current state of both the biosphere and the anthroposphere, as well as a certain vision of the future, that humanity should achieve. The popularity of the idea is mainly due to the lack of its opponents' alternative vision, of which the numerous scientific papers predicting the end of history would try to convince people. After all, it is not an important idea capable of capturing crowds, but rather a sign of intellectual weakness in addressing both social and ecological problems. The end of history, predicted by Francis Fukuyama, preached that humanity has already achieved its target state and all countries of the world have adopted the liberal democracy model, which is the best of all possible regimes, but it is not the ideal solution. Meanwhile, supporters of the sustainable development concept proclaim exactly the opposite slogans, that the existing political solutions are deeply unfair to both individuals and entire countries. The preservation of the current state is really only for the privileged and therefore, its aim is only to ensure security for the elite. Ordinary people do not need golf courses, which replace drained moors, or private airports, because they isolate, rather than unite them. For an ordinary person the world is shrinking, because it is dominated by the privileged elite, which possess private islands, lakes, attractive places, monuments etc. and access to them for a mere mortal is strictly controlled, or even impossible. Clearly, it is at odds with the egalitarian view that Earth is home for all people.

Thus today, we observe two fundamentally different approaches to the existence of our species and at the same time adopting one of them means siding with a specific historiosophical option. The first one assumes a static course of history, and its embodiment is the end of history concept, or any similar assumptions based on either infinite multiplication of the existing condition or its limited evolution. They also assume that the existing situation does not require any radical changes, but at most limited modification. This implies a specific precautionary principle, which leads to a defence of the existing status quo because the changes not only disturb the existing order, but are also associated with a risk whose consequences cannot be predicted. This leads directly to defending ones ownership at all cost, which is also achieved with the help of the military. Every war is a spark for uncontrolled and unpredictable changes

in the social and natural environments. Good examples of this situation are the war in former Yugoslavia, as well as the current conflicts in Afghanistan and the countries in the Maghreb region of North Africa.

The second option, expressed in the sustainable development concept, is inherently associated with a disagreement over the existing order. It also assumes that historical progress does not have to be associated with progress measured using parametric indicators. Thus, specific periods of stagnation or even decline in some areas would be acceptable provided, that man's quality of life does not deteriorate. The decline in industrial production does not have to be a disaster if people live better. Better, always also means more safely.

Sustainable means secure

Sustainable development is not exclusively about behaving carefully with the limited natural resources, but about maintaining the potential for further functioning and development in the interests of future generations. Already in the United Nations World Commission on Environment and Development report Our Common Future also known as the Brundtland Report, published in 1987, a definition of sustainability was included, namely economic development of such conduct, which does not affect in a significant and irreversible way man's living environment, does not lead to the degradation of the biosphere and reconciles the laws of nature, economy, and culture (WCED, 1987). In my opinion, this is very clear wording which simply reflects the practices implemented by our species against the natural and social environments. At the time when human intervention in nature was almost imperceptible, there was simply no need to introduce any specific directives in this area, but such directives appeared as soon as the interference turned out to be excessive and risked compromising the interests of other people.

Accepting all the criticism towards sustainable development, which Václav Klaus expressed in his book *Blue Planet in Green Shackles. What is Endangered: Climate or Freedom?*, the entire concept should be recognised for being very harmful to mankind¹. Meanwhile, everything seems to indicate that sustainable development is the most natural course of action for humans. The first Polish environmental laws, which protected beavers and aurochs at a time when there was no talk about an ecological crisis, testified how our ancestors have taken care of nature. But similar records can be found even in the Egyptian *Books of the Dead*, in which the deliberate destruction of the irrigation system was considered to be one of the greatest sins and transgressions.

One can of course contemplate the wisdom of the Saxon forester Hans Carl von Carlowitz (1645-1714), who was authorised with the primacy to use the term *sustainable development* by indicating this management method for forest goods so that in the place of felled trees new ones had time to grow (Pawłowski, 2011). A rapidly industrialising Saxony then at a lightning rate rid itself of its forests, which fell under the lumberjack's axe, which served both as building material and fuel. Hence, there was an urgent need to stop the wasteful economy, which initially was intended to be achieved by only importing timber from neighbouring regions. But was von Carlowitz's motto so revolutionary, or does it reflect his high level of sensitivity to environmental protection issues? It is much easier to accept that he was simply a good manager directed by an appropriate rationality for the informed representatives of our species. Nonetheless, the actions of the Saxon authorities reminds us of the modern industrialised nations, who have not even allowed a permanent depletion of their natural riches now, as if saving them for a rainy day. But it is nothing more than an experience, rooted in our species, which is the easiest way to survive even the most difficult moments. People can be considered as masters of survival precisely through the implementation of the sustainable development principles. We of course believe that ecological issues are inherent, or occur as a result of the implementation of the projects which did not achieve their aim, but it does not change the nature of the problem which is that most often those are people themselves who cause the ecological crisis, and significantly less frequently, but independently of them, natural disasters. This results from the observation, that every natural phenomenon, even if it spreads terror as a tsunami or an earthquake, it does not lead to an ecological crisis by itself. However, this does not mean that such a risk cannot occur in the future, because the biosphere can achieve a state where life is impossible on the planet, since the planet's evolutionary direction, as well as the world's, cannot be predicted to the end. Indeed, this is the logic of the evolutionary processes.

It is fair to say, that we humans are the sole perpetrators of the ecological crises, because we still forget that whatever we do in our artificial environment, the anthroposphere, is automatically reflected in the natural environment. A classic example of this is draining the swamps in order to acquire additional areas for crops. Then, it is obvious that we radically change the local natural environment, but it should be no surprise, that beavers disappear and for example hares appear. Knowledge of what each change to nature which surrounds us can lead to is provided by ecology, which speaks of the conditions connecting organisms with their environment. When we change

¹ Zdzisława Piątek conducted a thorough analysis and critique on the works of Václav Klaus, in her article *Does*

society 'obsessed with ecology' pose a threat to human freedom and democracy?

the environment, it is clear that the composition of the organisms inhabiting it also changes. If our knowledge of the consequences of implemented projects is insufficient, then it is necessary to be guided by the principle of precaution, as the human race did for centuries, and to introduce these changes gradually, monitoring the state of the environment.

Critics of sustainable development, such as Václav Klaus, see the orders of the ecological demands above all others, because they consider the ecological issues as something autonomous, something that has no significant effect on humans. But each action in the natural environment has an impact on the human condition and vice versa, each change in the anthroposphere alters the state of nature which surrounds us. Knowledge on this topic is essential to effectively modify our civilisation, in which building a human-friendly environment has also a positive influence on nature. In France, the precaution principle was written into the Basic Law, as a basic requirement, when undertaking decisions of a political or economic nature. As Klaus believes, it does not mean, that the state of our civilisation is automatically deteriorating. For instance, the French do not mind developing the nuclear power which supplies the vast majority of electricity consumed there. Therefore, sustainable development is a rationally chosen direction in which our civilisation is developing. It is not that there are no alternative development paths, but it is the most reasonable solution which we have at our disposal, and human activities testify as to its effectiveness. Cultures, which could not abide by it in their daily practice, have long since become extinct, and it is all for the same reason (Dorst, 1987). Thus, there is no better way for civilisation to develop, than that which implements, even to a limited extent, sustainable development. Security is not just endurance, but also the maintenance of the capability for further development that leads to survival in the medium and long term.

A New axiological order

Sustainable development is also involved with the transformation of the order of values, which functions in human societies. Robert Goodin's *Green Theory* may propose a new axiological order. Its starting point is the belief, that every improved idea based on scientific achievements must be simultaneously pro-ecological. This makes it possible to gather large numbers of people. Thus, humanity currently has only three systems of values to choose (Goodin, 1992):

- 1. neoliberal based on the interpretation of preference, and the core value is consumer satisfaction,
- 2. socialist the core value is production and human labour associated with it,
- 3. *Green Theory* the core values are the natural attributes.

The Green Theory implies that associating effectiveness with morality is something natural. Thus, the more natural (green) the man-made product is, the more morally acceptable its production becomes. It also indicates that both a politician and a capitalist can and should act pro-ecologically, but at the same time without sacrificing future successes. The starting point here is the assumption, that all pro-ecological measures are always good for humanity. The same reasoning can be found in Hans Jonas' The Imperative of Responsibility, which inherently involves the future, and thus the survival of our species with the state of the natural environment. We have become responsible for nature and for ourselves, since we have the tools to self-destruct by destroying simultaneously both environments in which we operate. Hence, nature needs human support, but at the same time protecting it, ensures our continued existence (Jonas, 1996). However, our existence is not associated with continuous endurance under static conditions, but with continuous change, which should improve both our own security as well as that of the ambient environment.

So, questioning the sense of sustainable development does not appear to be reasonable. It must be assumed, that our ancestors survived due to their reasonable exploitation of the natural environment. Long term residence in one place convinces us as to the reasonableness of this strategy. For instance, there is no other explanation for the fact that people have been living continuously for tens of thousands of years on the Apennine and Iberian Peninsulas in the same place. If they did not take into account such a concept, they would not only have devastated the natural environment, but also exploited all the local resources. Therefore, it seems that cultures, even if they have been guided by the limited logic of sustainable development, survived not only historical storms, but also delved deeper into nature's mysteries and were able to not only take advantage but also use the acquired knowledge to improve their material culture. However, our type of globalisation and its associated specific eco-imperialism, are still calling for new requirements and at the same time imposing a unique responsibility on the global community. Sustainable development activities do not explain everything, but explain many things. It is worth referring here to the experiences of Bill Drayton and his ideas and practices related to the implementation of the Ashok concept, the so-called new social economy in various neglected regions of the world, where prudence was not applied earlier, and to his foundation's program which effectively supports these cultures, by introducing sustainable development concepts as is happening today in Bangladesh, Africa and South America.

Adjectives such as *green, natural, ecological* are also readily used in the language spoken by politicians because they give a positive meaning to the spoken words. Such terminology has permeated into the language of political debates from the incorrectly termed popular culture and hence is used to describe what for man and his continued existence is of utmost importance. Thanks to some politicians, green has become a quality which is always worth seeking and taking care of. In order to explain the reasons for the politicians' interests in the concepts drawn from ecology, it is necessary to go back into the history of our culture. Green is the traditional colour of hope, and consequently not only do political groups willingly use it in their symbolism, but it is also often introduced into a nation's symbolism. Therefore, it is synonymous with naturalness. Naturalness is something which needs to be maintained, preserved, because its existence is *fragile* and is often irreparably damaged. The restitution of an extinct species is a misguided task, because, after all, nature is also guided by a specific sustainable development logic and the disappearance of a specific species means the constitution of a new order in a given ecosystem, for which the return of an extinct species would be an unmitigated disaster. In this analysis, restitution is an artificial procedure which does not have much in common with naturalness. Nevertheless, it is obvious that every species inhabiting a defined environment finds itself in a defined equilibrium within it, because it can only receive food and find shelter within it.

It cannot be forgotten that the protection of the natural environment is a targeted procedure only performed by humans. However, such an activity only makes sense, when it combines human interests with the interests of the environment. This is precisely the meaning of sustainable development, and it does not involve, as some radical supporters of environmentalism want, a man suddenly renouncing the anthroposphere, the environment he created after thousands of years. Sustainable development does not depend upon people voluntarily renouncing the benefits of civilisation. Such an understanding of sustainable development prevailed when in September 2000 the United Nations Millennium Summit took place in New York, when the Millennium Development Goals were adopted. Even then these objectives were ambitious and were formulated on a global wave of enthusiasm and belief in the bright future awaiting our planet. The state of affairs from the year 1990 was chosen as the initial basis for these targets and the individual objectives were to be achieved by 2015. In order to control their implementation intermediate points were also identified. Moreover, those targets should already be partially completed. Eight strategic objectives were adopted, none of which, as it is already known, will not be fulfilled by 2015. Even the most mundane objective, the postulate to provide the world's young people up to 15 years of age with at least a basic level general education, has proven to be impossible to achieve. The reasons for this of course do not lie with nature, or the lack of access to resources, but in the fact that a significant proportion of the Earth's poorest people do not have a permanent place of residence, and their offspring have not even been registered. Numerous armed conflicts deepen this state of affairs resulting in considerable numbers of refugees and the destruction of the educational infrastructure. Those are people themselves who have to first manage to end all conflicts between themselves in order to effectively improve the condition of the surrounding environment.

Nonetheless, it is important that in the objectives of The Millennium Goals, the main emphasis was placed on general public issues, as it was clear by then, that an improvement in nature will not occur if not preceded by an improvement in the conditions of human existence. A prerequisite to radically improve the state of the natural environment is not, as it turned out, typical protective activities, or some strict rules to protect the environment, but public access to environmental information and the elimination of illiteracy. In order to protect the environment it is necessary to know what and how to do it. Ignorance is the cause of the mindless devastation of nature probably more often than targeted exploitative human activities. The numerous fires as a consequence of burning meadows and pastures constitute the proof of this.

Interestingly, in the ongoing discussion big phrases such as we must, we have no choice are used and this determinism is very awkwardly explained. Human activities are rarely determined by the laws of nature, but are more often an expression of a convention, which can be agreed or negotiated. The formulated sustainable development concept is the result of compromises, that have been agreed at international conventions. Therefore, we can only say that our current knowledge and experience indicate that it is the best functional model of our civilisation available to us at a given time. So if someone opposes sustainable development, he should point to a model that better protects the needs of individuals and whole societies. It seems that the declared critics of sustainable development, such as Václav Klaus, have nothing to offer except for a handful of little meaningful slogans. Therefore, the starting point for the undertaken deliberations is not a mutual exclusion of either sustainable development or the end of civilisation, but a bound alternative, sustainable development or some other model, which assumes that it is possible to implement in parallel with social practices some competitive principle. Even so, it seems reasonable to assume that all previously identified civilisations always adopted a development direction which can be considered sustainable. Striving for balance appears to be a natural feature of any system which by its very nature tends to arrange its elements in such a way, as to ensure itself the longest period of endurance. It would be intriguing, if it turned out that human rationality escapes from this convention and may approve of such a culture which today we would call suicidal. Trying to benefit from past experiences

we should rather look for answers to the question: why a particular culture disappeared; or why, despite everything, it still persists? In the light of available information, it appears that this is primarily due to past experiences, with the implementation of sustainable development, which is currently a paradigm for the development of our civilisation.

The current implementation of the sustainable development model is not ideal, as we have already experienced, through the ongoing financial crisis. It will force certain adjustments to the implementation model because, regardless of the actual noticeable improvement of e.g. air purity, it is however the quality of life and people's sense of security which has declined. So the question for today is - what needs to be done, so that the residents of our world do not feel the discomfort associated with the various crises? Sustainable development links all the development factors into one indivisible whole, thanks to which it is possible to effectively combat many epidemics and improve the global natural environment. However, it is not a charitable or typically protective action which has improved the current state of affairs but actions seemingly remote from the very problem such as the elimination of illiteracy and improvements in hygiene and sanitary conditions. The very idea is based on the fact that through consistent efforts in specific areas, the condition of our planet will improve together with mankind's quality of life. The current crisis once again reminds us how far our world has become globalised and integrated in a network of interconnections whose characteristics we have not yet learned, but which we severely feel every day. So, it seems that the world's development, on the whole, is moving in the right direction but this development encounters from time to time various obstacles, which we must manage to overcome.

But how do we know what we should strive for? Ostensibly, the answer to this question seems difficult, because man always sets the development goals, and besides his needs, they must be met first. Discussion on the fact that the environment is more important than a man is on the whole misguided, because it is only meaningful when a man is already within it. Nobody feels sorry, when trees or animals die as a result of a volcanic eruption, but everybody regrets it when they die as a result of an intentional or unintentional human activity. Therefore, the value of the individual natural environment elements depends on man himself. While considering how the implementation of sustainable development should look, we must first take into account man's interests. It is possible, of course, to consider a hypothetical situation, where we reduce a man into the role of a world citizen, but it will never be an idea sufficiently important to mobilise people into taking concrete actions targeted at such a state of affairs. Therefore, to implement sustainable development one must start from oneself. This is the starting point for social, economic and

even ecological practices. Such an opinion can be criticised that it unduly differentiates man, but then no other opinion can be realistically implemented.

Man in nature

Even among those people with a revolutionary attitude towards the current reality, the following belief may be interpreted as surprising only a vision based on human nature, or (...) unchanging objectives pursued by man, can visions of a desired society be built. *Society has to be suitable for people, who – by nature* or for other unchangeable reasons – have such rather than different expectations (Krol, 2008). Human objectives are also constantly changing, earlier they were only limited to ensuring survival. However, today many of the implemented objectives pursued by humans go back so far, that they sometimes modify the Earth's ecosystem. The problem is mainly that their implementation should not interfere with the interests of others and the foreseeable needs of future generations. Importantly, it should be also compatible with the individual objectives, as well as social one. In other words, a man who is protecting the natural environment, or is reducing some of his expectations, works as much as possible in his well-conceived long-term interest. Following this path it must be recognised that a man, since the dawn of civilisation, had to act in such a way, that he will express at least the various forms of protection of the selected elements of nature, which was achieved at least by assigning them a sacred meaning (holy places, trees, animals, etc.).

Thus, we can fully benefit from past experiences, because human nature has not changed over this relatively short period of time in which we have acquired the ability to record our experiences in writing. Epicurus wrote, He who believes that he has little, even though there is plenty, for him nothing is sufficient (Epicurus, 2003). This quote retains its relevance even today. In order to further develop, mankind is reaching out for inorganic resources which convert into chemical compounds which can be applied to satisfy his biological needs. We are already able to harness microorganisms to this task, which in their biotechnological reactors produce not only vanilla for us, but also biodegradable plastics. Microorganisms in modern wastewater treatment plants can also neutralise toxic wastes, which are a by-product of human activity. Therefore, it is not entirely true that existential human activity only leads to the impoverishment of the biosphere, as it also expands its physical boundaries. Meanwhile, we are constantly talking about the economic crisis, which has pushed discussions about environmental issues into the background. It is astonishing how little is written about sustainable development in the practical context for example in Poland. Undoubtedly very few fellowcountrymen know that in the interests of mankind's future we are celebrating the UN's Decade of Educa*tion for Sustainable Development* (2005-2014) whose presence in the media or in politics in Poland is difficult to find. In parliamentary debates the issue of sustainable development is either not raised or is only limited to the selected aspect.

Meanwhile, in science there are two general strategies to explain the reasons for the causes of every crisis. The first one raises the argument about the aggressive nature of humans that led humanity to try to dominate over nature and make it a conquered territory, appropriated, which can be ruthlessly exploited. In this case, the cause of the ecological crisis would lie in man's very nature and would be in some sense justified by subjective mental reasons. Then again, from the supporters of technocracy's point of view, ecological issues stem from the weakness of the applied technology, as an undesired by-product of civilisation. Therefore, improvements to our technical shell should be sufficient for the problems to disappear by themselves (Mikiewicz, 2009).

In fact, there is no other choice but to opt for one of these strategies in order to explain the causes of the ecological crisis. We all agree that the crisis should never have happened, but then with each step we experience its effects. How is it that although being full of good intentions to end the crisis, we have not achieved major successes in this battle? To answer this question, one needs to once again refer to one of the strategies which explain the causes of this crisis. Since the crisis is real, then it would be theoretically easy to eliminate its causes, in order to return to the original state prior to the crisis. But returning to this desired past is only possible with the first strategy. The second strategy absolutely does not create the possibility of return, because this would entail the liquidation of civilisation's entire infrastructure, which would require an even more sophisticated technology, than that considered to be the driving cause of the ecological crisis.

While approving the first strategy, we assume at the same time, an opportunity to harness human nature to such an extent that people will voluntarily renounce their desire to rule over nature, and perhaps even to give up the entire material cultural heritage. After all, by building houses, motorways, airports, we appropriate nature's existing territories, and in addition we do a lot to prevent it from returning. In our own homes we do not tolerate insects, rodents, etc. Similarly, motorways and airports are not designed for forest animals or even small organisms. Therefore, it can be noted that the first strategy offers only one way of ending the ecological crisis; it is a strategy to give up the culture of material gains. In many ways it seems pointless, since only depriving humanity of contraceptives and medical technology would bring upon our species countless disasters associated with an uncontrolled growing population, and a rapid spread of certain diseases and disabilities. Thus, such a strategy is irrational, but willingly promoted by many supporters of the back to nature

idea. The popularity of these ideas has remained unabated for centuries, thanks to various philosophers, and this return would mean a return to the old reconciliation of man with nature, when apparently there was no hunger and disease, and everyone was happy. The ancient past emerges as an image of mythical Eden, of paradise lost, from which we were expelled, as if at our own request. It does not matter, whether we refer to the Plato's, Jean-Jacques Rousseau's, or the contemporary Henryk Skolimowski's view. Yet even if such a *return* turned out to be possible, we have already managed to transform the biosphere to such an extent, that it would then constitute a real threat to our species. But it is not at all about predators, but about places of past ecological disasters like Bhopal and Chernobyl. We do not possess a sense, which could warn us against radiation and chemical contamination. Therefore, a return to nature does not come into the equation, all the more since it is an illusion of a glorious past that never was. Such a vision has nothing to do with sustainable development. In the light of the achievements of modern ecology and anthropology another myth also falls apart – the belief, that man once lived in peaceful coexistence with other living organisms and the whole of nature. The belief that civilisation ruined man, because he once lived in harmony with nature and was peacefully set towards others, is simply false (Rotkiewicz, 2010). Observations of peoples, who have not developed material civilisation and man's evolutionary animal relatives, show that closeness to nature makes our species even more aggressive and ruthless. It is even possible to surmise, that if it was not for the developing culture and closely related conventions, customs and morals, mankind would never have left the caves, which of course would make the whole debate about the ecological crisis pointless. Thus, Rousseau's noble savage is not some scientific truth, but rather self-deception and an attempt to blame one's actions on an impersonal civilisation. It also cannot be hidden, that we willingly believe in this myth. The first type of solution to the ecological issues we can term regressive, because regardless of whether or not we will be guided back to the noble savage, that is implement the return to nature motto, or whether we build a mystical community of people reconciled with nature, it means stopping cultural development and depriving people of elementary security.

Since in the elimination process the first strategy was rejected, we are inevitably destined to work within the second strategy. It does not imply abandoning the achievements of the material culture, but its improvements indefinitely. Here, no achieved state is considered as being purely right and worthy desire, because even at the time when humanity is creating a completely closed material loop, in which there will be no waste and no need to appropriate new territories, it is after all in cases of vast wildfires, longterm droughts, floods, etc., that people will continue to come to nature's aid in such a way so as not to diminish its richness. This prompts a remote analogy regarding anglers, who care about fishing, stock the reservoirs with fish and ensure their cleanliness.

One should not count on humanity voluntarily giving up everything civilisation has brought us. It has also provided us with the knowledge of how to manage limited resources wisely. Accumulated evidence indicates, that nature gains more if man wisely take advantage of it, rather than when he does not have the skills or even gives up from exploiting it. History is full of evidence that the limitations of technology and demand, rather than cultural self-restraint, deterred tribal people from over-exploiting the environment (Ridley, 2000). In such a situation, they needed to implement sustainable development, imposed on them by external circumstances. In this respect the situation has not changed to this day, so humanity has no other choice than limiting itself in order to survive. Nor can it be expected, that oak and alder will spontaneously grow in former crop fields rather than thistles and corncockle. Maybe they will even quickly change from flowering fields into an arid desert. It seems, that man with his presence has changed the natural world so much that irrespective of what he might do, everything anyway will have an impact on the Earth's ecosystem.

Therefore, the technocratic strategy contributes to the development of civilisation by seeking to introduce such cultural changes, even by trial and error, which would allow a man, as well as the surrounding natural environment, not only to continue to exist, but also to have the best chance of further development. The consequence of such thinking is the idea of a new world order, that postulates not to eliminate civilisation, but only to modify its development in a direction that can be called a *green culture*. It is expressed of course in the assumptions of the implemented sustainable development model.

Conclusion

Political debates on sustainable development are burdened with legacy. One cannot expect agreement, if a discourse partner with a different viewpoint is treated as an enemy. It is the enemy, who is fully responsible for his underdevelopment and his moral shortcomings. Nevertheless, the disease of evil, although it has characteristics which are independent of will, is always guilty (Kubiak, 2008). However, such an attitude called protagonist psychology assumes the inner readiness of opposite side to adopt one's own position, which of course is considered to be the only rational one, and sometimes even the only possible and real one. A kind of *conversion* is only possible, when supporting an opponent's guilt and discomfort who is shown in every possible way that he is wrong and should repent as quickly as possible and unconditionally accept the other party's position. Practically all discussions about sustainable development are also tainted with this stigma of *conversion*. Only the proponents and opponents of nuclear energy, motorway construction, expansion of protected areas, hunting, and all kinds of prohibitions motivated on ecological grounds take part in the waged debates.

Such a *dialogue* does not lead to a consensus, and yet mankind needs to be convinced that all people and all cultures are guided by a similar set of symbols and that different languages can be translated and agreed in a consistent, global attitude towards the problems plaguing the world today. It is clear that the term *sustainable development* is translatable into any language, but it does not have to mean the same thing in each language. A Sub-Saharan African resident does not associate sustainable development with a hunting prohibition, but such connotation may be implied for a Swedish or even Polish resident. In discussions on sustainable development it is also possible to see a lack of elementary logic. For example, when we embrace strict protection of whales, it is the duty of everyone to protect them regardless of situation. Paradoxically, this leads to a negation of ecological component of sustainable development, which after all does not distinguish any element of nature, even people, as it only enables them to benefit exclusively from maintained livestock and crop resources without restriction.

What sort of future awaits sustainable development? Is humanity still able to rise above divisions and the specific interests of individual countries? This is quite a paradoxical question, since the problem can be turned around and perceived, that if it was not for sustainable development, is there any notion capable of uniting the whole of humanity? Therefore, it seems that due to the widening differences in the political and economic spheres, there does not exist any equally important notion today. Indeed, Stefan Kozłowski, the tireless proponent of this concept, was right in perceiving, that there had already been a historical moment in which favourable conditions existed for a global agreement for the implementation of the sustainable development strategy. He pointed out, that this moment came in 1992, when the antagonistic bipolar division of the world finally collapsed (Kozłowski, 2000). Today, conditions to unite humanity around this concept are less favourable, but instead of that societies' awareness is already so high, that regression for mankind is most likely no longer a threat. Only simple reserves have become exhausted which enabled self-development at the expense of other people or even regions (Wallerstein, 1998). However, even Wallerstein himself does not indicate what the new organisational structure of society will be, which replaces capitalism, but everything indicates that it will continue to be guided by sustainable development. Contemporary sensitivity no longer has a mercantile or social character because it is determined by the colour green, the colour of hope.

Pro-ecological movements are primarily mass social movements, from whose ecological aims demands for the reconstruction of the existing social, economic and political orders emerged. It is no longer a true picture of an ecological supporter, who no longer desires anything less, than a reform of the rules of governance, economic and social transformation in the name – because it is impossible to define it more modestly – of liberating nature from the yoke of man's exploitation (Nisbet, 1998). Not long ago, a few critics of such an unorganised ecological campaign maliciously remarked: Pro-abortionists, egalitarians, health food addicts, fluoridation opponents and as Engels would say, the rest of 'fanaticism', 'stupidity' and self-interest are seeking political protection today under the wings of environmentalism (Nisbet, 1998). Such discredit of spontaneous initiatives brought about socially undesirable results. Unfortunately, social sensitivity has recently decreased and an important notion is constantly needed, which will attract millions. It is strange that the rebellious environmentalism was seized by millions, while the rational sustainable development concept somehow was not, even though it is the subject of official speeches, conferences and scientific publications. But in the light of the contents discussed here, one does not have to be a prophet in order to anticipate, that political representation of the supporters of the green theory will continue to grow in strength. In the context of the slogans proclaimed by unorganized supporters of the outraged movements, the wording with which once Alexis de Tocqueville described the upcoming changes seems more accurate: one could suppose that the goal of the imminent revolution was not the overthrow of the old order, but its restoration (Arendt, 1991). In the context of the financial crisis and the accompanying ideas, these words should have a special meaning, because undoubtedly sustainable development is a proposal of such an order, and more importantly, may be universally accepted.

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The contemporary concepts of development in terms of the diversifying criteria

Współczesne koncepcje rozwoju w aspekcie kryteriów dywersyfikujących

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Abstract

In the 20th century, in the late 1990s and through the turn of the century, a lot of attention was paid to the so-called contemporary concepts of development. Simply speaking, it should be noted that those who discuss the concepts present their advantages and disadvantages, their common features, such as globality and a promise of *happiness* of the future generations, undefined in terms of time.

The purpose of this paper is to analyze the so-called contemporary concept of development, in terms of the criteria that diversify them.

We accept the following hypothesis for such a purpose: there are two subsets of the criteria diversifying the contemporary concepts of development:

- the criteria of the philosophical nature, which diversify the development concepts *ex ante*: the relationship to existence and action, the relationship to axioms and natural law and to paradigms and the relationship to individual types of capital (economic, human and natural);

- the criteria of the practical nature diversifying the contemporary concepts of development *ex post*, i.e. from the point of view of results in the real dimension: the relationship to consciousness, the relationship to the market, state and money, the relationship to technology, and the method of *transforming* contemporary global concepts into models of the local development.

The paper gives the opportunity for further research, it presents issues, which should be a subject of multi-faceted analysis, and which include the basic issue: does the subject scope of a properly defined category of development include and can it accept the multitude of so-called concepts of development?

Key words: development, axioms, concept of development, neoliberalism, sustainable development

Streszczenie

W XX i na przełomie XXI wieku tak zwanym współczesnym koncepcjom rozwoju poświęca się wiele coraz więcej uwagi. Efektem tego są liczne opracowania poświęcone ich prezentacji. Zakres przedmiotowy tych opracowań obejmuje przede wszystkim przedmiot materialny głoszonych koncepcji: zagadnienie wzrostu gospodarczego, postępu technologicznego i cywilizacyjnego, przedstawienie zalet i wad, pozytywów i negatywów poszczególnych koncepcji rozwoju, ich wspólnych cech, jakimi są globalność i obiecywanie *szczęścia* przyszłych – bliżej w czasie nieokreślonych – pokoleń.

Celem artykułu jest analiza tzw. współczesnych koncepcji rozwoju w aspekcie kryteriów, które je dywersyfikują. Tak sformułowany cel stanowi przedmiot niematerialny (formalny, zadany) dla podjętych w niniejszym artykule rozważań.

Dla tak sformułowanego celu przyjmujemy następującą hipotezę: istnieją dwa podzbiory kryteriów dywersyfikujących współczesne koncepcje rozwoju:

- kryteria o charakterze filozoficznym, które dywersyfikują koncepcje rozwoju *ex ante*: stosunek do istnienia i działania, stosunek do aksjomatów i prawa naturalnego a do paradygmatów i stosunek do poszczególnych kapitałów (ekonomiczny, ludzki i przyrodniczy); - kryteria o charakterze praktycznym dywersyfikujące współczesne koncepcje rozwoju *ex post*, czyli z punktu widzenia efektów w wymiarze realnym: stosunek do świadomości, stosunek do rynku, państwa i do pieniądza, stosunek do technologii, stosunek do efektywności oraz sposób *transmisji* współczesnych koncepcji globalnych do modeli rozwoju lokalnego.

Artykuł prezentuje zagadnienia, które mogą i powinny stanowić wyzwanie do podejmowania dalszych badań i uwzględniać fundamentalną kwestię czy w zakresie przedmiotowym poprawnie zdefiniowanej kategorii *rozwój* mieści się i może być akceptowana wielość tak zwanych koncepcji rozwoju?

Słowa kluczowe: rozwój, aksjomaty, koncepcja rozwoju, neoliberalizm, rozwój zrównoważony

Introduction

In the 20th century, in the late 1990s and through the turn of the century, a lot of, or you can even say that more and more, attention was paid to the so-called contemporary concepts of development. This has resulted in a number of publications devoted to their presentation. The subject scope of these studies mainly includes the material object of the concepts: the issue of economic growth, technological and civilization progress, presenting the advantages and disadvantages of each concept of development, their common features, such as globality and promising happiness of the future generations, undefined in terms of time. It also happens that the presentation of each concept is not substantive enough, dichotomous wording is avoided, and *perhaps* replaces yes and no. Marketing presentation of the essence of a particular concept makes it become dominant and widely accepted. Such approaches are not uncommon, and they sometimes even fill areas that are called science. History teaches, that after some time negative effects of such actions are so discernible and noticeable that the concept implemented so far is condemned. Then, however, it is replaced with a new, more promising concept winning new (and sometimes even the same) supporters.

Certain philosophical, scientific or political premises always underlie each concept, proclaimed and implemented in the real dimension. Unfortunately, when an economist is wrong, millions of people always suffer. In history there are few examples of proponents of particular concepts, promising happiness of future generations, who were consistently condemned and suffered the appropriate sanctions because of no success or even harmful effects. The presented arguments and dissimilarities justify the reason for taking up the subject of this paper.

Synthetically speaking, the paper aims to analyze the so-called contemporary concepts of development in terms of the criteria that diversify them. Such a goal is a formal object (*obiectum formale*) of the discussion presented in this paper.

We accept the following hypothesis for such a goal: there are two subsets of the criteria diversifying the contemporary concepts of development:

• criteria of the philosophical nature, which diversify the development concepts *ex ante*: the relationship to existence and action, the rela-

tionship to axioms and natural law and to paradigms and the relationship to individual types of capital [economic (E), human (L) and natural (P)];

• criteria of the practical nature diversifying the contemporary concepts of development *ex post*, i.e. from the point of view of results in the real dimension: the relationship to consciousness, the relationship to the market, state and money, the relationship to technology, to efficiency and the method of *transforming* contemporary global concepts into models of the local development.

The goal and hypothesis formulated for the discussion determine the structure of the paper:

- reflections on the category of *development* and its implications;
- description of the contemporary concept of development in terms of their relationship to capital (E, L, R) as the diversifying criteria;
- axioms and natural law and paradigms as criteria diversifying the contemporary concepts of development;
- the effects of the contemporary concept of development in the real dimension as criteria verifying and diversifying the concepts being implemented.

The formal object (*obiectum formale*) formulated for the purpose of the discussion in the paper is not discussed extensively in the literature.

1. Reflections on the category of *development* and its implications

The starting point for discussions about the contemporary concepts of development should be an analysis of the category of development. It is an expression commonly used and applied, for different needs and to a various extent. As a result, this category is not clearly understood in practice. It is also difficult to define, but you cannot stop trying to include this category in reflections.

At this stage, the category of development is seen primarily from the angle of economics, and its subject scope includes the following areas: the economic development, development stages of the social economy, the question about the social economic growth, theories of the economic development, theories of the development of economically underdeveloped countries, as well as the economic development presented by selected authors (A. Marschall, J. St. Mill) and the economic development in a specific trend of classical economics. For example, textbooks (Taylor 1957; Taylor 1958; Górski, Sierpiński 1979; Blaug 2000) ignore the fact that economic sciences have not explicitly reflected on the category of development. Certainly, in the past years, representatives of other fields of science have tried, to a certain extent, to fill the existing gaps and specify the subject scope of the category of *development* (for example, A. Sen explains the category of development using the category of *freedom*, Sen, 2002; Strzeszewski, 1976; Piontek, 2006).

Another reason, inspiring to reflect on the category of development, is the process of globalization and the related building of a new civilization.

The process of globalization is based on the three socalled pillars: liberalization, privatization and deregulation (Grupa Lizbońska, 1996). Parallel with the process of globalization, in the construction of a new civilization, the inexorably intensifying process of noosphere (consciousness) totalization takes place (de Chardin, 1967). Studying the correlation between these processes is not explicitly the subject of analysis undertaken in this paper. However, it should be noted that in past centuries science and related intellectual development of man were based, to the extent reasonably possible, on the precisely, i.e. in accordance with the canons, defined categories. Meanwhile, A. and H. Toffler promise the following for the process of building a new civilization: we combine concepts in a surprising way (...), whose premises include new assumptions, languages, codes and logical systems (Toffler, Toffler, 1996). This means that individual categories in the process of building a new civilization and the accompanying totalization of consciousness will not be - or at least they do not have to be - precisely understood. This practice is enabled by using four principles to define each category:

- the principles of deregulation;
- the Darwin's principle of evolution, whose second, currently implemented stage (de Chardin, 1967) refers to consciousness, and which involves *adaptations to the current living conditions* (Encyklopedia... 1987). To put it simply, in practice this may mean defining a category, interpreting the law, forecasting the future and evaluating the events depending on circumstances and needs (e.g. immediate, individual, etc.);
- the principles of *newspeak*, which involves (Blihr, 2008):
 - reversing the meaning of terms used, replacing their original meaning with their opposite or with the meaning of their antonyms;
 - blurring the meaning;

• the principles of *doublethink* – this principle exempts from speculative thinking, and it even makes it impossible, thus blocking access to critical thought (Blihr, 2008).

The category of development is not free from such conditions, and even threats:

- as shown below, understanding a category of development is sometimes narrowed to economic growth, prosperity and even technological progress;
- the category of development as a basic category should be defined in such way that it is accepted by all fields of science, which does not mean that it will be accepted. Meanwhile, the contemporary definitions of this category do not meet this condition, and many fields of science define this category for their own use;
- the Dictionary defines a category of development as a process (...) of turning to the states or forms more complex and more perfect in some respect (Słownik..., 1985). However, this definition is very vague and, in particular, it does not inform about :
 - who development should serve;
 - what criteria it should meet.

It is important that the definition in the Dictionary is more appropriate for a category of *progress*. History shows that many concepts and institutional solutions were progressive, but they had nothing to do with development. And proclamation of the concepts of that time related to it is sometimes condemned nowadays.

Deregulation in defining the category of development (and not only this category), and deficiencies in the definitions make that concepts used in practice are not clearly understood, and the category of *development* can be the basis for various concepts, including those that promote apparent development or even anti-development. Historical facts prove such statements.

Correcting the identified deficiencies in defining the category of development we assume the following definition of this category: it is a process of transformation, change, turning to the states or forms more complex and more perfect in some respect, subordinate to dignity of a human being and fulfilling the criteria articulated by axioms and natural law (Piontek B., 2006, p. 20).

It should be noted that basing the category of *development* on axioms and natural law and, subordinating it as such to dignity of man makes that, when speaking about the category of development, it is not possible to present the category of development in positive terms, but only in the prescriptive ones.

As a basic category, *development* must include *existence* and *action*. The category of *development* is shown on Fig.1 in the structural presentation.



Figure 1. A category of development – structural presentation. Source: Own study based on (Piontek F., Piontek B., 2007/2008, p. 33-40).



Figure 2. The relationship to the three types of capitals (E, L, P) – a basis for diversifying contemporary concepts of development Source: Authors' own study.

Explanation of figure 1:

- the diagram (Fig. 1) shows the existential-functional nature of the category of development, consistent with its nature;
- the diagram (Fig. 1) shows that the components of the development category include: existence and action, as well as axioms and natural law and skills, technologies, knowledge and paradigms;
- axioms and natural law protect *existence* (1), and control *action* (2), and skills, technologies, knowledge and paradigms enable and maximize *action* (3);
- *the principle of sustainable development* performs a specific function in Figure 1, which is defined as follows: *one capital (entity) cannot be expanded at the expense of another or others* (Piontek, Piontek, 2010, p. 23). In this case, *existence* cannot be secured at the expense of limiting *action* and *vice versa*.
- other categories appearing in the diagram require explanation as well (Fig. 1):
 - axioms are basic statements, self-evident, whose truth does not need to be proved. The set should include, for example, the following statements: truth cannot both be false, and *vice versa*; good cannot be evil and *vice versa*. These statements are the basis for the principle of contradiction, which is one of the bases of any rational cognition and the foundation of culture.

The subset includes the following statements: no fact can be real (existing), and no statement can be true if they do not have sufficient reason (the principle of sufficient reason); statement: not every possibility can become a being (the ontological principle of *a posse ad esse non est illatio* – there is no transfer from the possibility of being to reality).

Axioms are not proved, and they are assumed to be true. They can also be rejected, but the question is: can it be done without consequences?

natural law – is a set of natural laws, discovered and formulated by the mind. *The principle of sustainable development*, defined above, is also part of this subset.

The set of *axioms* and *natural law* is standards constituting the world. Their mission is to protect existence and control action. In this context, it should be noted that axiology must be non-sectoral and it cannot be proposed for sustainable development.

paradigms – these are scientific statements, patterns, models. They are the result of the development of science according to such specific character of their value that is only probable.

However, there is a feedback between knowledge and paradigms. Knowledge based solely on paradigms (unconnected with axioms and natural law), in addition to having rich development of exact sciences, uses two criteria (paradigms):

- whether the specific solution is technically feasible;
- whether it will ensure that return rate improves.

Such criteria are not based on the theory of development, they harm existence and human capital.

The analysis and reflection on the category of *development* leads to two main conclusions:

- a properly understood and defined category of *development* includes the criteria which allow us to assess *ex ante* and verify various, so-called development concepts emerging in practice;
- a man is or at least should be not only an addressee of development, but also a subject that realizes properly understood development through deliberate and intelligent action.

2. Contemporary concepts of development in terms of their relationship to capital (E, L, R) as the diversifying criteria

The reflection on the category of development leads to the next stage of the discussions. It is the identification of contemporary concepts of development. The criterion to isolate them – explicitly noticeable – is their relationship to the three types of capital: economic (E), human (L) and natural (P).

Taking into account three types of capital, highlighted in Fig. 2, three contemporary concepts of development should be distinguished:

- the process of globalization, also called turbo capitalism, with its source in neo-liberalism;
- sustainable development, based on capitalism and having its source in liberalism (in freedom based on law);
- eco-development, which is often, but wrongly, equated with sustainable development and *vice versa*.

The first two concepts, i.e. the process of globalization and sustainable development, are the subject of our analysis, presented synthetically. We are also aware that these concepts take different forms and varieties, however, the dichotomous division allows us to outline the most important varieties in understanding and realizing development.

The globalization process focuses primarily on economic capital (E):

• At first it should be clarified that there is no single model of globalization and at this stage it is not possible to give a universally accepted definition of the term. However, its characteristics can be described. The changes caused by globalization are extensive both in scope and intensity. It is also believed that globalization has become an irreversible process (Kołodko, 2008, p. 97 et seq). However, we make slightly different assumptions in this respect:

- we differentiate between globality (universality), and a process of globalization (Piontek B., 2002);
- equating the process with everything that is *global* and *universal* blurs the real consequences of this process.

Accepting or rejecting the assumptions we have adopted results in a different analysis and leads to somewhat different conclusions.

- In the process of globalization, the economic capital (E) is superior, and the other types of capital human (L) and natural (P) are treated as production factors;
- vividly, the process of globalization is defined as a river of *free investment capital*, increasing day by day and *seeking fertile pastures* (Bauman, 2000). The pastures are local (and also national) demand and local (and also national) supply, which are given to third parties in all corners of the world to be managed, and mobility allows them to be exchanged in the global markets. Both production and consumption, as well as exchange, usually take place at the expense of human and natural capital, and institutional solutions allow shifting social and environmental costs on the environment or they enable their apparent internalization;
 - it is necessary to explain the issue of free investment capital, which is usually associated with real capital and seems to be located in real dimension. However, free investment capital is a *stream of stateless money* (Solomon, 2000, p. 36), granted in the form of loans and aimed at generating demand and supply now and in the future. It does not take into consideration the restrictions in the real sphere, and the procedures related to granting loans take into account the transformation of these restrictions.

Other attributes of the globalization process are as follows:

- the criterion of absolute maximization of the return rate (narrowly understood economic efficiency). In the name of this criterion a man (human capital L) once becomes a slave, and in another case – a waste. It is important for the stream of stateless money because it allows drainage of economic pastures;
- it happens that, according to the above rules of defining concepts, the attributes of sustainable development are assigned to the process of globalization and we are talking about *harmonized (sustainable) economic growth.* The

problem, however, is more complex. We certainly should talk about the economy for sustainable development.

Other criteria diversifying the contemporary concepts of development, also in relation to the process of globalization, will be presented further in the text.

Eco-development – like the process of globalization – is the sector concept, primarily natural capital-oriented (P):

- natural capital is superior in this concept and other types of capital [economic (E) and human (L)] are subordinate. In practice, it sometimes happens that in the name of environmental protection workplaces and jobs are eliminated, or no consent is given to start specific production, which would be possible from the point of view of pollution standards. As a result, it enables other parties, including third parties, to develop specific areas of demand.
- a criterion which applies, at least to a certain extent, is the criterion of absolute protection of nature, which means that this concept focuses primarily on *existence* (indirectly also on ensuring *existence* of a man). In this aspect *eco-development* is often identified with *sustainable development*;
- the criterion of absolute protection of nature can be equated with efficiency (in this case aimed to reduce the specific activity) and it is based on social efficiency, which is a relationship of priority to investment and is absolute (does not depend on the criteria). The category of eco-efficiency used in the *Environmental Protection Law* is the relation of net profits (made as a result of environmental actions) to investment and it also depends primarily on social efficiency.

The fact that should not be omitted is that the process of globalization accepts *eco-development* as a new area of generating demand, and regardless of the relationship between eco-development and sustainable development, it subordinates this concept to itself.

Sustainable development:

- In contrast to the sector concepts, it comprises three types of capital that occur in the real sphere: economic (E), human (L) and natural (P);
- it explicitly recognizes the primacy of human capital (L);
- the criterion of sustainable improvement in quality of life of present and future generations dominates in this concept, and this is related to observing social and economic efficiency;
- sustainable development is not defined clearly in theory and practice. The work (Piontek B., 2002) compiled 44 definitions of sustainable development. In this discussion we assume that it is *permanent improvement of quality of life of*

present and future generations by developing an appropriate balance between the three types of capital: economic (E), human (L) and natural (P);

It is worth to mention *The Constitution of Poland*, which differentiates between:

- the principle of sustainable development (Art. 5), which is constitutional in nature, and which has been defined above and as a constitutional principle it should apply to a large extent;
- a concept of sustainable development (Art. 20), which is *social market economy*. This category defines sustainable development in functional terms and is consistent with the adopted definition of sustainable development. Defining the category of social market economy in the language of science, it should be noted that it means *market freedom* and *social equality* (Pysz, 2008).

As H.Luce emphasizes, *the abundance of goods is always founded on freedom*, but on freedom subordinate to the law (Luce, 1941), including axioms and norms of the natural law (see Fig. 1). Such a concept of sustainable development shows new quality and it is not reduced to economic growth.

The analysis leads to two conclusions:

- the relationship of the contemporary concepts of development to the three types of capital deeply diversifies these concepts, but it is not the only criterion (among the criteria described as diversifying *ex ante*);
- other criteria (see item 3) are related to how contemporary development concepts are based on the category of development (see Fig. 1).

3. The relationship to axioms and natural law and to paradigms as a criterion diversifying the contemporary concepts of development

The way how each concept, and in our case the contemporary concepts of development, is based on the category of development is determined by two relationships (see Fig. 1):

- 1) the relationship of a particular concept to *existence* and *action*;
- 2) its relationship to *axioms* and *natural law*, and to *paradigms*.

These relationships perform criterial functions, diversifying the contemporary concepts of development. They also make it possible to assess *ex ante* the impact of a particular concept on realizing development in practice. The direction of these relationships manifests itself as trends, but they also have the form of the specific facts.

Following this line of reasoning, it should be noted that:

- sustainable development:
 - is both existence and action-oriented and the principle of sustainable development

says that action cannot take place at the expense of existence and *vice versa*;

 is in favour of observing axioms, natural law and paradigms, but the paradigms which are controlled and verified by axioms and natural law. Such is the condition of obeying the principle of sustainable development (see Fig. 1).

Both the principle and the concept of sustainable development are based on axioms and natural law, on achievements of Greek and Roman philosophy and on achievements of later philosophers, using the achievements of the ancient classical philosophy. The issue does not need to be extensively highlighted in this paper. The thing that is more important is the answer to the question: which philosophical concept is the concept of globalization based on, implemented also to a large extent?

- the process of globalization:
 - is primarily action-oriented;
 - action requires skills, technology and knowledge, as well as certain paradigms, and this state of affairs is natural and it is also present in the concept of sustainable development;
 - a problem arises when axioms and natural law tend to be replaced by paradigms to a large extent;
 - it caused a revolution in the field of science and the methodology of science. Skills became the content of science, eliminating ethical and intellectual reflection. Basic and general sciences were replaced by exact sciences, and in the methodology of bivalent methods (which allows to evaluate ex ante) by mathematical methods based on empirical data (often selective ones) and evaluating the phenomenon ex-post. (Piontek F., 2009, p. 9-14). Adopting such solutions paved the way for the dictatorship of relativism (De Matei, 2009) and totalization of the noosphere (consciousness. the superstructure in the globalization process). And loyalty to a particular paradigm became more important than intellectual honesty (Barbour, 1984).

Each concept of development, promising happiness of future generations, undefined in terms of time, has certain philosophical assumptions from which it originates. However, the paper does not focus on philosophical discussion. We limit ourselves to such aspects of philosophical premises that directly affect the shape, and then the implementation of the contemporary concept of development, such as the process of globalization.

In the discussion presented in this paper we use only two, indisputable statements about the philosophical achievements of Friedrich Nietzsche and about the expected outcomes of his achievements, which the author said himself: *radical rejection of values, existence without meaning and purpose* (...) *Nietzsche found the most handy formula for his philosophy* in the concept of *the will of power*. *The will of power* – it is a will of possibility, power, rule (Tatarkiewicz, 1958, p. 226). This category was discussed in detail by Z. Kuderowicz; (...) in addition to the diagnosis a proposal of a therapy also appears, in the form of a new, *intellectual world* created by Nietzsche (Kunzmann et al., 1999, p. 179; Tatarkiewicz, 1958, p. 222-226; Kuderowicz, 2004, p. 136-157);

W. Tatarkiewicz believes that F. Nietzsche himself saw the possible effects of his philosophy (Tatarkiewicz, 1958, p. 226; Kuderowicz, 2004, p. 67-75).

Therefore, in this paper we are not interested in what F. Nietzsche had in mind, or what he wanted to say or what he did not want to say, or who he addressed his philosophy to. These issues are neither the material object nor the formal object of this paper.

We have a reason to ask about the doctrine that underlies the concept of the process of globalization and of which it was said: there is no alternative -TINA. Such is the doctrine of neoliberalism. D. Rodrik believes that the relationship between neo-liberalism and economy is like between astrology and astronomy. Neither astrology nor neo-liberalism are sciences, but ideologies. So we know what we need to avoid (Maczyńska, 2009). And E. Mączyńska puts it more bluntly that neo-liberalism can be compared to liberalism like fundamentalism to the foundation (Maczyńska, 2009). Can such a doctrine be the foundation for implementing the process of management and development? We do not settle the dispute whether neo-liberalism is an economic or philosophical doctrine. Moreover, there are many definitions of the category. We cite the opinions and present the attempts to identify the category.

Neoliberalism (the concept of neoliberalism has been discussed based on D. Harvey) is a theory of political economic practices that proposes that human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets and free trade. The role of the state is to create and preserve the institutional framework appropriate to such practices. The state has to guarantee, for example good quality and power of money. It must set up those military, defence, police, and legal structures and functions required to secure private property rights and to guarantee, by force if need be, the proper functioning of markets. Furthermore, if markets do not exist (in areas such as land, water, education, health care, social security, or environmental pollution) then they must be created, by state action if necessary. But beyond these tasks the state should not venture (Harvey, 2005). While the first part of the definition does not raise reservations, the second one raises some questions. The question is who will

be given the title to the areas where the market does not exist, and who will decide about it? How can we compare this transfer of the title to the fundamental principles that neo-liberalism supposedly uses, namely: freedom, equality and democracy? Next D. Harvey concludes that *state interventions in markets* (once created) must be kept to a bare minimum because, according to the theory (and only the theory), the state cannot possibly possess enough information to second-guess market signals (prices) and because powerful interest groups will inevitably distort and bias state interventions for their own benefit.

G. Kołodko states that *neoliberalism is the deviation* of market relations, which means that the great ideals of liberal economy and politics are used, such as freedom, democracy, private property, competition to improve the material situation of the few at the expense of the majority (Kołodko, 2010, 2008).

A. Saad-Filho and D. Johnston point out that it is impossible to define neoliberalism in purely theoretical terms, because the concept of *neoliberalism includes* a wide range of social, political and economic phenomena of different levels of complexity (...). Despite transformation in the global economy and technological achievements (including the improvement of living standards of minorities), neoliberalism does not create effective basis for capital accumulation. (...) Neoliberalism is a global system of minority power, robbing nations and ruining the environment (Saad-Filho, Johnston 2005).

In this paper, we define a category of neo-liberalism from the side of its origins and we present it in graphical terms:

Neoliberalism = liberalism = power + nihilism =central values of civilization + deviation caused by the negation of axiology and natural law, which translates into deviations in economic and social areas

It should be emphasised that it is wrong to use the terms of liberalism and neo-liberalism interchangeably. A category of liberalism in terms of neo-liberalism is used in a distorted way.

The graphical presentation of the neoliberalism category (Fig. 3) is closely linked with the graphical presentation of the category of development (Fig. 1), and the relationships justify the appropriateness of the adopted criteria diversifying the contemporary concepts of development, i.e. the relationship to existence and action and to axioms and natural law and paradigms.

The functioning of the above criteria in practice can be illustrated as follows:

 with regard to the primacy of action over existence – on the example of a corporation in the processes of shifting social and environmental costs on the environment (e.g. generating unemployment by moving production to places



Figure 3. NEOLIBERALISM category – graphical presentation. Source: Own study and (Tatarkiewicz, 1958, p. 222-226; Kunzmann et al., 1999, p. 179).

where it is possible not to comply with environmental and social requirements. Some of the measures of the primacy of action over existence include: 1) the ratio of CEO's salary to the median of earnings of workers, which in 1970 was 30: 1, it increased to nearly 500: 1 in 2000 (Harvey, 2005), 2) the measure of income accumulation: in 1976 one percent of the richest Americans received 8.9 percent of total revenue, in 2007 – 23.5% (Rybiński, 2011).

Such an approach is supported by paradigms, such as, *inter alia*, the sixth and eighth rule of technology:

- climb to the top. After the success a step back (6), including a possible liquidation of the company;
- no harmony everything is fluid In search of a stable disequilibrium. This means that the primary task of the new economy is to dismantle the industrial economy – a

company after a company, industry after industry (Kelly, 2001).

We do not deny that there is a need to maximize profit and make changes or technological progress. We only show the proper system of priorities and criteria: survival, investment and growth and profit. This means that profit cannot be the sole objective (Pawłowski, 2012, p. 9). Indeed, in network companies maximizing profit is a priority because their priority, in addition to profit, is to survive.

- replacement of axioms and natural law with paradigms can be illustrated based on the fifth rule of technology: *first feed a network. What is good for the network, is good for its users* (5), which essentially replaces the principle of contradiction and is the principle of universal standardization. It manifests itself in:
 - rejecting anything that does not live up to the standard, not only in the option of minimum (which is usually a positive

thing), but also in the option of maximum (although something better than the standard is not accepted);

- shaping human behavior by standards (e.g. law) while rejecting ethical norms. However, law cannot replace morality. Good law should support ethics and morality. Law and morality usually go hand in hand, at least in one direction. What is prohibited by law and what is punishable, it is widely perceived as immoral simultaneously. However, what is generally considered as immoral is not always prohibited by law. This vice versa untranslatability poses a kind of danger (Matuszak, 2012);
- replacing objective truth (assessed on the basis of axioms) and objective good with truth and consensual good (Kołodko, 2008, pp. 12-13) which could be determined by teams of experts, referenda, etc.).

The discussion presented in section 3 of this paper shows that:

- the contemporary concepts of development can be diversified and evaluated *ex ante*, analyzing how they are based on the category of development;
- isolating in the discussion the criteria and their relationships to analyzed concepts results in different practical solutions.

4. The effects of the contemporary concepts of development in the real dimension as a verifying and diversifying criterion

In practice, different effects of the implementation of the contemporary concepts of development, which are the criteria diversifying *ex post*, can be illustrated in the following areas: the relationship to shaping and defining the function of consciousness, the relationship to the market, state and money, the relationship to technology, to the category of efficiency and the way how the contemporary concepts of development are transformed into a model of local development.

The relationship to shaping and defining the function of consciousness

Each socio-economic formation, and you can say that also the concept of development, which essentially seeks to shape the new formation, consists of a base (broadly defined production forces) and the superstructure (Lange, 1963). An important component of the superstructure is consciousness, both social and of an individual. At this stage consciousness is treated as an economic and deficit commodity, which leaders of the economic life, politicians etc. seek to acquire, using broadly understood marketing.

Consciousness is also a component of economic policy and public management, which determine the multiple choices made both by citizens and the state (Stiglitz, 2004, p. 19-29, 286 et seq). Nowadays it has also been understood that in many cases, instead of searching new areas of demand, i.e. transforming costly production forces, sometimes it is more costeffective to transform consciousness. And A.Toffler highlighted the need for change in consciousness, in connection with the implementation of the third wave, including the process of globalization: This mentality is today a major obstacle hindering the creation of an effectively functioning civilization of the third wave. The new civilization brings (...) completely different consciousness (Toffler, 1997, p. 57, 45).

At this stage, the fight for developing consciousness is an attribute of both contemporary concepts of development, which means equality neither in possibilities of action nor in obtaining results.

In this area, the diversification of the contemporary concepts of development is related to:

- the predominant use of axioms and natural law (sustainable development), and on the other hand paradigms (the process of globalization);
- formulating objectives of developing consciousness, which can be either preparing people for making existential choices that are consistent with the goals and sense of human existence and actions (sustainable development), or totalization of consciousness, subordinate to paradigms: consumerism and hedonism;
- the relationship of consciousness to the base (production forces): in the first case consciousness is capable of establishing the direction of progress, growth and development based on production forces (sustainable development), and in the second production forces (including technologies and paradigms) determine the shape (and subordination) of consciousness, according to the accepted paradigms.

However, it should be noted that these attributes diversifying the contemporary concepts of development in the real dimension are not fully clearly contradictory, or fully separable in terms of developing consciousness. In practice, the implementation of the contemporary concepts of development is dynamic and is accompanied by specific interactions, and we pay attention to prevailing trends, which prove the validity of these criteria, mentioned in sections 2 and 3 of the paper. The relationship to the market, state and money

The market, state and money, as the areas where contemporary concepts of development are implemented, are presented jointly, as solutions undertaken in these areas share a common effect – they have an impact on sovereignty. Synthetically speaking, it could be argued that the loss of sovereignty (Friedman, 1991) – resigning from it consciously or less consciously – and elimination of the nation-state (Grupa Lizbońska, 1996, p. 51 et seq) are included in the process of globalization and the market, state and money are sub-areas where paradigms are pursued.

Both contemporary development concepts recognize the categories of the market, state and money, but they determine differently how they function.

A main component of the market is demand, which is more important than investment capital, and the way it is managed is strategic (Piontek B., 2012). In the process of globalization, demand in different scales (national, regional and local) is managed by global capital and the strength of global capital is not offset by the strong state (Pawłowski, 2012, p. 11). It should be highlighted that the profit generated by the demand is mostly made not by a manufacturer, but an intermediary, that is the owner of the capital. Thus, both the manufacturer and the consumer are only the profit generators to the varying extent. The result is negative for the system in the socio-economic and strategic dimension: equality, social justice, the rational use of the Earth's resources are pushed out of contemporary civilization (Pawłowski, 2012, p. 9).

Sustainable development treats managing demand, within each system, as the starting point and basis for implementing entrepreneurship and realizing development of the system (country, region, municipality).

In the process of globalization, a paradigm of free competition functions in the free market and in sustainable development a paradigm of fair competition is postulated.

In the process of globalization, it is the stronger one who wins and in sustainable development it should be the better one.

The free market and competition function in the short-term horizon and therefore they cannot perform strategic tasks, which tend to be handed over to the free market in the process of globalization.

The imperfection of the market functioning is also determined by uncertainty, incomplete information and free competition itself, which does not undermine the role and importance of the market category. Under these conditions sustainable development calls for a *fair market*.

Many economists believe that efficiency of economy (exchange, production, and the production structure) can be ensured as a result of the market mechanism. This mechanism regulates the relationship between the producer and the consumer. As it has already been mentioned above, it is the owner of capital, an intermediary, who has the largest power in the market, not the manufacturer nor the consumer. The paradigm of the free market functions in the globalization process, and the criterion that is accepted is called Pareto efficiency, which means that *resources (income) are allocated in such a way that it is impossible to make one party better off without making somebody worse off* (Stiglitz, 2004).

However, there are changes when the situation of some people (entities) is improved without deteriorating the situation of other persons (entities), but the overall disproportions between market participants increase (Stiglitz, 2004). Therefore, two questions arise:

- is the market mechanism able to correct these disproportions?
- is the market mechanism able to effectively enforce the institutional solutions, including those used in the free market?

So whether and when is the state necessary, also, as you know, the imperfect one?

In the process of globalization a sovereign state is no longer a guard of national sovereignty in all its key dimensions (Grupa Lizbońska, 1996). The withdrawal of the state and the rise in multinational corporations have resulted in the situation (...) that a sufficiently strong partner has not been developed, who could play a regulatory role in the relationship to multinational corporations, whose only goal is profit (Pawłowski, 2012, p. 9). The role of the state is sometimes reduced to the partly virtual sphere, to the tax collector, to the guard against minor criminals and to ensuring the happiness of the future generations, unspecified in terms of time.

Sustainable development adopts the principle formulated by J. E. Stiglitz that *the state is needed where the market fails* (Stiglitz, 2004). And the relationship between the imperfect market and imperfect state should be regulated by the rule included in Art. 5 of the Constitution, that neither of them can function at the expense of the other.

Money, whose flow is a circulatory system of socioeconomic life, determines how the market and the state function, and how the relationships between them develop.

The process of globalization, *inter alia* defined as *a river of free capital increasing day by day* (Martin, Schuman, 1999) and a stream of stateless money (Solomon, 2000, p. 23). This means that in the globalization process money performs key functions. Nevertheless, it should be noted that in this concept (and in the real dimension) money has changed its character and it performs its functions differently. If the essence of money was previously defined in the following way: *it absolves from obligations*, as far as the process of globalization is concerned, it can be said that money is used to create obligations (by incurring debts without ensuring that the actions financed by interest money is efficient). In this con-

cept money is also changing its function. For example, how money can be used as a measure of value, if its value is the virtual value, not corresponding to reality, including the separation from the global product. The estimated amount of money in circulation exceeds the value of the global product by a few to several times. While on the one hand, separation of money from gold has boosted growth, on the other hand, the size of the gap between the amount of money, and the global product is considered as a threat.

In the process of globalization, money also performs new functions. It is used to generate artificial demand, to shift demand from future periods to the present ones, to fix prices in future periods (e.g. futures), as well as to control both markets and states. Depriving oneself of own currency increases such possibilities and enables the globalization of threats. Sustainable development is possible to implement without the global stream of stateless money. It allows and calls for a lot of self-financing projects (Weizsäcker et a., 1999). It creates the possibility of non-credit management, of using cash flows based on barter money, which can ensure protection of its own demand with the real coverage (Piontek B., 2006, chapter 2.3).

Thus, sustainable development in the area of money may strengthen the sovereignty of the state and the market and limit their subordination to the shortage economy (This issue is discussed in the work of J. Kornai, 1985). The strengthening of the shortage economy destroys a widely understood *quality*.

The analysis shows that both contemporary concepts of development in the areas of the market, state, and money may result and result in clearly different effects, in particular with regard to sovereignty of states.

The relationship to technology

At the current stage *technologies (and techniques)* are defined as very broadly understood procedures, i.e. steps to follow – ranging from physical and chemical processes to the regulatory procedures (Ritzer, 1999). A following division of technology into two subsets is useful for our discussion: standardized (capital intensity-oriented) and non-standardized (labour intensity-oriented). This does not mean that the non-standardized ones are worse. In the area of technology we answer two questions about both contemporary concepts of development:

- how do they employ each type of capital (economic E, human L and natural P)?
- what kind of technology is used in these concepts and what effects does it have in the real sphere?

Presenting these issues synthetically, it can be stated that in the process of globalization capital intensityoriented technologies dominate and in sustainable development, in addition to those which are capital intensity-oriented, also labour intensity-oriented. Such situation is in developed countries. In the countries with cheap labour and where legal systems fail labour intensity orientation results in slavery. Such diversification determines how the individual types of capital (E, L and P) are employed. Differences in the two concepts to employing the types of capital can be illustrated as follows (see Fig. 4):



Figure 4. Differences in employing types of capital in the contemporary concepts of development. Source: Authors' own study.

In the process of globalization capital (economic E and natural P) can be employed without human capital L. What does it mean? It may result in widely implemented advanced technologies, but also (for developed countries) in moving production to the so-called countries of cheap labor and low environmental and social requirements (Piontek B., 2006, p. 108-112).

Indeed, the model of the twenty-first century, 20: 80 and titty-tainment are called *the model of the future world* (Pawłowski, 2012). It says that in order to keep the global economy going, just one-fifth of the population (L – technological intelligence) is enough. However, it does not preclude employing and exploiting cheap labour. In turn, the unemployed and the poor are necessary to secure demand and consumption of cheap products, including poor quality food, which in turn allows the creation of new profitable markets, such as a waste market, or ensures the condition of the existing markets, for example of the pharmaceutical market.

A separate issue is using the technology of shadows, which may limit, also with a positive result, the use of natural capital (P) (Fiedor, 2002).

In the process of sustainable development human capital (L) is involved in employing economic (E) and natural (P) capital. Sustainable development does not preclude the advanced technology, but it only proposes the diversification of the technologies used. *The Factor Four* is a practical example (Weizsäcker et al., 1999).

A graphical model of the functional relationship between technological progress (T) and the process of globalization (E – on the X axis) and sustainable development [(E: L: P) – on the Y axis] is presented in Fig. 5.



Figure 5. The relationship between technological progress (T), the process of globalization (E) and sustainable development (E: L: P). Authors' own study.

The following conclusions can be inferred from the analysis of Fig. 5:

- the segment (GG_n on the X axis), which in the interval (KK_n on theY axis) corresponds to an exponential curve (W1Wn) and in the interval (OK on the Yaxis) a curve (W1WZ on the X axis) is not the interval of the higher stage of development. It is the interval within which development has been dominated by the exponential growth (E2) with all its consequences for economic (E), human (L) and natural (P) capital. The effects of implementing the process of globalization;
- figure 5 shows very clearly that sustainable development is primeval and natural, and it corresponds to the segment (GI) on the (X) axis, and which is accompanied by economic growth (OW1) a component of sustainable development and the process of globalization;
- economic growth in the interval (GI and OK) is not accompanied by the generation of bad structures (D). This rate of growth, albeit slower, enables maintaining the structural order [the ratio between the growth rates of its components (Sulmicki, 1962)] and authorizes the use of the term *sustainable development*;
- in figure 5 the area of bad structures (D maximizing the negative ones) includes: unemploy-

ment, a growing scale of mass production, consumerism and hedonism models and aggressive marketing, the waste, the growing stratification between the rich and the poor.

The discussion in the area of technology (Figs. 4 and 5) clearly shows that both contemporary concepts of development are diversified by their relationship to technology and the consequent effects in the real dimension.

The relationship to the category of efficiency

A category of efficiency and the relationship of both contemporary concepts of development are another area diversifying these concepts in practice. The validity of this statement is confirmed by E.U. von Weizsäcker et al., calling for a *revolution of efficiency*, showing the reasons that are in favour of the revolution, and they say: *you need to avoid situations in which the companies incurring a greater risk for the revolution of effectiveness are punished for it* (Weizsäcker et al., 1999, p. 12-14).

Regarding our discussion it should be added that development also means pursuing well-defined, ranked and accepted priorities, which is determined by the type of efficiency being used.

The essence of the category of efficiency is the relationship between results and investment: P/N or N/P.

Efficiency has a necessary condition, and it is the relationship of result to investment (P/N) and a sufficient condition, i.e. benchmark (r) (Piontek, Piontek 2003).

As far as these conditions are concerned, two basic types of efficiency should be distinguished:

- *economic efficiency*, which is a relationship between result (economic) and investment (economic) related to the criterion (r) for example, the average interest rate in the money market, the average rate of return in the industry. This kind of efficiency is relative and determined by criteria and it is used in the market private sphere;
- social efficiency, which is the relation of result to investment, but here the result is a well-defined priority, whose value is invaluable, and the estimated cost of abandoning such a priority - very big. This kind of efficiency is absolute and not determined by criteria. It can be equated with effectiveness. That kind of efficiency should be used to evaluate the activities of non-commercial (healthcare, education) entities and the functioning of public institutions (state and self-government). Social efficiency is related to economic efficiency by applying the principle of minimizing investment (maximizing savings), when priorities are pursued to the required degree.

The following should also be distinguished: socalled integrated economic, ecological and social efficiency, which is the sum of the relationships: economic results and investment, the environmental priorities and investment and social priorities and investment, related to a criterion, for example of the rate of return (r), corrected by law regulations (K), correcting unfair benefits at the expense of economic, environmental and social spheres. The principle of sustainable development is the reason for distinguishing these types of efficiency.

With regard to the distinguished types of efficiencies the following can be stated:

- the process of globalization is largely subordinated to a narrowly understood economic efficiency, which is used in the free market and in so-called free competition. This is confirmed by the fact that absolute commercialization of healthcare and education etc. is the goal. (Polak, 2012);
- sustainable development should primarily focus on social efficiency at the level of municipality and state, which is connected with economic efficiency by the principle of minimizing investment, when at the same time priorities are implemented to the required degree.

 In the private sphere, in addition to applying economic efficiency, such conditions should be created, with the help of institutional solutions, that will effectively stimulate private capital to achieve the integrated economic, social and eco-efficiency.

The following conclusions can be inferred from the discussion on **the relationship to efficiency:**

- the relationship to efficiency diversifies both contemporary concepts of development;
- the distinguished types of efficiency can be used neither voluntarily nor interchangeably. A principle which applies is the principle that a type of efficiency used corresponds to the nature of the undertaking (the entity) being evaluated (Piontek F., 2000).

Comments on ways of transformation

A detailed discussion about how to transform the contemporary concepts of development into the local system goes beyond the scope of this paper and requires separate presentation. Therefore, we limit ourselves to presenting this issue synthetically.

Both of the contemporary, global concepts of development correspond to two different models of local development:

- the process of globalization a model of the island of opportunities, open to the external funding and to managing demand and the potential by third parties;
- sustainable development models of niche development, focused mainly on using the local potential and local demand to stimulate the processes of growth and development of local systems. It also does not exclude the participation of third parties.

Furthermore, in models of local development both of the concepts diversify detailed operational goals concerning the following: priorities and means of action, conditions of action and evaluation measures.

Conclusion

The analysis of the criteria diversifying the contemporary concepts of development, i.e. the process of globalization and sustainable development leads to formulating a few important issues that can and should be a challenge to initiate further studies, namely:

- does the subject scope of a properly defined category of *development* include and can it accept the multitude of so-called concepts of development?
- What should the stages of organizing the relationship between categories of development and the so-called alternative catego-

ries such as: economic growth, technological progress, progress of civilization be? Is it possible to subordinate these relationships on the basis of repairing the results of *the end of the pipe* (comparison to environment protection)?

- What should the stages of organizing the relationship between axioms and natural law and paradigms be? How to evaluate and verify paradigms?
- who should make efforts to organize these issues?
- who should development serve and who should be the subject of development?
- to what extent it is possible to create alternative solutions in terms of the current mainstream of the paradigm TINA?

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Mineral energy sources and political activities: introduction to mutual dependencies and their selected exemplification¹

Mineralne zasoby energetyczne i działania polityczne: wprowadzenie do wzajemnych zależności i ich wybrana egzemplifikacja

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Abstract

The mineral energy sources, possessed by a certain state or remaining an object of interest for it, may form a basis for political activities, both oriented on usage either of the purely political (non-militarized) or militarized methods. The usage of these sources in the political context may have a natural impact on the essence of sustainable development, especially then if to juxtapose it with previous experiences of the mankind. The natural gas based energy policy seems to be the key factor for the above political activities of states with imperial ambitions, as the contemporary Russia. Referring to the shale gas, the syndrome as such concerns the monopolistic position of the USA in terms of the applied exploitation technologies. The size of coal mining and steel production at the turn of the 19th and 20th century, or oil fields' possession and their usage before and during WW II used to play such a role in the past. In both of these cases there were necessary prerequisites for planning the military campaigns in potential wars (envisaged as successful indeed). Fortunately such an extreme way of conducting political activities is not confirmed today. Following the same trace the policy of the possessed energy sources' usage, or taking over those being in possession of others, might ultimately lead towards maintaining an economic and perhaps political supremacy of ones over others. On the one hand it demonstrates the policy of pressure led by stronger, imperially oriented states against weaker and dependent ones. On the other one, it shows the results of the mutual antagonizing policy of the latter stimulated by the stronger state- and non-state-like entities, having their own interests. Due to some experiences, taken from the most recent past, one can speculate, if the possessed or desired energy sources may be utilized as a tool for unequivocally political decisions, also in the military sphere. It is hard to be optimistic bearing in mind the rule that history tends to repeat itself. Such scepticism is even deeper if we realize that the control over the water reserves remains a source of the future large-scale international conflicts.

Key words: sustainable development, policy/politics, mineral energy sources, political supremacy

Streszczenie

Mineralne zasoby energetyczne, posiadane przez dane państwo lub będące obiektem jego zainteresowania, mogą stanowić podstawę do działań politycznych zorientowanych na użycie tak metod czysto politycznych, jak i zmilitaryzowanych. Wykorzystanie tych zasobów w kontekście politycznym może mieć naturalny wpływ na istotę

¹ The article is a revised and significantly extended version of the presentation delivered by me during the **Club of Rome** Annual Conference, titled *The Power of the Mind*, Bucharest (Romania), September 30-October 2, 2012.

zrównoważonego rozwoju wtedy zwłaszcza, jeśli zestawić to z wcześniejszymi doświadczeniami ludzkości. Polityka energetyczna opierająca się na zasobach gazu wydaje się być czynnikiem kluczowym dla wzmiankowanych powyżej politycznych działań państw z ambicjami imperialnymi, jak współczesna Rosja. W nawiązaniu do gazu łupkowego syndrom taki dotyczy z kolei monopolistycznej pozycji USA w zakresie stosowanych technologii wydobywczych. Poziom wydobycia węgla i produkcja stali na przełomie wieków: XIX i XX lub posiadanie pól naftowych i dysponowanie nimi przed i w trakcie II wojny światowej spełniały taką rolę w przeszłości. W obu tych przypadkach niezbędne okazywały się także przesłanki na rzecz planowania kampanii wojskowych w potencjalnych wojnach (oczywiście przewidywanych jako zwycieskie). Tak ekstremalny sposób politycznego działania nie ma szczęśliwie swojego odzwierciedlenia obecnie. Podążając tym śladem polityka wykorzystania posiadanych zasobów energetycznych, albo przejęcia będących w posiadaniu innych, miała ostatecznie doprowadzić do utrzymania przewagi gospodarczej i przez to politycznej jednych państw nad drugimi. Z jednej strony demonstruje to politykę nacisku prowadzoną przez państwa silniejsze, zorientowane imperialnie przeciwko państwom słabszym i zależnym. Z drugiej wszakże pokazuje, do czego może prowadzić polityka wzajemnego antagonizowania tych ostatnich, stymulowana przez kierujące się własnym interesem silne podmioty państwowe i niepaństwowe. Na kanwie doświadczeń z najnowszej przeszłości można spekulować czy posiadane lub pożądane zasoby energetyczne będą wykorzystywane jako narzędzie do podejmowania działań jednoznacznie politycznych, w tym militarnych. Trudno być optymista, jeżeli przypomnieć regułę, że historia lubi się powtarzać. Ten sceptycyzm pogłebia się, jeśli przyjąć, że źródłem przyszłych konfliktów międzynarodowych na dużą skalę staje się kontrola nad zasobami wody.

Słowa kluczowe: rozwój zrównoważony, polityka, mineralne zasoby energetyczne, supremacja polityczna

1. A concise introduction to the nature of sustainability and political activities

The sustainable development as generally understood concept refers to such actions to be undertaken which may comply with the needs of the current generation without depriving future generations of their ability to meet their own needs (Bruntland, 1987). Thus any responsible debate of how to avoid the crises, understood however on much wider scale than only within the socio-economic sphere, is juxtaposed with the concept of sustainability (Zacher, 2007, p. 141 and further). The assumption as such seems to be entirely natural since the latter is seen as an idealistic positive state of affairs (including social, economic, environmental, cultural and governance) that we all should aspire to achieve (Zacher, Marinova, 2007, p. 1). Since I am political scientist the approach to the political aspect of sustainability, but placed within the wider perspective seems to be very inspiring for me in particular. The political activities are not shaped within the vacuum indeed. Thus the considerations to what extend purely political decisions depend on the wider context, e.g. motivated by the economic power, but also culturally imperialistic awareness always belonged to one of the most fascinating problems for many intellectuals.

The sustainable development may be perceived as cognitively and analytically perceived tool of how to avoid speculated global disaster. Having in mind the latter there is no doubt the rational argumentation chosen by decision-makers has definitely to overcome the irrational one. This is the way which mankind has to consider now in order to begin with solving their fundamental problems in the future. In such a way the previously formulated fears, referring to the concept of crisis may be placed as the opposite to sustainability which is perceived here as panacea. Hence the rational arguments on the global scale have to be formulated first, and at least generally approved, and concrete and well-planned steps may follow afterwards. However the consensus here is still far to reach, what is transparently manifested by these scientists' approach, who oppose e.g. global warming². Another interesting fact is, that also the intellectuals who once supported the concept of sustainability still take part in the debate, but represent critical approach to it. The latter is interestingly manifested by e.g. Dennis Meadows, who introduces the concept of survivable development. He explained its essence in his presentation during the annual - in 2012 - conference of the Club of Rome in Bucharest on October 2, 2012. He places it as a notion which matters for the future, but refers it to smaller communities like people living in rural communes or blocks of flats, and families. Due to Meadows the survival oriented activities of such small entities may show of how to overcome some challenges in the future, and in more effective way than on the global scale.

The approach to the liberal capitalism remains currently a hot debatable item among many intellectuals. It is expressed frequently by their criticism towards ineffective decision-making process within the democratic state, the misuse of the natural sources, and unreliable financial system. It was directly formulated by *Jørgen* Randers, but is also mentioned by some other authors, to quote Ugo Bardi and his recently published book *Der geplün*-

² E.g. Leszek Kuźnicki from the *Poland 2000 plus Prognoses* Committee of the Polish Academy of Sciences consequently maintains that global warming is less dangerous than global cooling.

derte Planet (Plundering the Planet) or the contributors to the common book Money and Sustainability: The Missing Link written by Bernard Lietaer, Christian Arnsperger, Sally Goerner, and Stefan Brunnhuber. Jørgen Randers together with Meadows is one of the co-authors of the famous Limits to Growth - areport to the Club of Rome published firstly in 1972. In 2012 he focused the attention of many readers in the world by publishing his newest book (a subsequent report to the Club of Rome) titled 2052 A Global Forecast for the Next Forty Years. In fact he does not perceive it as a typical forecast. I spoke with him on that during the above conference in Bucharest. He admitted openly (and more or less in provocative way) that his research was concentrated on the endeavours on that what happens and not on that what may happen. The book itself is perceived among intellectuals in very diversified, if not critical way. Randers, himself a climatologist, is interested in almost all the fields of human beings activities and their future shape, hence he refers to economies, energy, natural resources, climate, food, politics etc. He is definitely critical to the current significance of the democratic decision making, which is an obstacle for the smoothly arranged governance of divided societies. He seems to be simultaneously fascinated with the growing economic and political role of China. He demonstrated it while in the Bucharest conference by saying in his presentation that the Communist Party of China is sensitive to the wish of majority to get rich and not sensitive to temptation of dictatorship. This definitely interesting and outspoken admiration to economic and political pragmatism encourages me to begin with the short introduction to political activities.

The phenomenon of politics in its wide understanding as a fusion of conceptual and practical approaches remains one of the most fascinating and cognitively fertile notions within the humanities and social sciences. In fact the politics itself has many meanings which depend on the individual and cultural experiences and habits. In this respect Bernard Crick's considerations deserve to be mentioned as a relative novelty. His revised perception of politics as a way of governance over divided societies without needless violence seems to be entirely idealistic indeed (Crick, 1992). In fact there has always been a place for violence within political activities, which, however, not always yielded fortuitous results. The threat of violence was sufficient to achieve one's aims in very many cases, as with e.g. the infamous 1938 Munich Agreement and Czechoslovakia's (coercive) consent to be partitioned. By his approach Crick demonstrates that he refers first and foremost to the political systems which tolerate the opposition. He also suggests in this way that politics in his understanding should be interpreted as a phenomenon that would be mainly applicable in the system of government typical of the liberal democracy traditions. This view is usually well exemplified in practice, however, it also narrows down the historically verified meaning of the term politics. Thus Crick maintains that politics is a sort of activity which enables to reconcile the interests of various social groups living at an area and subject to one power. These groups are granted the access to the power proportionally to their importance for the survival and well-being of the whole community (Crick, 1992).

However the history of mankind has shown very clearly that militarized political activities, namely in the form of war, are also politics *in extenso*. This claim has in fact a long history – it was made a long time ago by Carl P.G. von Clausewitz. He was a Prussian general and writer, but above all theoretician of war, which he confirmed in his famous book *Vom Kriege [About War]* (Herberg-Rothe, Honig, Moran, 2011; Ryszka, 1975, p. 35-38 and passim). There were some agendas which have been pursued by coercive methods whether they involved coercive persuasion or military activities, which are perceived as an extension of *purely* political activities, namely of non-violent nature.

While observing the socio-political and economic history of Europe its internal solidarity is not noticeable as a long lasting phenomenon, but rather the preferences of individual states, once with powerful aspirations, matter more. In modern times European powers constructed a pattern for such activities (Kennedy, 1994, passim; Kissinger, 1996, passim). Consequently the latter tendency created in many cases a rather unconstructive instead of constructive influence on the states' future cooperation on both scales: bilateral and global one. It still continues in contemporary times and consequently complicates the prognoses for Europe and the rest of the World indeed. Thus I presume the irrational factor's influence on the decision-making process has to be taken into consideration with great attention also now in the époque of globalization.

It should be added that the phenomenon called solidarity within Europe or between European states still remains one of the most fertile and often mentioned European myths. Thus some examples of the above phenomenon would last only for shorter periods, e.g. during the Christian wars (crusades) to win back the Holy Land from the Muslims particularly in the 11th and 12th centuries. In fact it was the solidarity among European powers mostly, e.g. after the Congress of Vienna, which lasted until the Crimea war outbreak in 1854 (Kissinger, 1996, p. 82-108), and not with other smaller states or stateless nations. The latter entities' perception might be changed but only due to current geopolitical interests of the continental powers. Let us quote the France interest towards Italian independence movement in the 1850s, and practical lack of it towards the Polish January uprising in 1863 (Zamoyski, 1997, p. 284). This selective approach to the solidarity issue continues until now and depends solely on the superpowers' interests and not

on moral issues at all. Thus it is not a democratic deficit which matters significantly in today's politics of the European Union. With exclusion of the short period after the collapse of Berlin Wall in 1989 it is rather the solidarity deficit which matters most.

2. Effective and ineffective policy. Selected historical examples

As it was mentioned above, an important reason for getting involved in politics was to fulfil own goals both by political and military means, with the possibility of changing the allies. This naturally brings to mind the rule formulated by sir Henry John Temple, better known worldwide as lord Palmerston, a leader of British Liberal Party and Prime Minister twice: 1855-1858 and 1859-1865 (Brown, 2010). He is well-known for the phrase about the *changing allies but permanent interests* of Great Britain. Literary the proper quotation is as follows: *We have no eternal allies and we have no perpetual enemies. Our interests are eternal and perpetual, and these interests it is our duty to follow* (Kissinger, 1996, p. 101; *The New Indian Express,* 2011).

The above sentence is the core prerequisite for effectiveness in political activities. Simultaneously its approval as a constant and sole rule forms the basis for the cynical treatment of other participants in these activities, which may be understood as political pragmatism in its euphemistic form. Winston Churchill seems to be a classic follower of Palmerston, which is reflected in some of the Churchill's political dictums. The most famous one refers to democracy although it does not concern directly Palmerston's axiom. On November 11, 1947, Churchill said that democracy is the worst form of government, except for all those other forms that have been tried from time to time (Democracy and Churchill, 2003). His cynical and rigid reference to Palmerston's opinion - by some British intellectualists called the Churchill's specific sense of humour, which I personally heard while attending some research conferences - was manifested by him transparently in many other cases. Let us quote two of them. The first one concerns the outbreak of the Irish Civil War in Dublin on June 28, 1922. While the Four Courts (Dublin Tribunal – WK) was burning, Churchill was asked in the House of Commons about its great law library and irreplaceable records and documents (Cronin, 1980, p. 152-153). His comment was symptomatic: a State without archives is better than archives without a State (Cronin, 1980, p. 153). Churchill has been extremely pragmatic also in his statements of the role of Josip Broz Tito's partisan army in the struggle against the Nazi Germany in the Balkans during WW II. General Fitzroy Maclean, the then British emissary working with Tito on behalf of Churchill, once realized Tito was a Communist. The British Prime Minister replied by saying that neither Maclean nor Churchill will be living in Yugoslavia

after the war (Koseski, 2002, p. 158; New York Times, 1996).

Contrary to this sort of cynical, but finally effective political activeness is the missionary approach to it, which often ends with futile results. Thus, there are not many examples in history of political effectiveness without cynicism. The foreign policy of Polish-Lithuanian state known as the Commonwealth of Both Nations until the end of the 18th century remains here a special and simultaneously misfortunate example. In order to exemplify it some cases deserve to be mentioned. The first one concerns Hungaro-Polish involvement in the anti-Turkish crusade in 1443-1444, and the second one refers to the mostly Polish involvement in 1683 in the battle which finished the Turkish siege of Vienna. Hungary first (until beginning of the 16th century) and then Poland (until the end of the 17th century) played the role of a rampart of Christendom. antemurale Christianitatis in Latin (Davies, 1981, p. 125 and further; Zamoyski, 1997, passim), during the Ottoman Turkey expansion in particular. Due to the partitions of Commonwealth - by Russia, Prussia and Austria its political and military position deteriorated and finally resulted in a loss of its independent status in 1795.

However some 20th century (and early 21st century) examples confirm that ethically oriented political activities might bring successful results for some leaders and the movements led by them. It is well manifested by Mahatma Gandhi's, Nelson Mandela's, Martin Luther King's, the Dalai Lama's, and even Aung San Suu Kyi's – the Burmese democratic opposition leader – philosophy of pacifist political actions. On the other hand, they do not confirm the general rule for effective politics across the centuries, which in most cases is less ethical and more pragmatic and, in fact, deliberately egoistic.

3. The mineral energy sources and a temptation for political supremacy – some cases

The exploration of mutual dependencies between mineral energy sources and political, including military, activities may be exemplified by a very rich tradition confirmed on a broad international scale. In terms of results it is often manifested by a temptation for political supremacy. It may also be a proper measure of the effectiveness of political activities. Several cases mentioned below are my own selection and may be supplemented by many others indeed. At the turn of the 19th and 20th centuries coal mining industry and steel production became the basis for global and militarily verified supremacy. It was a political issue within the internal realities of the rapidly industrializing European powers and the United States of America. These two spheres formed the hinterland for economic, political and military competition between the II German Reich and Great Britain in particular. The German sources of the iron ore in Lorraine guaranteed the large scale of steel production and stimulated Berlin's appetites for their usage (Tarle, 1957, p. 16-21). Thus this competition finally became a catalyst for the imperially oriented policy of these two powers, which ultimately led to the outbreak of WW I. The newly born large industrial entities deliberately endorsed and accelerated this competition. The other then powers, excluding France perhaps, belonging to both military blocs, namely Austro-Hungary, Italy, Tsarist Russia, and Ottoman Turkey, were not able to cope with that challenge. They were rather dedicated to their geopolitical and colonial ambitions on a large (France, Russia), and regional (Austro-Hungary, Italy) scale (Ferro, 1997, passim; Moczulski, 2000, passim).

The temptation to reach supremacy does not necessarily refer to the endeavours of the main political players, namely, the global powers. It may also serve as a *temporarily applied blackmailing tool* of nominally weaker entities towards the stronger ones and is manifested as a sort of regional solidarity against the common enemy's supporters. Such a decision was announced by the Arab members of the OPEC (Organization of Petroleum Exporting Countries), including Egypt, Syria and Tunisia, in October of 1973. They forced the oil companies to increase the oil prices to an enormously high level. It was their reaction to the USA decision to supply weapons and other logistic supplies to Israel during the Yom Kippur war. The embargo continued until March of 1974 (OPEC states..., 1973; Horton, 1973; OPEC Oil Embargo, 1974).

The possession of energy sources may also form a *basis for pro-independence activities*, as well as a *guarantee of stable statehood in the future*. This special case fits neatly endeavours and argumentation of the Scottish National Party (SNP) towards Scottish independence. The discovery of oil fields in the North Sea off the coast of Scotland created an economically and politically fertile ground for such argumentation. During the 1970s the slogan *It's Scotland's oil* became part of it and is currently used in the pre-referendum campaign for Scottish independence (Kaczorowska, 2009, p. 297; SNP, 2013).

The policy of large regional powers towards nonmilitarily manifested supremacy over weaker states in the region has been for some time manifested by Russia and her natural gas based political activities versus Poland and Ukraine in particular (Opioła, Omelan, 2012, p. 7 and passim; *Russia/Ukraine: Gazprom...*, 2012). Thus the traditional Russian expansionism accompanied by the authoritative political culture and imperial past is frequently recalled here as a phenomenon still in existence (Whist, 2008, p. 22-25). It is fair to say that also the USA natural gas based policy is often identified as monopolistic, however, America is perceived almost uncritically in Poland, in contrast with Russia.

Let us put aside the criticism of Russia's rigid energy policy, which in fact is a cognitively interesting

proof of the linkage between the Russian Gazprom's desire to make profit and Russian government's to use the dominating position of the former. Paradoxically such a policy may be perceived as a potentially positive factor for the Central-East European countries' regional identity, but in fact it is not. It might be also dangerous for Russia in her former temporary financial troubles, as it was shown sometimes at the Moscow stock exchange in particular. In one aspect it verifies negatively the (non)existence of the already mentioned solidarity within the region and also within the EU common space. In official statements Germany's pro-Nord Stream policy with Russia as a partner was oriented on economic gains only, hence from the purely economic viewpoint it is a reasonable venture, but it is short sighted in terms of mutual confidence of the states in the region, not to mention the ecological risks (Nord Stream..., 2013). The other verification of this solidarity deficit came from Norway, a country which is not interested in delivering its gas for preferential prices to these countries, which feel uncomfortable with one supplier only, namely Russia (Opioła, Omelan, 2012, p. 9-10). Such a gesture would not cost Norway too much and above all may have a positive impact on the spirit of cooperation. At the same time, the once presented Swedish or Finnish readiness to criticize the Nord Stream issue did not appear to be a strategic approach, but rather a tactical action with some military and ecological concerns in mind (Whist, 2008: 30-35). It may be called a one-sided approach. Poland's critical attitude towards the Nord Stream does not seem to be sincere either, particularly given the fact that Poland has become too dependent on the American military technologies on the one hand and constantly suspicious towards Russian policy intentions on the other.

At the moment it is hard to predict how the shale gas may influence the position of those states which have their natural gas fields. However there is only one state, which has an evident supremacy in the shale exploitation technologies, namely the USA. Therefore further progress in shale gas mining may undermine Russia's natural gas monopoly in the Central-Eastern Europe. On the other hand there is a large criticism from the ecological organizations towards any undertakings in this matter worldwide (Energy in Depth., 2013). The critical approach towards the US such practices became an object of interest among the film makers either, to quote Promised Land, the Gus Van Sant and Matt Damon movie, shown in recent 2013 Berlin Festival (Berlin Film Festival..., 2013).

The last case study here, not so well known, but fascinating cognitively and analytically, refers to the Gran Chaco War of 1932-1935. Therefore it is analyzed in greater detail than the ones above. This conflict serves as one of the most transparent proofs of the powers' and large-scale corporate entities' intrigues resulting in the military conflict between less powerful and manipulated states³. The key prerequisites for this war were the approximate oil-fields exploitation together with large-scale corporate entities & states' interests, and intra-continental states' competition. The Gran Chaco area is located in the South-American interior and comprises a large steppe plain, triangular in shape, 150 000 sq miles in area, embracing part of Bolivia, Paraguay and north-western Argentina (Mroziewicz, Rómmel, 1973, p. 57). The object of the long lasting dispute between the two first mentioned states was part of Argentina called Chaco Boreal. For decades its main attraction were woods rich in the species of a tree called quebracho (Rómmel, 1972, p. 96), which provided sought after tanning extract. In the colonial times this area belonged to the Caracas Province, which later became the independent Bolivia. The latter state had more rights to it according to the rule uti possidetis juris what means that the Latin American states have the right to own the areas of the former colonial administration from which they come (Rómmel, Mroziewicz, 1973, p. 58). Paraguay, on the other hand, kept recalling the rule that already in the late 18th century the governor of the province ordered to build defensive forts on the right bank of the river Paraguay. It was motivated by the fact that the access to Chaco Boreal was easier from Paraguay than from Bolivia. Consequently, in the early 20th century, the Paraguayan government granted concessions to the foreign capital to exploit the forests. Simultaneously the attempts at settling the dispute were taken mainly by Bolivia.

In the late 1920s the dispute about Chaco Boreal went much further than just the conflict of interests of the two states. In 1926, disregarding Argentinean pressure, the government of Bolivia granted the American petroleum company, Standard Oil, a licence to work at the disputed area (ca 23 million of acres, Rómmel, Mroziewicz, 1973, p. 60). The company carried on considerable development work, drilling and refining. But there was no outlet for this oil except through Paraguay, Brazil, or Argentina. Brazil (...) generously offered a port on the Parana, but Paraguay, controlled by Argentina, thereupon refused to let the oil come through except under conditions Bolivia would not meet (Beals, 1940, p. 340). Standard Oil was checkmated. Argentina itself represented indirectly the interests of another petroleum company, the British-Dutch Royal Dutch Shell. So finally Paraguay and Bolivia went to open war in 1932, although the first armed incidents had begun already in 1928. It is quite obvious that both states, but Paraguay to a greater extent, were victims of Argentina's scheming and imperial ambitions. Thus the bitter comment of the latter made by journalist, Hubert Herring that the chief sinner is Argentina (,,,) deliberately egging Paraguay on in order to weaken

Bolivia and to give Argentina the chance to extend her economic thrust seems particularly acute (Beals, 1940, p. 342).

The direct struggle ended with a ceasefire agreement in June of 1935, and the final peace treaty was signed in Buenos Aires on July 28, 1938. Fierce fighting took place in uninhabited, covered with the jungle, often deprived of water, areas. Paraguay gained the military victory, but at the price of 50 thousand of lost soldiers and officers. The losses of Bolivia were still greater, reaching 70 thousand (Mroziewicz, Rómmel, 1973, p. 61).

This war remains an example of a conflict in which not the victorious army but the instigators, scheming behind the backs of the fighting sides, gain the most. This also concerned the profits obtained from providing weapons to the parties in conflict. The cynical attitude of Great Britain, which provided ammunition and weapons both to Bolivia and Paraguay came prominently to the fore (Beals, 1940, p. 125). The Italian military mission operated in Paraguay at the end of the war. It is also worth to know that Paraguay obtained weapons from Japan (Beals, 1940, p. 42).

Paraguay was granted almost three quarters of the disputed area, embracing ca 250 thousand square kilometres (Mroziewicz, Rómmel, 1973, p. 62). This favourable for Paraguay decision was inspired by Great Britain. Paraguay was the second, besides Argentina, true beneficiary of the military conflict. Despite that, in the course of time the influence of Great Britain gradually decreased in favour of the USA. It deserves to be mentioned that over almost 80 years which followed, no commercial amounts of oil were discovered in the part of the Chaco awarded to Paraguay, which is a sort of a tragic irony. As late as on November 26, 2012, Paraguayan President, Federico Franco announced the finding of oil reserves in the area.

Instead of summing-up

There is no doubt that the owners of mineral energy resources will be tempted to utilize them as a tool in their strictly political plans in the future. On the other hand, however, the experiences in that issue gained so far, sometimes very dangerous for the mankind, may also show the necessity for much deeper reflection here.

Thus in order to minimize a potential for future conflict based on the possession of mineral energy sources it is necessary to prepare and shape a new and rational energy policy on a European and world scale, at least in collaboration with the intellectuals as the main participants and contributors. Three steps are crucial here:

³ The Gran Chaco War was analyzed in details in: W. Konarski, Isolationism, Dependency and Clientelism as

Traditional Features of the Paraguayan Foreign Policy, in: *Politeja* no 2(12) 2009.

- 1. Drawing up a protocol of divergences in all the visions of energy policy of all the countries now and in predictable future;
- 2. Finding a commonly accepted ground for the implementation of such a policy;
- 3. Perceiving solidarity as a real, and not only declared, value for such a policy for the common benefit of all its participants, instead of economic and political selfishness.

In the context of the historical experiences it is entirely idealistic to believe that these steps might ever materialize. History shows that international conflicts, involving many states, including devastating wars, have always been the result of the unbearable burden of egoism, if to rephrase the title of Milan Kundera's famous book. On the other hand, we are homo sapiens and not homo insipiens, who live in globalized space, where no one is the sole winner, but many can lose a lot. Thus a generally understood energy policy should serve as a tool for the creation of a socio-political stability and not for elaborating a new version of economic and political supremacy. It is perhaps a sign of naivety, but as history shows even brief intervals of internal solidarity on a global scale can help to reach the long-lasting stability. Thus the policy-making today (including that for the energy sector), must heed the Palmerston's axiom, if only because its interpretation is beneficial for common interests, and not only those of the most powerful states. It is a complicated puzzle indeed, but we have to pursue our efforts in this direction. The revitalization of the UN activities in this sphere seems to be one of necessary prerequisites to accelerate the above processes. In this context the growing role of the Pacific powers' phenomenon has to be taken into consideration either.

The latter is recognized by the Club of Rome. Since this Club is mentioned at the beginning of this article I will close the above considerations with remarks referring to the current and future activities of this organization. There exists a concrete challenge for the Club of Rome in the nearest future as far as the energy policy is concerned. The Club should serve not only as a source of analyses and warnings and a catalyst for emergency actions for national and global leaders (and as a kick to the societies due to the literary expression of Randers) as it has been noticeable so far. What seems to be particularly important is to endorse its position as the *intellectually* effective and seriously perceived adviser in the world decision making processes. The Club's activities may be more known and particularly influential due to the growing interest towards them from China and Indonesia either. Thus the Club of Rome itself may be a real and not speculated tool for overcoming plutocracy by meritocracy, hence the idea of sustainability may be revitalised as well. From the one side my approach here seems to be again idealistic, if to juxtapose it with the logic of current capitalistic development. However from the other side the idealism

itself has always been an asset in the intellectuals' hand. It may lead to more influential debate on the world scale, and be perceived as a sort of pressure from this special group on the towards world and national leaders. For our common sake *political decisions and science have to be in fundamental relation-ship*, as Mugur Isărescu, the President of the National Bank of Romania said during the Club of Rome Conference in Bucharest. Perhaps it is reasonable here to change slightly the sentence of almost entirely forgotten Angela Davis who once said: *what this country needs is more unemployed politicians* into *what the World needs is more unemployed politicians* (*Inspiring Quotes*, 2013). Then these who keep their job will be more empathic.

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System aspects research of ecosystem services in the economy for sustainable development

Systemowe aspekty badania usług środowiska w ekonomii zrównoważonego rozwoju

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Abstract

One of the strategies to develop a coherent and consistent approach to the economic category of ecosystem services in the economy for sustainable development is to adopt a systemic perspective. The aim of this paper is to present original system aspects in the research on ecosystem services in the emerging economy for sustainable development. The paper analyses the concept of a system, properties of dynamical systems, evolution of systems, systems approach in the perspective of the sustainable development paradigm, and assumptions of the systems research on ecosystem services in the economy for sustainable development.

Key words: sustainable development, economy for sustainable development, environment, ecosystem services, systems, systems theory

Streszczenie

Jedną ze strategii umożliwiających wypracowanie spójnego i jednolitego podejścia do ekonomicznej kategorii usług środowiska w ekonomii zrównoważonego rozwoju jest przyjęcie w badaniach nad nią perspektywy systemowej. Celem opracowania jest autorskie przedstawienie systemowych aspektów badania usług środowiska w tworzącej się ekonomii zrównoważonego rozwoju. W opracowaniu przeanalizowano pojęcie systemu, właściwości systemów dynamicznych, ewolucję systemów, podejście systemowe w perspektywie paradygmatu zrównoważonego rozwoju i założenia systemowego badania usług środowiska w ekonomii zrównoważonego rozwoju.

Slowa kluczowe: zrównoważony rozwój, ekonomia zrównoważonego rozwoju, środowisko przyrodnicze, usługi środowiska, system, teoria systemów

Introduction

Ecosystem services can be viewed and examined from a biological and ecological perspective as well as from a socio-economic perspective. From a biological standpoint, ecosystem services involve all natural processes that shape the developmental niche of man and provide adequate environmental foundations for human life. In a socio-economic view, ecosystem services are natural processes, strengths and values which are of vital importance for economic processes and for the development of civilization. In the idea of sustainable development, it is assumed that all advantages and disadvantages should be taken into account in an economic calculation. In the past, when the use of the natural environment had no adverse effect on ecosystem services, it could be left out of the economic analysis. Today, however, ecosystem services must be a subject of economic research. This is due to the fact that the efforts to increase the material well-being of man have led to the deterioration of the environmental foundations of life and to the increasing costs of producing goods and services. To date, scientists have not reached a
consensus on how to understand and classify ecosystem services and what exactly they should include. This issue needs further discussion (Poskrobko, 2011; Michałowski, 2011; Gómez-Baggethum et al., 2010; Costanza, Kubiszewski, 2012).

One of the strategies to develop a coherent and consistent approach to the economic category of ecosystem services in the economy for sustainable development is to adopt a systems perspective in the research. The aim of this article is to present original systemic aspects in the research on ecosystem services in the emerging economy for sustainable development.

In the discussion on the emerging economy for sustainable development, different criteria of values as axiological bases for economic and environmental analyses have been proposed. Within environmental ethics, moderate and extreme anthropocentrism, biocentrism, and holism are usually distinguished (Borys, 2005, 2011; Rogall, 2009; Kośmicki, 2009; Kiełczewski, 2011; Poskrobko, 2012). It should also be noted that axiological foundations of the economy for sustainable development can be viewed in terms of responsibility. In this approach, the need to integrate different types of responsibility (legal, economic, financial, social, and environmental responsibility) has already been emphasised. Moral (ethical) responsibility plays a primary role in this integrated responsibility and it pervades all other kinds of responsibility (Borys, Borys, 2011).

In this study, moderate anthropocentrism, along with the anthropological model of homo sustinens, forms an axiological foundation for the analysis of systemic aspects in regards to economic category of the ecosystem services for society and economy in a perspective of the emerging economy for sustainable development.

Concept of a system 1.

In the literature there are many definitions of the term system. A broad overview of how system is understood was given in 1976 by J. Habr and J. Veprek. Representatives of systems sciences suggest the following definitions of the term:

- A system is a set of units with relationships among them - L. von Bertalanffy,
- A system is a set of objects together with relationships between the objects and their attributes – A. Hall,
- A system is a set of interacting elements W. Ashby.
- A system is an organized number of elements related to each other and carrying out certain functions - S. Beer,
- A system is a set of objects and activities that has four key characteristics: content, structure, communication, and control – P. Rivett and R. Ackoff (Jajuga et al., 1993)

On the basis of the definitions presented here and

others which can be found in the literature, some common characteristics of a system can be identified:

- a system is a set of interrelated elements,
- a system is related to its environment,
- a system may be a part of a system of higher • order.
- the elements of a system may themselves constitute systems of lower order.

To put it simply, a system can be described as a set of elements and the relationships among them together with the attributes of these elements. Attributes are characteristics of the elements, whereas relationships bind individual elements into a whole. Distinguishing individual elements of a system is necessary in order to compare different systems. Differences in the composition of systems result in quantitative differences, while differences in the relationships among systems' elements lead to qualitative differences.

The basic concept of systems theory includes the ideas of system structure and of the systems environment. The structure of a system can be defined as a set of elements and the relationships among them. The environment of a system, on the other hand, can be described as a set of elements not belonging to the system, but rather attributes of which affect the system and also are affected by the behaviour of the system. Immediate and remote environments are distinguished. Systems have inputs and outputs. The input is a relationship connecting a system with its environment in such a way that the environment affects the system. In contrast, the output of a system is a relationship connecting the system with its environment in such a way that the system affects the environment. Systems are characterized by states that can be expressed in numerical presentations of their attributes. For static systems, a state is expressed by the following vector:

$$x = [x_1, x_2, ..., x_m],$$

m is the number of attributes that define a system, x_i is the value of *j*-th attribute.

In dynamical systems, the state of a system at some moment *t* is expressed by the following vector:

$$x(t) = [x_1(t), x_2(t), ..., x_m(t)],$$

where:

 x_i (t) is the value of *i*-th attribute at the moment t. Static systems have only one state, whereas in a dynamical system there is a trajectory, which is a sequence of the system's states in successive moments. In other words, it is a set of vectors which contain the numeric characteristics of a dynamical system at a certain moment (Jajuga et al., 1993).

2. Properties of dynamical systems

All dynamical systems share some properties that static systems lack. Dynamical systems undergo structural and functional changes over time. Any

analysis of a dynamical system should take into account the relationships between the system and its structure, and the relationships between the system and its environment. At the same time, it is important to identify the causes of changes in the environment and in the system as well as the rules that govern the behaviour of a system. The most important properties of dynamical systems include:

- equilibrium a defined state of the system resulting from the mutual interactions between internal and external forces which neutralise each other, and so they do not cause any changes in the structure of the system; permanent equilibrium in the system is a theoretical concept that serves as a convenient model. It should be remembered, however, that the reality studied is based on the phenomena and processes of dynamic equilibrium; the individual systems' states in the society-economy-environment macro-system are always closer to or further away from the point defined as equilibrium;
- stability the behaviour of a system returning to equilibrium some time after being perturbed from it; what is necessary, though insufficient is the ability of a system to change the force of interactions among its elements provided that the elements and the directions of interactions stay the same. A system is considered stable if the interactions reduce the effect of perturbations; an example of such interaction is a negative feedback;
- ultra-stability the ability of a system to return to equilibrium by changing purposes of its individual elements and so changing its internal structure. This property characterises only some systems such as living systems, systems with living elements, or some artificial systems consisting of people and material resources;
- adaptation the ability of a system to maintain its structure and operate in a changing environment. Two types of adaptation can be distinguished: primary and secondary; primary adaptation occurs when the system secures its durability, and secondary adaptation occurs in the process of system's development. Additionally, there are active adaptations which come from the system itself and passive adaptations which are forced from the outside;
- homeostasis the ability of a system to maintain a stable, relatively constant condition of properties that determine its existence despite changes in the environment. Homeostasis is focused on reactions against interferences from the environment as well as those generated within the system; these

interferences may make the system lose its dynamic equilibrium or disturb a trajectory leading to this equilibrium. Interferences may have adverse or beneficial effects on the system's development. Importantly, due to the system's inertia, between the moment that interferences occur and the system responds to them, some specified time elapses;

- equifinality characterises only open systems which can achieve some given end state through different intermediate states or, in other words, where the end state is not dependent on the initial one. In closed systems, by contrast, the final state is determined by the initial one;
- transformation (transfer) the relationship between the input and the output of a system, given by the formula y = GX, where G is the capacity of a system to transform the input variable into the output;
- dynamics the unilateral or reciprocal interactions of specific elements within the system; there are two basic types of dynamics: supply and information;
- synergy the interaction of elements in a system to produce an effect greater than the sum of their individual effects; the synergy effect is the result of improvement processes, adaptation, activity and development of the system (Jajuga et al., 1993; Habr, Veprek, 1976; Bertalanffy, 1984; Kisielnicki, 1986; Flakiewicz, 2002).

A category that can be distinguished from dynamical systems is that of large dynamical systems. These systems have a significant number of elements that cannot be fully identified. They are particularly complex and hierarchical. The most important properties of large dynamical systems should include:

- consistency results from interactions among the elements of a system and refers to its functional integrity;
- separation from the environment each system is in some way separated from the environment, because the interactions within it differ from the external ones in their nature and intensity; thus, there is a boundary which shows resistance in the processes of matter, energy, and information exchange with the environment;
- openness a system is interconnected with its environment through its inputs and outputs;
- harmony with the environment large dynamical systems are focused on long-term operation, which involves cooperating with the environment by beneficial exchange of matter, energy, and information;
- high complexity a large number of elements and interactions among them;

- versatility large dynamical systems are characterised by a variety of specialised elements, which means that the system as a whole can perform many functions;
- having multiple states behaviour of a large dynamical system is subject to many internal and external factors, which makes it difficult to predict because it is stochastic and there are many states it can have;
- organization the interaction of the system's elements according to certain rules in order to fulfil its function; it is a dynamic property, as it is reflected in the functioning of the system;
- purpose-orientation large dynamical systems are usually organized in such a way that despite disruptions and changing conditions, they maintain certain specific states or attempt to reach them; if these constitute the purposes of a system, we talk about purpose-orientation;
- hierarchy hierarchical way in which a system is organised;
- ability to grow and develop refers to increasing the complexity, the number of purposes and/or functions to be performed. This property is associated with learning processes, system improvement, or adapting to changing conditions;
- economy savings in the use of matter, energy, information, and time. This property is realised through the rational allocation of resources, depending on the importance of various functions;
- information information about large dynamical systems is necessary for their proper functioning. This information is collected and processed by systems and its extent determines the effectiveness and efficiency of how they operate;
- energy large dynamical systems perform work that requires appropriate internal energy, which is also replenished from the outside;
- inertia the property that makes it more difficult to undertake new tasks in conditions of rapid changes in the functioning of a system and its environment. Systems with strong interactions and central control usually have greater inertia than smaller systems with highly autonomous elements. High inertia reduces the efficiency of a system;
- indefiniteness when studying large dynamical systems, it is impossible to learn about all their elements and relationships among them at any given time in the past and in future;
- uncertainty is linked to the future of large dynamical systems and it means that it is

not possible to determine the exact state of such systems in the future. This state depends on natural (objective) factors and on the ways individuals and institutions act (subjective factors) (Jajuga et al., 1993).

The list of the most important properties of large dynamical systems can be longer. It can be supplemented, for example, with the property of regeneration, destruction, reliability, and innovation. The list presented here includes the most common properties that are particularly relevant for the socio-economic and environmental analysis of ecosystem services.

3. Systems approach in the light of the paradigm of sustainable development

The origins of the systems approach go back to the attempts made by A. J. Lotka to integrate ecological and economic systems. In his book Elements of Mathematical Biology published in 1925, he presented inter-disciplinary systems assumptions. His ideas were slowly received, but they had a significant influence on environmentalists (for example, E.P. Odum and H.T. Odum) and economists (for example, P. Samuelson, H. Schulz, H. Simon). A.J. Lotka greatly contributed to the later development of ecological economics by integrating the approach to ecological and economic systems. According to him, ecological and economic systems form a whole limited by the streams of matter, energy, and information, and are subject to non-linear dynamics. Formally, the systems approach in science was initiated by L.von Bertalanffy in 1950. He stated that it was necessary to consider complex systems in all disciplines, which resulted in a fundamental shift in scientific thinking. The mechanical analysis of causal sequences and the fragmentary approach proved to be inadequate in the research done in the natural and social sciences, as well as when solving practical problems of modern civilization. Currently, it is believed that systems theory is a branch of science that deals with the study of any system as a whole in a specific environment. Systems research is carried out in relation to the structure, operation, and development of systems. Systems analysis is one of the areas of systems knowledge, which is a set of methods and analytical techniques used to solve situations that require decision-making. Many social, economic, and environmental problems, including those related to the research on the economic category of ecosystem services, are solved by means of a systemic approach. Various systems methodologies are employed: the method of analysis and identification of systems and phenomena, the method of studying the behaviour of a system, the method of determining the purposes of system's operation, the method of assessing behaviour, or the general comprehensive research method (Kośmicki, 2009; Habr, Veprek, 1976; Kisielnicki, 1986; Steckiewicz, 1991; Rzemykowski, 1994).

The systems approach distinguishes many criteria for the classification of systems. For instance, systems can be grouped according to the number of elements or states they have, how they interact with their environment, how they change over time, or according to the degree in which humans participate in their construction. Systems can also be classified according to several criteria simultaneously. An example of such a classification is the classification based on the following criteria: whether a system is ideal or material, natural or artificial, made of things or people, or whether it operates in an active or passive way. The following systems can be distinguished according to this classification:

- ideal systems include conceptual systems, i.e. ideas or concepts, for example ethical, moral, or legal systems, language systems;
- physical (real) systems made of physical elements;
- natural systems material systems that have been formed by the natural environment, such as a cell, organism, ecosystem, the Earth,
- artificial systems material systems that have been deliberately created by man,
- systems composed of things only artificial systems that consist only of elements which are physical, for example a machine or a building,
- systems composed of people only artificial systems that consist only of people, for example a family, social class, people employed in some company,
- mixed systems artificial systems that consist of things and people, for example a household, a company, or national economy,
- passive systems systems which do not have the capacity to make their own arbitrary decisions about how they operate; changes in how they operate occur over time and are usually dependent on natural processes,
- active systems systems which can make arbitrary decisions with respect to how they operate, for example automata, systems made of people, mixed systems (Flakiewicz, 2002).

The analysis of the Earth system poses a great scientific and practical challenge as it refers to large scale spatial-temporal structures and functional phenomena. The systems approach assumes that the main effects can be explained only by the interaction of a large number of elements. The Earth is viewed as a non-linear system that is characterized by competing dissipative states which occur under the influence of external and internal changes. The development of this system can be gradual or sudden and it may have irreversible effects. Systems analysis of the Earth requires combining various disciplines; the importance of the biosphere as an active component of the Earth system has already been recognised and emphasised. The purpose of the systems analysis is also to determine alternative potential dynamic states of the biosphere and of its components, which cause change. Furthermore, research methods for determining safe states and critical points that disturb these states are searched for (Kośmicki, 2009).

The systems approach in view of the paradigm of sustainable development is oriented towards understanding the scope, range and duration of development processes in the systems of society, economy, and environment. It is assumed there are mechanisms for sustainable development in two areas: inter-system and intra-system. The inter-system area concerns balancing the relationships between the development of the system of society and economy, society and the natural environment, and economy and environment. In reality, there are also indirect relations concerning interactions between society and the environment through the economy, society and economy through the environment, and the economy and environment through society. Maintaining sustainability in the society-economy-environment macro-system does not mean that the individual systems would develop at the same rate. This is a situation which is both unattainable and disadvantageous. Instead, it is necessary to adjust the scope and pace of changes in these systems. The main problem of sustainability is diversifying the developmental cycles of society, economy, and the environment. The environment is developing at a slow pace in the ecosystem and geological time; though, some anthropogenic impacts are visible in the short term. Also, there are very limited possibilities for controlling its development. On the other hand, the economic system is developing rapidly and is much easier to control. Sustainable development does not always mean slowing down the economic processes, as the rapid growth of the latter can limit material and energy consumption, and thus reduce the pressure on the environment. The social system is characterized by a growth rate which is the result of changes in the environment and economy. It is more difficult to control than the economic system. As each system has its own development cycles with characteristic amplitudes, the macro-system does not have to display equilibrium, while it may be on the way to attain it. Thus, assessment of sustainability levels of the macro-system should be carried out over a long period of time, i.e. several decades. The research conducted over a shorter time can only reveal some tendencies in the development of the macro-system's elements. The intra-system sustainability refers to sustainability within the social, economic and environment systems. The ways and methods of achieving this sustainability are extensively described in the social, economic and environmental literature (Poskrobko, 2005).

The processes of sustainable development of systems require an interdisciplinary approach, which is significantly facilitated by the concept of integrated order. This concept can be defined as a positive state of development changes that coherently combines its basic component orders, i.e. social order, economic order and environmental order. The integrated order is a benchmarking mechanism of the macro-system development model characterized by sustainability. It cannot be identified with sustainable development because it is a target state, while sustainable development is a process. The integrated order means consistent creation of social, economic, and environmental orders. In strategic planning, two additional orders are identified: an institutional and political in the social order, and a spatial order in the environmental one. Their integrity is achieved through a balanced protection of social (and human) capital, of anthropogenic (especially cultural and economic) capital and of natural (natural environment) capital. The binding force in the process of order integration is an axiological foundation for the sustainable development paradigm. In an in-depth analysis of the role of integrated order for sustainable development of the macro system, it is necessary to identify similarities and differences in the approaches of various sciences to realisation of sustainable development. These approaches differ significantly depending on the field and discipline (Boris, 2011).

4. Systemic factors in establishing orders of sustainable development

The thermodynamic perspective and the entropic interpretation in particular are becoming increasingly important in systemic development of the integrated order and of its component orders (pillars). The entropy of systems can be identified by many processes or phenomena and it can be viewed in different ways (Czaja, 1997). Firstly, the entropy of a system is its property which involves the creation of growing disorder. Systems can exist and function by taking matter, energy, and information from their environment. According to the law of entropy, isolated systems are characterized by increasing disorganization and disorder. In order to exist longer, they have to draw low entropy from the environment (resources of available and useful matter, energy, and information), and so they become open systems. Lack of resources of low entropy means the state of thermodynamic equilibrium. The presence of these resources is a prerequisite for the evolution of systems and the movement of matter in the space-time. The second aspect of the entropy of systems is the material and energetic dimension of their processes, which cannot be separated from the symbolic dimension. This is very important in the analysis of economic processes, which have both a material dimension and a financial one. All parts of the economy from local to global are, in

fact, parts of an open system of communicating vessels. The third aspect of the entropy of systems is connected with producing pollution and waste, which are streams of high entropy. This is a side effect of the systems' operation. In the case of economic processes, it is a by-product of satisfying human needs and of preserving human life and civilization. The fourth aspect of the entropy of systems is the ability of systems to self-organise by making use of the resources of low entropy from their environment. Self-organisation is an expression of the entropy of a system. It requires higher levels of low entropy than the continuance of the system at a lower level of organization. The survival of any system is therefore dependent on the processes slowing down the entropy within this system. The aspects of entropy presented above constitute one way of describing this property. According to the principle of ordering by fluctuation, which attempts to combine entropy laws with the idea of social and biological systems aiming to increase their ordering, the system's dynamics allows it to temporarily move away from the state of maximum entropy (thermodynamic equilibrium) being a result of internal processes of forming more developed organizational structures and dissipative structures. At a new level of organization, the system's entropy is high, but with the increase of adaptation, it shows a decreasing tendency. The use of new resources reduces the overall level of entropy within the system, but their continued use leads to the increase of entropy. Evolution of a system consists in continuous attempts to reduce the level of entropy. This can be represented by the following formula:

 $dS = d_e S + d_n S,$

where:

dS means an increase or decrease of the total entropy of a system,

 d_eS means an increase of the entropy of a system, d_nS means negentropy of a system (a measure of the degree of organization, negative entropy).

Evolution of each system can be progressive or regressive. In natural and social sciences, evolution is defined as a transition process from simpler states to more complex ones, from less diverse states to more diverse ones, or from lower states to higher ones. Taking into account both the evolutionary and the thermodynamic perspective, evolution can be understood as the system's developmental processes which lead to the increase in the system organisation (selforganization). Such understanding of the socio-economic development processes has been present in the economic theory. The concept of evolution is most broadly approached in the so called modern evolutionary theory of development. This theory employs the category of evolution of the genotype and the phenotype, category which has been developed in natural sciences. The genotype is a set of all genes of an organism that determine its properties. The

phenotype, on the other hand, is the composite of all characteristics of an organism which are influenced both by its genotype and by environmental factors. In contrast to evolution of the phenotype, which can be predicted, evolution of the genotype is unpredictable. This is due to the following three factors: firstly, it is impossible to predict the effect of mutation; secondly, it is impossible to predict the influence of mutation on the genetic material; and finally, the influence of genetic variation on the phenotype is unpredictable. It is much more difficult to identify a set of characteristics pertaining to the economic genotype in economics than in natural sciences. What we can do is to merely attempt to determine a set of elements that can create this genotype. These elements include the preferred rules ordering operation of corporate entities, technology, and social, economic and legal institutions. The biological and the economic phenotypes are dependent on the genotype and the environment of the system, in particular the natural environment. It can be assumed that the phenotype is the state realising itself in a certain opposition to the genotype and the resultant of implementation of possibilities determined both by the genotype and the environment. In economy, the economic phenotype can include the following elements:

- production technology used,
- capital goods and their resources used,
- capital goods, consumer goods and services produced,
- amount of goods and services and their prices,
- distribution of consumption, income and wealth,
- market structure (Czaja, 1997).

In an evolutionary perspective of systemic establishing of individual sustainable development orders, three types of systems can be distinguished: physical, biological, and socio-economic systems. Taking into account three main pillars of sustainable development, it should be noted that in physical systems, evolution is a simple process and it proceeds differently from evolution taking place in biological and socio-economic systems. In the physical genotype, evolution or/and sudden changes do not occur. This stability of the physical genotype makes it possible to focus on the phenotype and search for methods to study and analyse the dynamics of the physical system. In the case of biological systems, the process of evolution is more complicated. In its first phase, there is a simple reproduction which does not bring about any changes. However, when random mutagens appear, they cause some change in the genotype, which therefore results in a modified genotype and the second phase of Darwinian evolution begins. This changed genotype gives rise to a new phenotype which is subjected to natural selection. If the new phenotype is successful, new characteristics are passed on in the new genotype, which will help to

create another phenotype. Otherwise, there will be a return to the original genotype. In both cases, the next phase of reproduction will begin. In socio-economic systems, evolution proceeds similarly to evolution in biological systems, but there are some differences. In the economic theory of evolution, the genotype is a set of possibilities; hence, every invention changes the previous genotype irreversibly. In the first phase, reproduction of the phenotype created on the basis of the genotype takes place. An invention changes the genotype in the process of introducing innovation of a new phenotype. This new phenotype is subjected to market selection. If it is successful, the new genotype will give rise to a new phenotype, which in the third phase will be reproduced. If it fails, there will be a return to the earlier phenotype, which will be reproduced in the third phase. In the long term, evolution of socio-economic systems will resemble a spiral stretched in time with its subsequent loops connecting in time. When describing systems in terms of evolution, it should be remembered that biological systems and socio-economic systems are different. These differences can be explained by at least three reasons. In the economy, changes which are not successful are retained in the genotype. In addition, changes in the genotype occur as fast as, or even faster, than in the phenotype. What is also important is that in economy the phenotype may affect the genotype, which is not possible in biological systems (Czaja, 1997; Georgescu-Roegen, 1971; Kwaśnicki, 1996, The Evolutionary..., 2005).

Additionally, socio-economic systems display certain adaptation properties which are negentropic in nature, such as the property of innovation and selforganization. Negentropy of these systems can be understood as a possibility of reducing physical entropy or slowing down its growth, as well as reducing information entropy by increasing organization of the system. Having this in mind, socio-economic systems can be classified in two ways. The first classification is based on the rate of creating entropy. This rate demonstrates how extensive economic processes implemented in the socio-economic system are. The other classification may be based on the degree of creating negentropy, which expresses the ability of generating processes that enhance survival and development. The differences between natural processes and socio-economic processes are major problems of such classifications. An increase in entropy in the natural environment is automatic, whereas socio-economic processes are conditioned by human activity. They use low entropy in accordance with established rules and regulations. In the natural environment, there are phenomena that balance potentials and organization of biological life; whereas in the economy, organizational activity is a conscious action. As a result, entropy increases faster in economic systems, and additionally, more information is generated and used. It should also be noted that the real purpose of socio-economic processes is not high-entropy, but satisfying needs in an adequate way (Czaja, 1997). These differences must be taken into account when establishing orders of sustainable development, which would preserve the natural environment and its services for the society and economy.

5. Assumptions of systems research on ecosystem services in the economy for sustainable development

In the emerging economy for sustainable development (economic theory of sustainable development), the research on ecosystem services should be carried out in an interdisciplinary macro-system approach (Ekonomia ..., 2011; Poskrobko, 2011, 2012). This requires undertaking research aimed at creating a coherent and multi-level sequence of paradigms increasing in their accuracy. The most general paradigm of sustainable development (at the first level) should generate new paradigms in various fields of science (at the second level). On this basis, sets of paradigms of scientific disciplines (at the third level) should be developed, serving as reference points for developing program proposals in the research conducted and education (level four). Developing a logical sequence of paradigms is currently in the early stages, especially when it comes to the second and third level. The first and forth one are more specified. At the first level there is a noticeable interdisciplinary integration of features, principles, objectives and development orders and at the fourth level there are quite comprehensively developed theories (Borys, 2011). So far, however, uniform methodological foundations of the systems research on ecosystem services and a coherent economic theory that would be based on the paradigms of the higher levels have not been developed.

In the author's view, one of the basic assumptions of the systems research on ecosystem services in the economy for sustainable development should be an approach based on the concept of co-evolution, which is widely used in the biological sciences and increasingly in the social sciences. Such an approach attempts to analyse the actual development, and not just seek causal, unilateral relationships. Nowadays, the concept of co-evolution is used in the analysis of ecological interdependencies in view of the specific reasons for the development of the human species (anthropogenesis) and historical stages of development of human culture. Recently, the concept of coevolution has been applied also in ecological economics. So far, the relationships between humans and their natural environment have been studied in detail by ecological anthropology. This field of study focuses on the historical aspect present especially in economic forms of appropriation, transformation of the environment, and ideological ways to justify adaptation strategies adopted, as well as in forms of interhuman relations and organisation of society. Socio-economic systems across space and time differ in terms of factors influencing their co-evolution with the environment. Ecological economics attempts to provide an in-depth explanation for the coevolution of economic and ecological systems. What prevented the integration of economics and ecology was a common assumption that the natural environment and economic systems could be considered separately. This view is still held by many economists. Similarly, most naturalists emphasize that the natural environment is independent of society. According to R.B. Norgaard, the relationships between the system of natural environment and social systems and their changes are co-evolutionary. He proposes that social organization should be oriented towards achieving sustainable development and that cultural evolution should be viewed as a process of co-evolution of values, knowledge, organization, technology, and the environment. The co-evolutionary approach does not mean denying the direct impact of society on the environment. It emphasizes, however, the chain of future events and human interference changing selective pressure and thus also the role of ecosystem characteristics. They have a reciprocal effect on the selection of values, knowledge, technology, forms of organization, and subsequent interferences in development of the natural environment. In a co-evolutionary approach, the solution to ecological problems caused by civilisation development is not just about creating the right market incentives or regulations, but rather developing ways to use resources and ecosystem services effectively. After all, modern values, knowledge, and social organization have co-evolved with the environment (Kośmicki, 2009).

The systems research on ecosystem services in the economy for sustainable development should also adopt greater physicalisation of concepts and analyses. An insufficient degree of physicalisation is one of the major problems in modern economics. Considering all the phenomena and relationships in the society-economy-environment macro-system only in financial dimension constitutes an important methodological limitation. This problem of the 20th century economics was emphasised by N. Georgescu-Roegen. The emerging economy for sustainable development in which the environment system is given an in-depth consideration highlights the necessity for physical analyses of matter, energy, and information in four-dimensional space-time (Czaja, 2011)

Including both physical analyses and biological aspects in the systems research on ecosystem services in the economy for sustainable development is possible when we draw on the achievements of H.T. Odum. He initially worked on the flows of matter and energy through ecosystems, but over time he broadened his approach and went beyond the economic and thermodynamic problems as viewed by N. Georgescu-Roegen. His approach encompassed all the systems, from simple physical systems to complex biological, social, and environmental ones. In his book Environment, Power and Society, he examined ways to integrate diverse systems, assuming that the energy flux is the primary integrating factor. The research conducted by H.T. Odum into the flow of energy through systems and their dynamic models inspired many scientific studies. They refer to, for example, the input-output analyses of energy and matter in ecological and economic systems, dynamic simulation models of ecosystems, and integrated economic and ecological systems (Kośmicki, 2009). The systems research on ecosystem services should take into account the distinction made by H.T. Odum between energy efficiency (ratio of useful output to the total input) and services (amount of work done). This distinction is a refinement of Lotka's law of energy as an evolutionary criterion for systems processes' analyses. According to H.T. Odum, low energy efficiency results in zero services since no work is done. At the maximum energy efficiency, the services again become low because the processes of achieving maximum efficiency must be invariable. Here, they are infinitesimally small, and so the value of the work done equals zero. Maximum services are achieved at average energy efficiency at high efficiency it is wasted. It can be concluded that those systems that maximize the services, and not the efficiency, are beneficial. This is true about ecological and economic systems which need low entropy to operate in a sustainable way (Kośmicki, 2009). The study of ecosystem services must also take into account the fact that characteristics of biological life make it possible for ecosystems to generate negentropy in the macro-system of society-economy-environment.

Yet another very important aspect of the systems research on ecosystem services in the economy for sustainable development is the aspect of time (dynamic aspect). When analysing phenomena and economic processes, time can be treated both as the cause of changes and as dimension. In the first case, it is analysed as an aggregated or disaggregated determinant of certain phenomena and economic processes. In an economic model, time significantly affects the analytical form of the model (discrete or continuous functions), and the nature of the variables used (streams and resources). Time variable is sometimes analysed on the basis of a set of natural numbers $(T_l,$..., T_n) and it refers to, for example, years, months, or days. Then, it assumes discrete values. If the time variable is analysed using real numbers $(t_0, ..., t_n)$, then it assumes continuous values. Discrete and continuous time analysis does not require determining how time is viewed, for example whether in logical or real terms. Discrete time is divided into periods of constant length which are treated as its units. When they are combined with some given economic variable (for example, production or revenue), we get a stream which is the ratio of the amount (given in natural or monetary units) flowing through a given surface (space) to time. The economy or market (socioeconomic space) can also constitute space. The most typical streams include production, income, consumption, and investment. Each stream has its time dimension, indicating a given amount per unit of time or period (time interval) (Czaja, 2011B). The systems research in the economy for sustainable development should accept the existence of streams of ecosystem services. Three basic types of streams should be identified: material, energetic, and informational. All of them have a spatial character.

Conclusion

One of the major methodology problems in the economy for sustainable development is overcoming gaps in the necessary consilience of knowledge. It is possible to develop a common set of fundamental abstract laws and ways to verify them empirically. Taking into account the fact that the economic and noneconomic human activity involves elements which are subject to physical causality, it can be concluded that in the research on ecosystem services in the economy for sustainable development, consilience of knowledge is possible. In fact, the role of ecosystem services in the development of civilization can be fully understood only when we take the model of society-economy-environment macro-system as a starting point.

Currently, consilience of knowledge can be achieved with the use of two basic research strategies: reductionism and complex systems theory (Wilson, 2002). At the current state of knowledge, the first strategy enables only mutual penetration of various aspects of ecosystem services. The second strategy, being a kind of synthesis, allows the realization of consilience of knowledge in the economic theory of ecosystem services. The theory of complex systems is already applied in the research on the beginning of the universe, functioning of cells, neurological foundations of the mind, climate change, and evolution of ecosystems, among others. The systems research on ecosystem services in the economy for sustainable development should search for algorithms that balance economic processes, which would lead to sustainable and lasting civilisation development.

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Placing the idea of sustainable landscape in ecophilosophy

Miejsce idei zrównoważonego krajobrazu w ekofilozofii

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Abstract

The preamble to the *European Landscape Convention* states, that the landscape is an important part of economic life, that it is associated with culture, the environment and social issues. It is the basic component of the European natural and cultural heritage, building the national and local identity of society. Attention is also drawn to the fact, that the landscape is a key element of social well-being, whereas its protection and planning to improve its quality and variety are important parts of the economy and the duty of each of us. This approach to space provides a basis for building the sustainability in the landscape, a challenging and multi-dimensional problem, whose foundations can be found in ecophilosophy. Therefore, this publication seeks to combine the world of philosophy and realistic spatial management in order to answer some fundamental questions about the nature of the relatively new idea, about whether this problem stands a chance to come into being as an important element of the vision of the future. It was also necessary to present the author's understanding of the concepts of landscape and landscape sustainability.

Key words: sustainable landscape, ecophilosophy

Streszczenie

W preambule do *Europejskiej Konwencji Krajobrazowej* czytamy, że krajobraz stanowi istotny element życia gospodarczego, wiąże się z kulturą, ekologią i sprawami społecznymi. Stanowi on podstawowy komponent europejskiego dziedzictwa przyrodniczego i kulturowego, buduje tożsamość narodową i lokalną społeczeństwa. Zwraca się w niej także uwagę na to, że krajobraz stanowi kluczowy element dobrobytu społeczeństwa, a jego ochrona i planowanie to podnoszące jakość i różnorodność ważne elementy gospodarki i obowiązek każdego z nas. Takie podejście do przestrzeni daje podstawy budowania zrównoważenia w krajobrazie, problemu trudnego i wielowymiarowego, którego fundamenty można odnaleźć w ekofilozofii. Dlatego publikacja ta stara się połączyć świat filozofii i realistycznego zarządzania przestrzenią, by odpowiedzieć na podstawowe pytania o istotę tej stosunkowo młodej idei, o to czy problem ten ma szansę na zaistnienie jako ważny element wizji przyszłości. Niezbędne było także przedstawienie swojego rozumienia pojęć krajobraz i krajobraz zrównoważony.

Słowa kluczowe: krajobraz zrównoważony, ekofilozofia

1. Introduction

Man is the measure of all things, of things that are, that they are, and of things that are not, that they are not, claimed Protagoras. This phrase can be applied to many aspects of the surrounding reality and understood in a variety of ways, and one possibility is to recognize the fact that every person has his or her own criterion of truth. This would, however, mean deep subjectivity, and thus the non-existence of an objective truth but rather (as was believed for example by the sceptics) total relativism of our view of the surrounding reality, including the landscape. Is it then possible to find an absolute criterion of truth, to clarify which human behaviour towards the landscape is appropriate? Following Protagoras' thought one can conclude that everything that we undertake should be for the benefit of others. If there were no humans, neither the beauty nor the logic prevailing in nature would be recognized or appreciated at all, since *man as the only being in the world is 'someone'*,

while all other beings are 'something' (Wojtyła, 2001a).

Each argument can be opposed by a counterargument, and reality is seen depending on the vantage point, thus every human being seen a different way. It would seem, too, that all cognition and, in the longer term, the activities undertaken by people make sense, when the entity constituting its essence is taken into account. If, therefore, the landscape is such an entity, we should ask questions about what behaviour towards it is appropriate. (1) Is this assumption similar to that of H. Skolimowski, that the world is a sanctuary, which deserves respect, honour and reverence (Tyburski, 2008)? (2) Do we see the world from the economic perspective, which is the basis of human existence? (3) Or maybe we incline more towards the idea of anthropocentrism, or even utilitarianism, where the measure of all things is man, and his or her happiness is a value above all others?

H. Vontobel (2006) draws attention to people's ability to interpret the interdependence of the economy, culture, general human values and historical experience. Maybe such an approach and developing ethos with regard to the landscape gives hope for finding a new way to avoid the errors duplicated so far and, in doing so, allows us to sketch such a vision of the landscape in which a certain era is over and a new era begins, characterized by civil courage and breaking the traditional thought patterns.

The issues of research into the landscape are multidimensional and their understanding requires the combination of a number of research trends in the field of humanities and sciences, including environmental science. However, it does not happen often that the works of naturalists approximate the philosophical foundations of the concept of landscape, in particular the idea of its sustainability. This publication aims to fill this gap, since, according to A. Papuziński (2013, p. 7), it is after all the works of philosophers that are the source of all of the ideas, world views, values and methodologies on which depend the picture of the world and the corresponding way of viewing and solving the problems of sustainable development. In order to achieve this goal we need to look at the existing philosophical beliefs regarding sustainable development in the context of the landscape. In addition to that, we need to provide against their background the definition of landscape and sustainable landscape that would render the essence of the approach. Finally, we should consider whether sustainable landscape can be achieved, if it is at all necessary, or rather whether the state of balance of the geographical environment, which is reflected in the landscape, is a utopia.

2. What do we mean by landscape?

I suggest beginning the reflections on the concept of the landscape with the etymology of the word (based

on Pietrzak, 2002), because in my opinion it well reflects the discussion on the definition of the landscape, which has been held for many generations. It is accepted, that the beginning of the existence of this concept in the literature of the subject goes back to the Book of Psalms (48), where, in the song celebrating the greatness of Zion, a mountain in Jerusalem, the Hebrew word noff, deriving from yafe or beautiful, appears. The term was probably first introduced in Polish by J. Lelewel in the sense of the history of the country, and W. Pol propagated it in physiognomic terms. In German, the word Landschaft may derive from schaft, used for things having common characteristics, or from the word *schaffen*, to shape. A. von Humboldt defined Landschaft as the comprehensive nature of an area. In English, however, the term landscape comes from the Latin landscepi and is connected to the word *shape*, shaping, forming.

As we can see, from the very beginning attention was paid to the visual aspect of surrounding areas, people's feelings and their conscious efforts to use the goods of nature. On this basis a number of definitions were adopted bearing in mind either the paradigm of the discipline undertaking landscape studies, or treating a part of nature characterized by a specific structure and dynamics as a system consisting of the subsystems assigned to it (Richling, 2004).

Perhaps the most common definition of the landscape today was embodied in the European Landscape Convention (p. 2, 2000), signed in Florence on 20th October 2000, in which the landscape is an area as perceived by people, whose character is the result of action and interaction of natural and / or human factors. P. Goodchild sees it in a different way (2007). He believes that the landscape is a concept, an idea, a real or imaginary look at an area in which natural and semi-natural elements can be significant, dominant or unique. Landscapes may include humans and anthropogenic objects. They are a combination of visual features, ways of using, perceiving and understanding the places that are part of open space (Goodchild, 2007). Another approach is represented by A. Farina (p.17, 2010), who treats landscape as an entity shared by different philosophers, different paradigms and different methods and scaling. It requires a common semantic basis and related principles.

In the ordinary sense of the term *landscape*, however, we define the reality that surrounds us, perceived in different ways, but whose most common form is *scenery* (Andrejczuk, 2010). This reality, i.e. the surroundings, is associated with a set of elements of the natural and social environment in which there are numerous links and its various components interact with each other and form a coherent system (Degórski, 2009). At the same time it is worth stressing that the term *system* refers to a certain whole, order, ordered structure composed of different elements, but harmonizing with one another. In this understanding of the landscape we can refer to the philosophical concept of the ecosystem and its surroundings, i.e. to ecophilosophy as a science of the systemic expression of philosophical issues of the natural and social environment (Dołęga, 2006). It should also be noted that a philosophical approach, contrary to common beliefs, does not preclude a practical one and the use of philosophical knowledge in spatial planning and management. J.M. Dołęga (2006) writes that, in relation to landscape research, it seems that understanding of it is best reflected in the systemic and informative approach to eco-development, which is justified and applied in forecasts of human development and assumptions of sustainable development.

Thus, given the numerous definitions, it can be assumed with some simplification, following P.L. Knox and S. Marston (2001 p.179; vide Pietrzak, 2010), that the term landscape is understood by everyone differently. Therefore, in my approach I treat the landscape holistically (after Richling and Solon, 1998), with emphasis on its physiognomy (after Schmithüsen, 1978). I assume that the landscape is what we call a part of space repeated in a similar form (after Forman and Godron, 1986), relating to the natural and cultural (geographical) environment (after Bogdanowski, 1994), which continues to be shaped under the influence of the natural, political, social and technological processes occurring in it (after Naveh, 2000). It is a system of natural and anthropogenic components reflected in land use and land cover, has an inherent structure and internal links (after Kondracki and Richling, 1983) and provides aesthetic feelings (after Szczęsny, 1971). This system reflects the social and economic needs of society at a given moment in time. A human being should blend into the landscape and not be its dominant form, should function in such a way as to take advantage of the benefits that the landscape can offer, while acting in accordance with his or her knowledge and experience to mitigate the negative effects of his or her actions in the past, and above all, not treat the landscape in a utilitarian way. The landscape deserves respect and reverence, allowing for the needs of people who live and function in this landscape.

It is also worthwhile paying attention to the different definitions of the terms related to the environment depending on interest groups. This includes such words as landscape, nature, development, sustainability, protection, harmony and aesthetics.

3. What is the idea of a sustainable landscape?

Alarming changes are observed in the landscapes of many parts of the world. They are related to the overexploitation of goods coupled with the lack of some sort of compensation, which would allow balance to be maintained. Another problem is the uneven distribution of attractive resources of the landscape, which is associated with a greater concentration of people in those areas. Exploitative spatial management results in a lack of order in a space, lowers its cultural value and causes the degradation of landscapes. There are more and more such areas since the consumption of space as a result of increased consumption of goods and services is increasing. Such a state of affairs cannot be overlooked, nor can it continue forever. It is therefore necessary to take measures to manage the landscape properly as soon as possible. Therefore, the idea of sustainable landscape is to be a response to the growing demand for relevant, planned, responsible, sensible, and sustainable spatial management.

Sustainable landscape, like sustainable development, is a multidimensional concept, which combines natural, economic and social aspects of human behaviour in the environment, but also institutional, spatial, moral, and spiritual aspects of life connected with its quality, although not necessarily considered in terms of material goods. This concept is commonly desirable, since its main objective is progress, and this provides an opportunity for correct, reasonable planning and spatial management. For it is important to find such areas of compromise (balance) between nature and human activities that do not disturb existing functioning mechanisms. The benefits of nature (landscape as space) can be enjoyed in accordance with the principle of balance, and simultaneously care must be taken not to destroy the existing values, including those of the landscape. Assuming further development we must begin to adapt the changes introduced to the capacity and capability of the environment. Evaluation, which is a tool for integrating the basic assumptions of this idea and ultimately leads to strategic decisions, plays a key role in this process (Langer and Schön, 2002).

Does the introduction of the concept of sustainable landscape in the context of consolidating the concept of sustainable development mean a multiplication of entities? It seems to me that it does not; this concept is designed to narrow the assumptions made for the analysis of the entire space to the landscape, i.e. in accordance with the previously adopted definition, to the portion of space relating to the natural and cultural environment. Sustainable development and sustainable landscape are not equivalent terms but subordinate to each other. Sustainable landscape, just like the whole idea of sustainable development, is to ensure a high standard of social life in a healthy and aesthetically pleasing environment, while respecting the environment and maintaining reasonable limits of consumption and use of natural resources. In order to make it possible to implement such an approach, market, educational and protective mechanisms which would promote efficient and proper management of landscape resources should be introduced.

In the discussion on the definition of the concept of *sustainable landscape* a group of supporters of the so-called dynamic approach has emerged, as op-

posed to the supporters of the evaluation of landscape structure in terms of the level of sustainability. For example, R. Haines-Young (2000) argues that sustainability should be measured and evaluated through the prism of the changes taking place in the landscape, and not through its condition at any time. Similarly, M. Antrop (2006) believes that this issue should be discussed in its two aspects: (1) maintaining certain landscape values and absolute continuation of activities that maintain and organize this space, (2) keeping balance as the main principle of shaping landscapes in the future, i.e. potential landscapes strengthen the balance particularly in rural areas through proper planning and management. Also M. Kistowski (2008) represents a view saying that the balance of the landscape *lasts*, not *is*, and so just a single *snapshot* of the landscape will not be enough to examine it, but a comparative analysis of its condition in at least two periods, or better in a longer sequence of time, should be made. On the other hand, J. Solon (2004) argues that landscape can be sustainable regardless of the degree of its naturalness, and – what is more important – some activities related to the maintenance of landscape character lead to stopping or delaying the renaturalization processes. Thus, for Solon, the capability of the landscape to maintain a specific structure (including its functioning) at a given time is called landscape sustainability.

Finally we can define sustainable landscape as a landscape that has not been converted into another type of landscape, and it is characterized by structural stability under the conditions of unchanging land use. Nor has it degraded, i.e. it still functions and is shaped under the influence of natural and an-thropogenic phenomena and processes, and has not been fully determined by anthropogenic processes (Degórski, 2009).

4. Does landscape research need ecophilosophy?

W. Tyburski (2008) believes that ecology needs philosophy. I believe that this statement can be re-expressed in the following wording: applying similar justification, landscape research needs philosophy. As in ecology, in landscape research one should closely examine the need to expand ethical judgement and carry out an assessment of the moral activity of man. One should not miss the importance that landscape education should have, shaping sensitivity to the importance of landscape to people, as well as the attitude to conscious planning and to the harnessing of social, environmental, economic and cultural qualities of the environment. All of these elements build the *ethical protection* of the landscape and are combined together by the need to *diagnose* the causes of the ecological crisis that the contemporary world is experiencing, to develop the best con-

cepts of resolving it and to construct such a philosophy of development which would take into account both human needs and the needs of nature (Tyburski, 2006). In my opinion, this statement can provide the philosophical foundations of sustainable landscape. We can also find similar assumptions in H. Rolston III (1989). He suggests an analysis of people's interactions with the environment based on the formulation of rules that would provide political foundations for local and global, legislative and administrative decisions. Such a comprehensive approach to the environment can also be applied to the landscape. The possibility of using economic and business solutions (so-called holistic ecological philosophy), which in turn creates the foundations of sustainable landscape, is also analysed.

Landscape research falls within the scope of the issues of general philosophy as it relates to the substance, nature and condition of the natural and social (geographical) environment and the changes that occur in it. Moreover it is connected with both the sources of these changes and their impact on human life and health, as well as with seeking philosophical foundations to protect the landscape as a timeless good. It also overlaps with the anthropological research of ecophilosophy, since it tackles the issues of demography, migration and cultural elements, including art and religion. The issues of sustainable development are defined in terms of the quality of life, justice, rationality and progress, which clearly highlights their philosophical character. The same statement can be applied to the concept of sustainable landscape. However, for the balance in the landscape to stand a chance of developing, a radical change in social awareness is needed, as called for by representatives of the philosophy of *deep ecology*. They advocate the idea of protecting the diversity of life, self-restraint in consumption and a reduction in our needs. Life forms do not form a pyramid with our species at the top, but rather a circle, where everything is connected with everything (Tyburski, 2008), so it seems that it is important not to make an evaluation of the importance of man and nature, nor to treat nature possessively, anthropocentrically, but also not to protect wildlife at all costs, not to build a kind of sanctuary. Such a direction of changes should be proposed that would not deny the value of progress or science, and at the same time would be pragmatic in its nature and constitute a different view of the position of humans in the structure of the reality constructed by nature. Different does not mean better or worse; different in this sense is to be holistic and balanced, to reconcile the interests of different parties.

The ethics of the philosophy of nature is associated with the concept of the responsibility that people bear for their environment within the meaning of the landscape as it exists, is changing or is created. A. Schweitzer (1974) and A. Pawłowski (2008), among

others, draw attention to it. Responsibility is a constant concern for the space entrusted to us, not allowing the balance prevailing in it to be undermined and, thus, encouraging us to engage in lawful action for the sake of changes, planned management and prevention of improper activities, which is not in opposition to economic development. People have a duty to make decisions concerning the creation of new parallel functions in the environment and, in exceptional cases, when necessary, even to destroy a single value for the sake of the emergence of a new one, necessary for nature or people. In the landscape, it could mean a transition from one form of spatial exploitation to another; the problem is to keep a balance. Is such a balance possible? A. Schweitzer wrote that in order for right decisions to be made, they should be based on a good understanding of the functioning of a given space: Whenever I injure life of any sort, I must be quite clear whether it is necessary. Beyond the unavoidable, I must never go, not even with what seems insignificant (Schweitzer, p. 52, 1974). He also draws attention to the need to determine the economic value of various elements of the landscape, which would then be subject to change, in order to determine whether they allow us to speak about the sustainable management of space. From the typological point of view, the relationships between philosophy and the landscape can be related to ontological beliefs of the pragmatic philosophy of sustainable development. These beliefs are based on the assumption of the uniqueness of humans in the universe, which entitles us to treat the landscape as an environment that meets our existential needs, realizes our desires and provides appropriate aesthetic impressions. Historiosophical beliefs, on the other hand, will turn our attention to the development and progress in people's attitude to the surrounding environment, which is directly reflected in the changes taking place in it. In the conservation philosophy of sustainable development, however, economic development is a priority before the comfort of human life and the quality of the environment (Papuziński, 2013). Also, ontological conditions dominate in this type of philosophy with regard to the landscape. People assume here a subordination of the environment to their needs and comfort, but take into account the prohibition against destroying what could prolong the state of balance. However, I believe that the essence of the philosophy of sustainable landscape is best described in the systemic philosophy of sustainable development. The ontological, anthropological, axiological or historiosophical assumptions adopted in it show the equalization of humans and nature, which leads to respecting all life and assumes the conducting of operations in accordance with the rules that have always prevailed in nature. A similar approach can be found in ancient Chinese philosophy and in contemporary theology. K. Wojtyła (2001a) believed that all the elements of the universe

are mutually harmonized and any violation of ecological balance causes injury to a person. Thus, a scholar will not treat nature as a slave, but (...) he will approach it more as a sister having to work with him in order to open new avenues for the development of mankind. Maintaining the dynamic balance of ecosystems is preferred in the systemic approach, and sustainable management is a function of the efficiency of ecosystems on which it is based.

M.R. Raupach (2012), however, saw the emergence of trends in the earth sciences to seek concrete solutions within the issues of eco-development, rather than to limit oneself to carrying out only observations or making descriptions of the processes involved. He draws attention to the complexity and multifaceted nature of sustainable development, which requires a multidimensional and multidisciplinary approach. He sees a solution in conducting activities in a strategic manner so as to be able to transform the values, principles, and aspirations into sustainable goods and introduce new mechanisms of interactive dialogue at different scales.

Seeking to answer the question of whether ecophilosophy is needed in landscape research, it should be noted that philosophy does not stand in contradiction to practice, it does not preclude the use of modern technology, but it takes into account both the needs of society and nature, and does not inhibit economic development. Rationalizing the philosophical approach to space in its broad sense or to a narrower concept of landscape, taking into account the values, ways of perceiving the world and attitudes existing in a given society, we can assume that the development of skills building systemic, holistic models of reality should be carried out in parallel with the technological development of civilization. However, the philosophy of sustainable landscape could not function as a separate philosophical stream in science but, in a more colloquial sense, as a way of showing the proper place of humans in the universe.

5. Is there anything standing in the way of the prevalence of balance in the landscape?

The development of civilization is both our blessing and a curse. The benefits of technological and scientific progress are compelling, but at the same time, paradoxically, raising our standard of living we have caused a decrease in its quality using the same mechanisms. W. Sztumski (2000), who argues that the contemporary social environment is characterized by, *inter alia*, the highest level of aggression and the worst ecological crisis in history, is of a similar opinion. All of these changes are very well reflected in the landscape. The common pursuit of profit is combined with a rejection of old ethical systems, and this affects the landscape by treating it as nobody's property, thus potentially able to be used according to one's own needs. Another attitude creates rivalry, especially for the most interesting location, which creates a sense of danger. These behaviours become evident in the landscape especially in the absence of respect for cultural heritage. It manifests itself in an expansive development of the most attractive space, often lying on the border of protected areas, or in the modification of forms of so-called small architecture consisting in the implementation of exotic elements, alien to the given region, (e.g. high fences around private homes, multi-storey detached houses, brightly coloured façades of houses, cutting down orchards, backfilling ditches, ponds, small streams, cutting down trees). These changes are chaotic and exuberant in their nature; as a result, we face a degradation of the landscape.

A. Pawłowski (2008) notices a contradiction between the relatively simple principle of sustainable development and the need to formulate complex strategies of action which take place in various areas of human activity. Many of them can also be applied to the landscape. It has long been known that the changes taking place in the landscape at the local level are a result of current ethical standards and the level of education of society, regional prosperity, and its tourist and recreational amenities at the same time, they reflect the socio-cultural patterns prevailing in a given period and the political preferences particularly of local decision-makers. The environmental awareness of society usually also raises some anxiety. Both the low level of knowledge on the subject and the fact that little significance is attached to solving problems in the field of landscape ecology can be put down to poor school and local government education, and the lack of faith in the possibility of obtaining solutions satisfactory to all stakeholders. Therefore, the first step is to develop a sense of responsibility in the individual for the consequences of his or her impact on the landscape. This aspect involves the protection of landscapes, although we should be careful here and protect it, but not at any price. Therefore, the idea of sustainability in this context appears to be the only reasonable solution.

One of the important questions that need to be answered as soon as possible is whether we can use the geographical environment in such a way so as not to cause adverse effects on the landscape. An interesting possibility associated with the introduction of the concept of sustainable landscape is provided by the concept of industrial ecology. It can be used in the development of the system of functioning of the landscape in a way to compensate for the losses due to the technological development in the area. Today, new ideas of spatial development such as introducing wind turbines to the landscape (Synowiec and Luc, 2013) raise many social controversies, but similar feelings arise in connection with the development of new, or the expansion of old, airfields, industrial sites (such as incinerators and landfills), quarries and many others. It is worth noting that, in

terms of protection, arrangements and legal instruments have been functioning in landscape research for a long time with great success. The issues related to landscape planning and management are treated with much less interest and, actually, as a niche concern. The adoption of systemic solutions would provide a chance to fill this gap, and thus to maintain economic and environmental balance. This would allow conditions to be created for the compensation for the losses caused either by mistakes made in the past, or by the introduction of new objects into space which disturb harmony and cause inconvenience to society, or reduce the value of space in its cultural and social aspects.

6. Is balance in the landscape a utopia or a real vision of the future?

The landscape, which is dominated by people, reflects their social and economic needs and priorities, and is subject to constant change in a more or less haphazard manner (Antrop, 2006). In this sense, it is difficult to accept the view, that the landscape can ever be sustainable, but it can definitely be part of the sustainable environment. M. Antrop admits, however, that the concept of landscape is experiencing a transformation, so this idea stands a chance of becoming a viable vision of the future, provided that the values of the landscape are well defined and the context of changes and its further functioning is established. Yet the author sees danger in a situation where the time frame for landscape management is not defined accurately, and then noble ideas will become fiction.

A. Papuziński (2013) expresses his clear opinion on this matter claiming that balance is a utopia, but it is not inconsistent with the rational nature of sustainability in the environment. However, Z. Hull (2008) shows two diametrically different attitudes of people in the modern world: one that leads to sustainable development and the other one predicting an ecological disaster. Both of them are believed to be equally probable, both also have their raisons d'être probably in every culture on Earth. However, discussing the issue of balance in the landscape from a global perspective, it seems that it is doomed to non-existence. Landscape solutions are usually implemented at the local or regional level, much less likely on a nationwide scale, because of the too great diversity of landscapes, and thus too many differences in the approach to the solutions proposed. In addition, one needs to bear in mind the purely psychological aspect, i.e. people care more about the environment found in their immediate vicinity (Vail, 2006).

No single answer will probably be found to the question posed at the beginning concerning an absolute criterion of truth and the ways of human behaviour with respect to the landscape. There is a range of geographical, cultural (local), political (at various levels of organization), social (including education), economic, ideological (e.g. religious) conditions which, in accordance with the principle of determinism, contribute to making choices and decisions. However, from an ethical point of view, there is nothing in the way of working to further define the landscape, establish criteria for sustainability in the landscape and ways of further functioning of landscape units of various importance. Such attempts must be made because the implementation of even just some of the principles of human functioning in the geographical environment can help to improve the quality of the landscape, regardless of the degree of its naturalness.

7. What are the possible solutions?

Changes constantly occurring in the landscape, often negative in their nature, force us to intensify the multi-faceted and integrated actions of science, administration and society, whose purpose would be to achieve its sustainability. They should work towards the implementation of a variety of systemic solutions taking into account local, cultural and social problems, certainly next to natural ones, as well as sociological research on people's new relations with space and social education in the broad sense. It is important to create alternative solutions from the social point of view in order to meet people's economic aspirations while maintaining the economic activity and preserving the best condition of nature. The proposed directions cannot ignore the necessity of taking steps to prevent adverse developments or to repair measures taken in areas of devastated landscape. The key to success is not to maximize benefits, but to maximize efficiency, i.e. to implement such spatial management that space would be most effectively exploited without destroying the prevailing order associated with cultural and natural values. The development of sustainable landscape must be characterized by realism and pragmatism, and pursue the permanence of the proposed solutions. It is therefore necessary to develop such new strategies for land use so as to be able to meet new challenges. One possibility is to build a system of relocation of attractive and attracting resources of the landscape. Another possibility, provided by M. Lane (2010), is the concept of reducing population in some areas and redirecting people to areas that can absorb them.

In conclusion it should be noted that the concept of ethics is derived from habit and custom; it is a set of rules specific to a given community. However, the purpose of ethics is, among others, to search for philosophical premises on the basis of which it would be possible to develop sets of imperatives in a rational way. The essence of the landscape and the balance prevailing in it fit these ideas perfectly. There is a need to create habits of carrying out any activity in the landscape, i.e. the standards on which decisions regarding landscaping will be made. However, *no ethical argument applies, if it is not related to the* *reasons inducing people to act* (Gray, 2001; Papuziński, 2013).

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Sustainable Development – unbalanced devastation of the environment and its consequences

Zrównoważony rozwój – niezrównoważona dewastacja środowiska i jej skutki

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Abstract

The article contains a reflection on the role of the idea of sustainable development in supporting the existence of human species. The problem is not easy and raises many questions. The contemporary social context does not favor sustainable development. Firstly, it is too firmly rooted in anthropocentrism, which is supported by the religion, and by the traditional European philosophy. Both make people think more about heaven than about the Earth. Thus, people are focused more on the soul than on the body; they are caring more for the favor of God than for their environment. Secondly, the ideology of consumptionism transforms people into wasters who increasingly over-exploit the Earth's resources. Thirdly, people – the social masses and the ruling elites – intensely stupefied, are not driven by reason or intellect. That is why, there is little hope that the degradation of environment will be stopped and future generations will be given the chance to survive as a result of the implementation of the idea of sustainable development.

Key words: sustainable development, the progress of civilization, consumptionism, religion, philosophy, wasters, environmental degradation

Streszczenie

W artykule zostały zawarte rozważania na temat roli idei rozwoju zrównoważonego w podtrzymaniu istnienia gatunku ludzkiego. Sprawa nie jest prosta i rodzi wiele wątpliwości. Współczesny kontekst społeczny nie sprzyja rozwojowi zrównoważonemu. Po pierwsze, zbyt mocno zakorzeniony jest antropocentryzm utrwalany przez religię i tradycyjną filozofię europejską. Jedno i drugie ukierunkowuje myślenie ludzi bardziej na niebo niż na Ziemię. Toteż więcej troszczą się o sprawy duszy niż ciała i o boską łaskę a nie o swoje środowisko życia. Po drugie, ideologia konsumpcjonizmu przekształca ludzi w marnotrawców coraz bardziej i niepotrzebnie trwoniących ziemskie zasoby. Po trzecie, ludzie – masy społeczne i elity władzy – gwałtownie głupieją i nie kierują się rozsądkiem. Dlatego nie można mieć nadziei ani na powstrzymanie degradacji środowiska, ani na zapewnienie szans przetrwania przyszłym pokoleniom w wyniku wdrażania idei rozwoju zrównoważonego.

Slowa kluczowe: rozwój zrównoważony, postęp cywilizacji, konsumpcjonizm, religia, filozofia, marnotrawstwo, degradacja środowiska

1. The haevencentristic thinking instead of the terracenristic thinking¹

From the very beginning, people cared more for themselves than for what was in their natural milieu, because it was all there in abundance, and their most important worry was how to get to the natural resources and how to process them to their benefit. Therefore, for many centuries, people developed a predatory economy and increasingly exploited the natural resources of our planet. Nobody took the Earth into account - what was important was satisfying people's needs or cravings, which rose disproportionately to the increase of consumption. Such unsustainable and carefree management lasted almost until the end of the 20th century. Different religious and secular ideologies supported this disregard for the Earth, which is the life-milieu of the human species and supports the mankind. This nonchalant attitude towards the Earth was fostered by a way of thinking characteristic of the western culture which can be traced back to Protagoras' anthropological philosophy; his famous saying was: Man is the measure of all things: of things which are, that they are, and of things which are not, that they are not. The ideologies of anthropocentrism and anthropochauvinism were built on this slogan. According to them, the human species, together with its environment, is the most important of all other species and our attention ought to be focused on the man and his welfare, even if this would mean harming his oikos and other living beings. The religion - apart from the ideology of anthropocentrism - also elevates the man over all other living beings in the world, because it considers him as the only creature that God endowed with the soul and made the ruler of the world. On the ground of the religion, the soul is regarded as more worthy than the body and the Earth as something worse than Heaven. After all, God has punished man for the first sin and banished him from Paradise to Earth, i.e. to some worse environment; and the immortal soul is better than the mortal body. Heaven with the entire pantheon of God, angels and saints, is the most important determinant of people's life and the ultimate goal of their existence. In order to achieve this goal, they must first of all care for the soul. Human life, thoughts and actions ought to be subordinated to the soul and Heaven, and not to the body and Earth. Although recently the church has corrected its error in the way it views the relationship of man to his environment (now ruling the world also involves taking care of it), it has not changed the essence of the Man-Heaven relation. This cannot be done as the sense of religion and the legitimacy of the existence of the church as an institution are based on this relation. Caring for Heaven, for the favor of God and other beings *living* in Heaven, and for getting to paradise is still more important than caring for themselves, for other people and for the Earth's environment. Therefore, because of religion, man thinks more about Heaven and is more in Heaven than on the Earth. An anthropocentric stereotype of man as the master of the world, with its all negative practical consequences, functioned for many centuries, really for far too long, mostly due to the religious thinking.

Stereotypes are usually long-living and therefore, what became established throughout the millennia, is now difficult to change quickly. So, it is not easy to eliminate from the consciousness of people the belief in their superiority and perfection in comparison with other species and some habits manifested in the behavior toward animals (for example, the Jewish ritual of anti-bioethical slaughtering) as well as their anthropocentric way of thinking. People reluctantly give up their leading role in the world and they are not willing to be more unselfish than it is required by the need for collective life or by the life in consistent coexistence with other living beings, which is emphasized by environmentalists. The stereotype of man who determines the fate of the world (nature, history and individuals) is still strongly visible in different situations. First of all, it can be seen in the attitude of individuals towards nature. Only in a few countries and social groups, environmental awareness is highly developed. The vast majority of people treat the natural environment as their enemy that must be destroyed or can be plundered with impunity.

A similar attitude can be observed in relation to the social environment, and in particular to other people that are in the milieu, especially to foreigners (the phenomenon of xenophobia), and to those who, for various reasons, are considered to be enemies in wars and battles on the grounds of economy (competitive struggle), politics, beliefs, ideology, etc. In the social environment, like in the natural one, individuals aspiring to power elites want to be lords-rulers to subdue others and in consequence, to rob or exploit them. They are not interested in improving the condition of the environment. Often, despite the declarations, they demonstrate an antiecological attitude. And in fact, the need for sustainable development policy proclaimed by them serves to carry out the sustainable, i.e. permanent robbery of people who are subordinated to them. Also, the secular ideology of consumerism dissuades people from caring for their natural environment - the Earth - and therefore the influence of this ideology on people can be compared to that of

¹ Terracentristic thinking is Earth-oriented thinking. It has nothing to do with terracentrism understood as a mythology of ground, which is a worldview of peasants (Sulima 1980, p. 224), or with terracentrism that recognizes the Earth as the center of the universe in contrast to heliocentrism. Also Heaven-oriented thinking has nothing to do with heliocentristic thinking.

religion. Admittedly, recently, under the pressure of environmentalists, it calls for giving concern about the Earth, but more is spoken about the protection of natural resources than done about it . And the implementation of the postulates included in the concept of sustainable development does not change the fact that the goal of consumptionism is rather to ensure continuous, though sustainable growth of consumption, than to limit it by reducing superfluous and excessive consumer needs. This would contradict the meaning and essence of this ideology. Therefore, consumptionism leads to a constant, though at best sustainable growth of the destruction of environment and the Earth's natural resources. In addition, the ideology of consumptionism contributes greatly to the degradation of social, cultural and spiritual environments. Growth of consumption (and production), which lies at the heart of consumptionism, results in unbridled desire for achieving profit as well as continuous and - so far - rather unsustainable (unbalanced) and unlimited enrichment. The consequences of this are:

- The aggravation of various forms of the competition struggle in many areas, which causes the increasing disintegration of society (atomization, individualism and egoism) and disruption of the social order, which, in turn, contributes to the degradation of the social environment.
- The accelerated development of mass culture, total and global stupefaction of social masses by the mass media, and dissemination of the boulevard style of thinking; all these cause the degradation of our cultural environment.
- The reduction of higher-order needs to lower (primitive and mass) needs as well the depreciation of the internal environment of man (his personality, emotions and spirituality), which causes the degradation of the spiritual environment.

Thus, contemporary consumptionism and traditional religions really contribute to the fact that the Earth is increasingly disregarded, to put it mildly.

2. From sustained devastation of human life environment to self-destruction of humanity

The progress of civilization can be somehow limited, for example by the implementation of the principles of sustainable development. However, it cannot be stopped and even more reversed. It results after all from the irreversible development of science and technology, which has been taking place , up till now, rather spontaneously, thanks to researchers and inventors. Theoretically, it seems to be possible to halt or curb this development , but in fact, nobody is interested in that for many reasons, primarily economic ones². On the contrary, more and more effort, resources and capital are invested in science with a view to achieving greater profits thanks to scientific discoveries, which include technical inventions and innovations enabling greater productivity of people and machines, and thus reducing production costs. And the economy, regardless of the different concepts of social development, always aims at minimizing the costs. Therefore, the progress of civilization has to be absolutely subordinated to the iron rules and timeless principles of economy and not to the people's ideas or wishes. As long as money rules the world and is more important than people, pragmatic rules of economics will be more important than the lofty ideals of ecology.

Each development causes the devastation of environment. In today's spontaneously expanding civilization and under the influence of neo-liberal economy focused on the maximization of profit or wealth by all means, this development is not limited or controlled by anyone. Therefore, the progress of civilization is usually accompanied by the spontaneous, uncontrolled and rapid destruction of environment, at a rate that is not proportional to social progress, but higher. If one were to evaluate the balance of gains and losses resulting from the progress of civilization, taking into account not only the economic effects, but also the systemic criterion, including, inter alia, the environmental and social effects, it would probably turn out that the progress of civilization brings more damage to the environment than benefits to humans. Probably, the benefits for humans are increasing linearly with the development of civilization, while the devastation of environment is growing exponentially. Therefore, the gap between the benefits of the civilization progress and the harm done to the environment and consequently to people is continually increasing³. Generally, people do not worry about this every day. First, in today's turbulent and crazy world they have no time for reflection, and secondly, they usually enjoy the benefits of progress, which make their lives more comfortable. The damage that will happen in the future is not their concern, because it is not visible immediately and it will be felt only by

² World view reasons, especially religious ones, do not count at present as much as they did in the past, when especially in the Middle Ages, the Catholic Church delayed the progress of science. Today, the Church still acts as censor of scientific research, but with less success.

³ Another negative consequence of the progress of civilization is the gradual degradation of man by mass use of prostheses, i.e. technical devices replacing parts of the human body and taking over many human functions, including the intellectual ones. Natural environment due to the progress of civilization is gradually, but fast, replaced by an artificial environment, in particular by the virtual one, and the natural human behaviors and emotions by artificial ones. This causes dehumanization of people and virtualization of reality (Sztumski, 2011).

a generation in the far future. In fact, generally two generations: children and grandchildren, determine the time horizon of solicitude for the future of humanity. However, as a consequence of the progress of civilization, this concern is now limited more and more only to the contemporary generation, i.e. to the present time. Additionally, the following factors contribute to narrowing of this horizon:

- The presentist ideology of consumerism, focused on the immediate effects (*here-and-now*).
- Rapidly changing and chaotic world in which it is increasingly difficult to predict future events and long-term implications of today's actions .

The postulates formulated in the program of sustainable development, which aim to control and restrain the economic growth based on a spontaneous and often *predatory* development attempt to prevent a catastrophic situation. Although the concept of sustainable development refers in principle only to the development of economy, it is often extended to other areas of human activity because of the belief in some universal healing and salutary power of the idea of sustainable development, the belief which has not been proven yet, even in economy. Thus, for several years now, sustainable development has been talked about in reference to agriculture, industry, urban planning, commerce, business, infrastructure, etc., as well as in refernce to society and economy, both based on biotechnology⁴.

Nowadays, everything has to be *sustainable*, whatever that would mean, and regardless of whether the sustainability is practicable at all. Hence there are attempts to implement all these ideas, but really with very little success. Sustainable development is expected to prevent the degradation of the natural environment (to reduce climate warming, carbon dioxide emissions, etc.), above all. Also, it has to balance supply and demand, productive forces with consumption forces⁵ (production of goods should be adequate to consumption power), to reduce the consumption of raw materials, to control (and to balance) demographic indicators, to harmonize interpersonal relationships, social relations and the relations between humans and other living organisms, etc. Of course, all of these expectations about sustainable development are greatly exaggerated, utopian and illusory (Sztumski, 2009).

In order to implement any idea, it is necessary to fulfill some precondition, which in this case is the appropriate social and historical context. Meanwhile, neither democracy (which consists in the dictatorship of majority of the stupid and/or in the exercise of authority by a small number of ban*dits*⁶), nor the economy (aimed at satisfying egotistic cravings of people for whom profit is the highest value, and multiplying wealth (money) is the most important goal - both being consequences of the ideology of consumptionism) do not provide the sufficient and adequate social context for implementing the guidelines of sustainable development. Simply speaking, the modern society, including the ruling elite, has not grown up yet to do so (similarly, at one time, the Russian society was not ready to implement the idea of socialism in spite of the successful socialist revolution and consequently, it was not able to materialize the idea of socialism). In fact, in the conditions of the contemporary world, there is no chance to put into practice the idea of sustainable development understood in this way and to fulfill the hopes related to. Sustainable development does not reduce the disproportion between production and consumption. It is pointless to artificially create new needs of the continuously stupefied society. Many exacerbating social contradictions of the modern world emerge as a result of the imbalance between supply and demand.

Consumption needs are growing continuously and it is hard to see the end of this process, because it is impossible to determine the limit of growth and to answer the fundamental question: How much is enough for a man to live well? (R. Skidelsky, E. Skidelsky, 2013). Contrary to expectations, sustainable development does not eliminate the mismanagement and the degradation of our environment.

⁴ An economy based on biotechnology (*green economy*) uses plants, waste and renewable resources. It can replace oil by other fuels, increase food security and energy, create *green* jobs, increase incomes and provide eco-friendly (*green*) growth – all at the same time.

⁵ Force of consumption is the purchasing power of society, conditioned by the wealth and the desire of people to satisfy their needs. A long time ago, Karl Marx wrote about the necessity of balancing the force of production with the force of consumption, or in other words about their dialectical unity (Marx, 1968). He also emphasized the inseparable relationship between or the unity of the two sides of the same process – production and consumption: *The production is also directly the consumption* (Marx, 1958).

⁶ Italian economic historian Carlo Cippola, as a result of research and observation of human behavior, distinguishes four categories of people: intelligent (smart), naive (helpless), bandits and stupid. Intelligent people contribute to society something that is beneficial both to themselves and to others. Naive people give something to society, but as a result they can suffer a loss because others can take advantage of it. Bandits pursue their own interests constantly and at all costs, usually ignoring others and to the detriment of others. Fools do not only harm themselves but also others and society as a whole. Wise people are not willing to rule, because they know that the government does not like the wise and it stupefies people (Allan, 2012). The helpless are not suitable to rule because no one chooses a naive or helpless person to the authorities.. The bandits strive to get power because it helps them to achieve their own goals, while the stupid, because they are easy to manipulate and they are not believed to be extremely harmful. So, the society is doomed to be ruled by the stupid or bandits.

Present wastefulness is a phenomenon resulting from the contemporary philosophy of economics. Sustainable development will not change anything. In fact, sustainable development is not about efficient use of material resources and energy, but rather about the substitution of natural materials by artificial ones, and the substitution of conventional energy sources (coal, wood or oil) by alternative sources of energy (wind, water, sun etc.). Its goal is not limiting the over-consumption of electricity (for example, unnecessary illuminations, advertising, etc.) or excessive consumption of raw materials and other substances. On the contrary, in times of consumerism, it is about increasing the consumption of energy and materials, because the more of them are needed and bought, the greater the profit of power plants, gas plants, refineries, mines, ironworks and other industrial plants. The more materials are consumed, the more waste is produced and that brings in profit to cleaning and utilization plants. In a sense, the tolerance for hyper-production and hyper-consumption (production or consumption over reasonable needs), and consequently for accelerating hyper-exploitation of energy and materials, and what follows for the degradation of environment, seems surprising in the times when the idea of sustainable development is widely promoted and partially implemented. Such tolerance contradicts the idea of sustainability explicitly! The use of energysaving technical devices can hardly help, because it is doubtful whether the energy saved in this way can compensate the increasing demand for energy, caused by the increasing demand for various everyday devices powered by electricity. The same goes for recycling - materials recycled from the waste cannot compensate the growing demand for raw materials.

In fact, sustainable development does not do much to impose the requirements of ecology or sozology on the global economy. It is not able to weaken the role of the economy with its driving force of maximizing profits (and not the protection of environment); it rather strengthens the dominant role of the economy. After all, the point is not to reduce the consumption of energy and raw materials, but rather not to exhaust them too quickly (to prevent them from running out) and to be able to realize in the future the idea of economy based on consumption growth. Otherwise:

- The economic system based on the ideology of consumerism can quickly collapse.
- It will be impossible to further accelerate the growth of production and consumption, which in turn will reduce profit and wealth.
- Centrally-planned economy will have to be introduced and the political and social system will have to be changed radically.

Regardless of whether the development is sustainable, prodigality and waste will still accompany the

progress of civilization and growth of human living standards in the economy which aims to maximize profit in the monetary form. The prodigality concerns various goods and manifests itself in various forms. The most visible, outrageous and dangerous for humans and their environment is the waste of food, equipment, footwear, clothing, and paper. Food is wasted (the more you buy the less you pay, for example, two packs for the price of one) because we buy more than we are able to eat⁷. Throwing away the equipment that is still good is caused by technological progress, as a result of which newer and more perfect equipment appears on the market very quickly, and it is better to buy new and better things. Shoes or clothes that are still quite good are not worn because they are no longer fashionable, and the fashion is changing increasingly fast for mercantile reasons. As a result, things are thrown away not because they are worn out physically, but morally.

There is also a huge waste of paper⁸. People are not encouraged to save, but rather forced to be prodigal.

⁷According to the study conducted in 2011 by the Swedish Institute for Food and Biotechnology, in the international program Global Food Losses and Food Waste, under the auspices of the FAO, every year about 1.3 billion tons of food , i.e. one third of the total global annual production is wasted. In industrialized countries, 40% of the food good for human consumption, is thrown away by retailers and consumers for various reasons. This could be used to feed 12 billion people! In Germany, the studies conducted in March 2012 at the University of Stuttgart have shown that 11 million tons of food is wasted annually (60% in households), i.e. about 82 kg *per capita*.

⁸ The mass use of printers and copiers in offices and at home has contributed to an excessive and unnecessary paper consumption. Hand and machine writing has become rare, because it is easier to write and print on the computer. Nobody counts the paper which is used. A lot of paper is wasted especially for the purposes of election propaganda and advertising. A huge number of different leaflets and posters is produced. They are handed to passers-by, sticked on poles and sent by mail (for example in Germany about 30 kg of leaflets are deposited in only one letter-box annually). Nearly no one reads them and therefore, very quickly they end up in rubbish bins. And taxpayers pay for it. The same applies to official printed matter (as an example, the Polish Parliament uses nearly 6 thousand sheets of paper per day), newspapers and magazines (now, almost 7.5 thousand titles are published, while ten years ago there were 5.5 thousand, and twenty years ago, only 3.2 thousand). In fact, a few titles would be enough because they all contain the same information and pictures properly selected from one source (the global news agency) and censored. Over the past 40 years, thanks to computerization, paper consumption in the world has increased 4-fold. The annual consumption of paper in Poland was about 40 kg per person in the late 80's, and now it is 72 kg. By comparison, in the U.S. in 2012 it amounted to 340 kg (the highest in the world), and in Sweden, Finland and Germany, it is twice higher than in Poland (Germany alone uses as much paper as

Thus, at least in developed countries, the homo economics (the frugal man) is fast becoming the homo prodigus (the prodigal man, Sztumski 2013a, 2012) Furthermore, the world population increases very rapidly and consequently, the number of homo prodigus is growing and with time there will be a lot more consumers and wasters than producers. If the process of overexploitation is not stopped, the Earth's resources will be used up prematurely. And that, together with the escalation of global poverty and hunger in poor countries, could lead to the collapse of our civilization in the form of so-called Malthusian catastrophe⁹. Although food production is increasing in arithmetic progression (linearly)¹⁰. the number of people is increasing in geometrical progression (exponentially). Generally, the number of poor people in the world, estimated at around 21% at present, is growing. Therefore, one cannot exclude two possible scenarios that could prevent the demographic bomb from exploding:

- For the good of humanity, some desperate madman a terrorist or a religious zealot, and there are more and more of them will use weapons of mass destruction: nuclear, chemical, climatic or biological.
- The population of the world will be reduced dramatically as a result of natural or controlled decline of births to 1.5 average for the whole world (now such a rate or even lower is only observed in a few countries), and then – as the statisticians of the UN foresee – the number of people in the world would shrink to about 870 million in 2300 (Schwentker, 2013).

Both these scenarios seem to have nothing to do with the concept of sustainable development.

People, in fact, are parasites on the Earth – they eat what they can grab, and in return they give nothing, except for devastating the ecosystem and the mechanisms of homeostasis functioning in nature. Human existence is inseparably connected with the destruction of environment, which is also destroyed by the progress of civilization, either resulting from the sustainable development or any other development. The human species, in the name of civilization progress, destroys the environment more than any other species. This is done not so much because of our biological needs, but rather it is a result of laziness (the need for a comfortable life), stupidity or lack of responsibility for the fate of the world and for the future generations. Engineering activities, without which the progress of civilization would not be possible, supported by modern technology, contribute to the erosion of environment, proportionally to technical progress. We have found ourselves, in a sense, in stalemate. On the one hand, in order to live, survive and develop, we must destroy everything around us - our life milieu. On the other hand, by destroying the environment we contribute to the shortening of our species' lifetime on the Earth. Sustainable development should support the existence of humanity as long as possible; it has to meet the needs of current generations without compromising the chance of future generations to survive. But this goal cannot be fully achieved because the degradation of environment, to some extent, inevitably accompanies people's life. By analogy to the principle of increasing entropy in thermodynamics, one can formulate the principle of increasing degradation of environment: in the real world, the degree of environmental degradation by people is constantly increasing. Thus, every next generation will have to live in an ever more devastated environment. So, implementing the idea of civilization progress, even in accordance with the requirements of sustainable development, we will, willy-nilly, constantly diminish the chance of survival for future generations. Consequently, the basic premise of sustainable development contained in its definition, is a fiction (Sztumski, 2004), As long as people tend to increase their needs, even to a small extent - and nothing indicates that it could be otherwise - they will contribute to the shortening of duration of mankind on our planet, due to the progressive degradation of their life environment (Sztumski, 2011). Therefore, we are the species that naturally strives for selfdestruction as if of our own wish. And the process of self-destruction has been taking place ever faster since the 20th century, when people gained a sufficiently great power over the Earth and ceased to respect it and take care of it as they should, and since the world is ruled by more and more stupid elite, because power times stupidity is equal to selfdestruction (Delavy, 2005). Long ago, Valentine Nowacki noticed that governments are exercised

South America and Africa taken together). I remember that before computers became widespread, it was claimed that as a result of the digitization of documents, the use of paper would decrease significantly (this was believed to be one of the many benefits of computerization). But it did not work. On the contrary, the consumption and waste of paper increased significantly. The amount of paper being used is one of the indicators of the civilization progress (horror of horrors – it brings to mind the times when social progress was determined by the number of tons of steel produced *per capita*). So, countless documents (whether necessary or not) are printed, duplicated, copied and stored in cabinets rather than on the hard drives of computers.

⁹ Malthus pointed out that human populations tend to grow exponentially, while the capabilities of agricultural resources tend to grow arithmetically. Using these patterns, Malthus predicted that at a certain point, the demands of human population would outstrip agricultural ability. This, in turn, would trigger radical state of misery. ¹⁰ Contemporary eco-optimists – like an Italian physicist

¹⁰ Contemporary eco-optimists – like an Italian physicist and systems analyst C. Marchetti 30 years ago– claim that the Earth can feed even thousand billion people if megalopolises transform into city-gardens, and if they use microorganisms (Marchetti, 1979).

more and more by stupid leaders and that their stupidity is inversely proportional to the progress of civilization. Therefore, he has formulated the principle of the outflow of logic among the leaders of high developed countries: During the progress of civilization, manifested in the steady growth of science and technology and the continuous increase in the standard of living of the population, the leaders of the people involved in the management of public sector lose their wisdom and understanding to the poor nations. In fact, the national leaders of the developed countries are behaving like children yearning misleading, false evidence and wishful thinking to reality (Nowacki, 1983). Although these leaders are guided by reason and think rationally, they, in fact, ultimately harm themselves and others - society and the human race. Therefore, they can be qualified as stupid, according to the categorization of people given by M. Cippola. Selfdestruction of our species is not only caused by stupidity of the ruling elites, but also by the growing stupidity of the social masses. And if only fools are multiplying, what a hope will remain for the mankind? (Singer, 1995). Fools succumb, usually uncritically, to the ideology of consumptionism and contribute to the enrichment of the ruling elite. Also stupid people usually succumb to religion and they direct their thoughts more to Heaven, abstract beings and what is eternal, and do not care for the earthly and temporal existence. Overconsumption, which destroys the environment despite the attempts to implement the idea of sustainable development, and caring more for the Heaven's environment than for the Earth's life milieu - both resulting from the increasing stupidity of the masses and the banditry of the ruling elites - reduce the chance of humanity to survive and shorten the time of our species' existence. The worst thing is that people think that in democracy, which, in fact, is a dictatorship of fools, the stupid majority (where only a few wise are able to think in the universal and principled manner) can save the world. They are not aware that the majority, stupefied by politicians, scientists, business leaders, and media tycoons, will never be able to understand the principles of survival and to take action which could prevent the forthcoming catastrophe. Stupefied people cannot think holistically, because the ideology of consumptionism and the need to participate in the competitive struggle on many fronts, force them to care more for their own particularistic and egoist interests than for interests of all - for society, humanity and the Earth. They are also unable to think in a futuristic way, because ideologues of consumptionism force them to be interested mostly in what is now. In addition, their education is fragmentary, and teachers (following minimum curriculum) can generally give them only a partial and fragmentary knowledge. Anyway, not too wise educators selected negatively for their job often

have no general or holistic knowledge themselves, and in their thinking they cannot liberate themselves from the shackles of ideology and religion (Sztumski, 2013b). Consequently, the stupid teaches the stupid, and the number of stupid graduates multiplies disproportionally to the number of teachers.

Unfortunately, we live in the times when:

- the Earth and nations are ruled by the most stupid in matters of politics.
- Business leaders kill the existence of future generations, increasing their profits.
- Religions destroy the remnants of reason and ethics (the same god is invoked to defend completely divergent values and everyone wants to see their god as the winner).
- Scientists invent things that destroy our future.
- People are threatened with technological holocaust.

And why it is so? There are three reasons:

- 1. More than the two-thousand-year-long Western religious tradition makes people reside more in heaven than on the Earth.
- 2. The traditional European philosophy is not sufficiently concerned with authentic and worldly problems that are most important for human life on the Earth .
- **3.** In addition, the ideology of consumptionism increasingly transforms people into wasters.

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Environmental ethics from a Thomistic-personalistic perspective (implications for the sustainable development concept)

Etyka środowiskowa w ujęciu tomistyczno-personalistycznym (implikacje dla koncepcji rozwoju zrównoważonego)

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Abstract

According to the author, Thomistic environmental ethics is the ethics of respect for man and nature. Contrary to popular opinion it doesn't possess a strong anthropocentric nor a non-ecological character but a theocentric one with a pro-ecological dimension. Thomism teaches that there is hierarchical order in reality. In Thomistic ethics it is God who is the main reference point and the supreme good (summum bonum). Thus, it has a primarily theocentric character, and secondarily an anthropocentric one, which is inscribed in relations between humans and other beings. However, this anthropocentrism is moderate and is not hostile towards nature. In theocentric terms, God is the cause and source of all natural beings. From the ontological perspective they are therefore good, and which must be protected. However, from this assumption it does not mean that all natural beings have the same axiological value. In Thomistic eco-ethics a man, understood as a human person, has an autotelic value. Currently, for this reason, traditional Thomism is increasingly supplemented with personalistic reasoning. In anthropologic analysis a man appears as a psychophysical being. He is therefore unique and the most perfect of beings occurring in nature. Only man can be described as a free and rational being, transcending nature which surrounds him. That is why the dignity of a human person is considered as the moral norm of Thomistic eco-ethics. It also has a person-centric dimension. The value of a human person also controls the relations between a person and other beings inhabiting the Earth. However, they cannot be based on the idea of human domination over nature. The duty to protect nature is inscribed in natural law. This understanding of Thomistic-personalistic eco-ethics can be reconciled with the sustainable development concept.

Key words: environmental ethics, sustainable development, environmental protection, (eco)Thomism, (eco)personalism

Streszczenie

W ocenie autora tomistyczna etyka środowiskowa jest etyką szacunku dla człowieka i przyrody. Wbrew obiegowym opiniom nie ma ona charakteru skrajnie antropocentrycznego i nieekologicznego lecz teocentryczny, który ma także swój wymiar proekologiczny. Tomizm albowiem uczy, że istnieje porządek hierarchiczny w rzeczywistości. W etyce tomistycznej to Bóg stanowi jej główny punkt odniesienia i najwyższe dobro (*summum bonum*). Ma ona zatem w pierwszym rzędzie charakter teocentryczny, wtórnie zaś antropocentryczny, wpisany w relacje pomiędzy człowiekiem a innymi bytami. Antropocentryzm ten ma jednak charakter umiarkowany, nie nastawiony wrogo do przyrody. W aspekcie teocentrycznym Bóg jest przyczyną i źródłem istnienia wszystkich bytów przyrodniczych. W perspektywie ontologicznej stanowią one zatem dobro, które należy chronić. Z założenia tego nie wynika jednak, iż wszystkie byty przyrodnicze mają tę samą wartość w ujęciu aksjologicznym. W tomistycznej ekoetyce wartością autoteliczną jest człowiek pojmowany jako osoba ludzka. Z tego powodu obecnie coraz częściej tradycyjny tomizm uzupełnia się argumentacją o charakterze personalistycznym. W analizie antropologicznej człowiek jawi się jako byt psychofizyczny. Jest zatem unikalnym i najdoskonalszym z bytów występujących w przyrodzie. Tylko o człowieku można orzec, że jest bytem wolnym i rozumnym, przekraczającym otaczającą go przyrodę. Dlatego godność osoby ludzkiej uznano za normę moralności tomistycznej ekoetyki. Ma ona zatem również wymiar osobocentryczny. Wartość osoby ludzkiej reguluje również stosunki pomiędzy nią a innymi bytami zamieszkującymi Ziemię. Nie mogą się one jednak opierać na idei dominacji człowieka nad przyrodą. Obowiązek ochrony przyrody jest wpisany w prawo naturalne. Tak pojmowaną tomistyczno-personalistyczną ekoetykę można również uzgodnić z koncepcją rozwoju zrównoważonego.

Słowa kluczowe: etyka środowiskowa, rozwój zrównoważony, ochrona środowiska, (eko)tomizm, (eko)personalizm

Introduction

Thomism is a philosophical system with its origins in classical philosophy. In modern times it is one of the fundamental and best known schools of philosophy included in the canon of European philosophy. Throughout the world Thomism's popularity has decreased in recent years in favour of other philosophical movements, but it still remains an important and influential system. From the times of St. Thomas Aquinas this philosophical movement has undergone development, adjusting itself to new problems and challenges. This modern version of Thomism is called *neo-Thomism* by some authors.

Neo-Thomism undertakes to explain a number of current issues. One of these is undoubtedly protection of the natural environment. Many thinkers are of the opinion that the ecological crisis is one of the most urgent contemporary problems. In the times of Thomas Aquinas this problem did not exist due to the lack of relevant threats. However attempts to grapple with this issue on the basis of Thomism appear today. This trend is particularly noticeable in modern Polish philosophical and theological thought where Thomism (increasingly supplemented with personalistic argumentation) dominates. Efforts to develop eco-Thomism, however, are most frequently limited, as they highlight only selected issues or concentrate solely on theology evoking Christian Revelation. The author of this article is attempting to show an overview of the Thomistic eco-ethics approach supplemented with fundamental personalistic findings. The aim of the article is to describe the foundation and main assumptions of neo-Thomistic environmental ethics. This approach is the author's own proposal and interpretation on the basis of his research to date (Ciszek, 2006, 2007, 2009), as well as other lines of enquiry not undertaken so far. In this article the author's idea has also been supplemented with the findings from other Polish authors based on an analysis of their publications. The publications have contributed to the development of the concept discussed in this article with the majority based on Thomistic philosophy and Catholic theology which also relates to personalism. However, this particular article on Thomistic environmental ethics is written mainly from the philosophical point of view.

Theological issues have been omitted or reduced to the absolute minimum. Although theological argumentation is valuable for people accepting the Christian faith, it may not be acceptable to other philosophical or ideological points of view.

According to the author, Thomistic environmental ethics is the ethics of respect for man and nature. Thus it can be easily reconciled with the current popular sustainable development concept. This kind of eco-ethics derives its anthropological and axiological solutions, as well as the resulting moral imperatives, from a realistic vision of reality (Ślipko, 1994).

1. Metaphysical basis of Thomistic environmental ethics

From the ontological (metaphysical) perspective Thomism is pluralistic for, according to the doctrine, reality consists of many real existing beings (substantial beings), different from each other, but interconnected through numerous relationships. They do not form a manifestation of a single thing (being), but are different beings. Thus nature consists of a multitude of (substantial) beings, interconnected with each other through various relations (Bocheński, 1950).

It is worth noting that, according to classical metaphysics, a being is synonymous with goodness (perfection). A *being* is a real existing thing (which could of course not exist). Perfection flows from its existence. However *goodness* is a conceptualisation of a thing (a real existing being) due to the fact that it can be the object of human choice (desire). Thus, value and being are inseparable (Anzenbacher, 1992; Stępień, 1995; Andrzejuk 2012). This type of assumption is significantly important for Thomistic environmental ethics. For beings co-creating nature exist in reality (indeed they might not exist). In this regard it must be held that each one is good (perfection). For this reason numerous natural beings constituting a natural environment are worth affirmation, desire and pursuit. Therefore they are of value. However, Thomists do not share the currently popular bio-centric and eco-centric trends in environmental ethics, as they attribute the same value to each living being, or even to the whole of nature, without singling out man (a human person). The followers of

bio-centric axiology in environmental ethics reason that, similarly to other organisms, man is one of many organisms co-creating (animate) nature. For this reason neither man nor a representative of any other species is entitled to any particular position or value. All living organisms are equal having the same value. Each of them has appropriate characteristics and skills enabling each its survival in nature. Therefore, each being endowed with life should be protected from the perspective of the totality of the biosphere it co-creates. Such a standpoint leads many bio-centrists to the viewpoint that not only specific organisms, but whole populations, as well as the biosphere are entitled to an autotelic value. The followers of eco-centric ethics go even further. They consider both animate and inanimate nature as an intrinsic value, due to the whole which they constitute. It appears to the followers of eco-centric environmental ethics as an autotelic value, a value in itself. Thus it is not difficult to notice that representatives of eco-centric environmental ethics treat nature as an individual, independent entity (metaphysical monism). Such a viewpoint is not acceptable from the Thomistic (classical) metaphysics perspective. It acknowledges that natural reality consists of various interrelated beings (metaphysical pluralism). Also it does not share the bio-centric viewpoint that all animate beings have the same value. The perfection of existing natural beings in the metaphysical (ontological) aspect is in fact different. Thus from the Thomist environmental ethics perspective, man as a human person is the most perfect being inhabiting our planet. That is why he is the main reference point. Here we touch upon a very important issue, namely the anthropocentric aspect of Thomistic environmental ethics. Currently the ecological crisis is blamed on the alleged Judeo-Christian heritage of anthropocentrism. Such a view is not objective in the opinion of Catholic thinkers. It results from a lack of deeper knowledge of Thomism which has a clear theistic and consequently a theocentric character.

2. The theistic and theocentric character of Thomistic environmental ethics. God as the *summum bonum*

Thomistic philosophy has a theistic character. However, it does not follow on from the theological assumptions which refer to Revelation. Theism is a conclusion from philosophical assumptions of realism and pluralism. Thomism teaches that God is a cause and source of the existence of all beings. As a person He has infinite reason and an infinite free will. He is also the supreme and infinite Being, the highest value, infinite Truth, Goodness, Beauty, Love, Knowledge, etc. Thomism results from the assumption that there is a hierarchical order in reality (Bocheński, 1950). For Thomistic philosophy, these ethical findings mean that the purpose of human life is infinite goodness, i.e. God. In the context of Thomistic environmental ethics it should be accepted that the *summum bonum* (highest good) is God. Thomistic ethics is therefore theocentric. Recall that theocentrism (Greek *theos* = God + Latin *centrum* = centre) is the direction in ethics, which requires man's moral actions to be considered in relation to God as the supreme and only value (God is identified with *summum bonum*, Gawor, 1999).

Such an understanding of theocentrism, in terms of Thomistic environmental ethics, requires any relation between man's moral actions and the natural environment to be considered in relation to God as the cause and source of existence of all natural beings in nature. They have a value because of God who created them and continues to keep them in existence. Man as a unique entity among the beings that populate Earth, should fulfil the role of a good steward, host and mentor of the natural world, who has been endowed by the Creator. People destroying nature oppose God by doing evil. Therefore, from this assumption the duty to protect nature can be deduced. However, a fundamental question arises here of whether there is any room for moral anthropocentrism in Thomistic ethics (including environmental ethics)?

The answer to this question is yes. Anthropocentrism is written into the relation between man-person and the remaining beings in nature which constitute the natural environment. Indeed Thomistic environmental ethics in its assumptions emphasises the uniqueness of man against a background of other earthly beings. It places man at the centre of its interests. However, it is anthropocentrism, which has its own characteristics. It has little to do with the current, negative meaning of this term.

It is worth remembering that the concept of anthropocentrism has a wide range of semantics. Two varieties governing the relationship between man and nature can be distinguished here. The first is strong anthropocentrism, the second is moderate anthropocentrism. Supporters of the former, strong approach, treat the natural environment as overly instrumental. It appears to them as a reservoir of natural resources, which can be used indefinitely or even be destroyed. This approach is a derivative of a consumptive lifestyle which accents only the materialistic side of human existence, disregarding almost the entire spiritual dimension. This extreme attitude is thus fundamentally distorted and non-Christian. It also stands in contradiction to the assumptions of Thomistic ethics for which the act of destruction is a moral evil. Evil results from such an act, whose purpose (direct aim) is mindless vandalism. However, representatives of the latter, moderate approach treat nature as a common good, so this approach is the most environmentally friendly. It denies man unlimited power over nature in line with the *responsible trusteeship*

and guardianship motto. It is in the latter, moderate approach that the anthropocentric nature of Thomistic ethics must be understood.

In the opinion of Thomists strong anthropocentrism is not a product of Christianity or classical philosophy, but is the work of the modern age. The Renaissance, the start of the modern era, is especially at fault here since it investigated the human phenomenon in isolation from God, whose place was replaced by human autonomy, often construed as too extreme (Dogiel, 1992). On this secular basis of anthropocentrism the causes of the ecological crisis should be traced. However, Christian anthropocentrism is moderate. Within it, we are dealing with a theocentric, and not a homocentric vision of the world, since God is the central reference point. It is true that Thomism recognises man (human person) as the most perfect of beings inhabiting the planet. However, this maxim applies to the relations between man and other beings in nature. Against their background man is an autotelic (superior) value. Therefore one cannot behave egocentrically and nature should be treated as a common good which should be protected and be responsible for. However, in a broader context, in Thomistic philosophy it is God who is the highest good (summum bonum). He is a fully perfect, personal being. In Thomism, anthropocentrism therefore gives way to theocentrism. Therefore, it has a derivative and moderate character. Theocentrism also provides an additional reason for the protection of man's natural environment. Natural beings that form nature arose as a result of God's creative action, who still keeps them in existence. For this reason they are of value. Therefore, man should not be nature's ruler but its manager, since after all he did not create nature. He should be responsible for it with regards to other people, or otherwise he commits evil. This idea is also promoted today within the frameworks of Thomistic theology and Catholic social teaching. They teach that nature is a gift from God, and therefore the skilful management of her resources is a moral imperative. Man was placed at the head of creation by God, in order to care for it, and also to use it for his own purposes, as taught in the Bible. However, any mismanagements of nature constitute a grave sin against the Creator, i.e. an ecological sin (Bayda, 1999).

It is the opinion of a growing number of Thomists that a theocentric paradigm of environmental ethics understood in this way could even become a *third way between holistic-bio-centric and anthropocentric ethics*. It endorses both the value of nature and man, avoiding the extremes expressed when absolutising one of the two listed categories (Ciszek, 2009; Biesaga, 2009).

Naturally, Thomistic environmental ethics assumptions which place man in a privileged position in relation to other natural beings, does not convince everybody. Environmental anthropology teaches us that man is part of nature, with which he is closely associated. Like other species, *Homo sapiens* arose through evolution. Thomistic environmental ethic does not deny it. However, Thomists consider environmental anthropology as an incomplete science in relation to philosophical anthropology, which in a rational manner, without any reference to Revelation, is able to show the phenomenon and the superiority of the human being and justify his intrinsic value.

3. The anthropological basis of Thomistic ecoethics. The autotelic value of man-person in the world of nature

From the classical philosophical perspective man is a unique psychophysical being. He is the only living organism inhabiting the Earth, about which it could be predicated that he is a person representing the highest type of being. It is a fundamental assumption for Thomistic environmental ethics. On this basis Thomists claim that man-person, as the most perfect being in nature, should be an autotelic value in their system of ethics. They justify this type of assumption with philosophical argumentation by referring to reason, and not the Christian faith. They advocate performing a philosophical analysis of man's *intrinsic* value in order to determine what this value depends on, and its relation with the values of other natural beings (Ślipko, Zwoliński, 1999). Thomists believe that without such a philosophical insight, it is impossible to properly practice environmental ethics.

Catholic thinkers have pointed out, that what undoubtedly differentiates man from other organisms is human psychism which is worth philosophical analysis. The answer to the question *who is man?* depends on what form of being this psychism represents. Then we can also determine how man's relationship with the natural environment should be shaped (Ślipko, Zwoliński, 1999).

Modern scholars point to some similarities between animal behaviour (especially primates) and human behaviour. Thomists however emphasise that one should not lose sight of the fundamental differences which distinguish man (and human psychism) from other species (Ciszek, 2013). These are presented below (Słomkowski, 1957).

Sensory cognition. This applies to all animals. With this type of cognition animals can associate specific objects with the help of their senses, e.g. a monkey, thanks to such an association, can use a stick to dislodge fruits. However, this type of cognition in animals is limited to specific beings, from which they cannot extricate themselves, unlike humans. For man, relations between objects are detached from cognitive and material specifics such as abstract and general concepts as well as symbols (Kłósak 1960). For this reason, animals

cannot develop psychologically or spiritually nor shape an autonomous and specific animal culture as a result of their own internal initiative (Ślipko, Zwoliński, 1999).

- 2) Usage of tools. Observation and experiments on hominids show that on a 6-point scale for using tools (a tool as a natural, purposeful, a modified means for direct and future use, as a prepared means for a particular situation and the choice of tools as a means), only three points can be assigned to the apes, whilst the remaining points only to people (Zieba, 1995).
- 3) Mental cognition. Only humans are characterised by it. Using abstraction man is able to create general ideas which exceed the being's individual qualities. The immateriality of concepts and thus spiritual knowledge manifests itself even more in abstract concepts such as truth, goodness, beauty, and especially God, spirit and angel. They relate to immaterial beings that cannot be observed by the senses. Man must therefore possess a cognitive spiritual power enabling him this abstraction. The ability to capture such relations, such as the relationship to an aim or cause to effect, also exceeds sensory cognition and point to man's immaterial cognitive power.
- 4) Sensual desire versus spiritual craving. Man, in contrast to animals exceeds biological determinism. It can be stated, that he is a free entity, able to control his instincts, even as strong as the instinct to maintain his life or sexual drive. He is able to give them up for the realisation of spiritual ideals. Therefore, there must exist in man an immaterial factor that can stand up to strong, congenital needs.

Thomists emphasise that these examples speak in favour of the thesis about the existence in man of a spiritual dimension called a soul (rational soul). However, the human soul cannot be identified with matter (which is a form), because its essence is different from the body. It is immaterial and its origins cannot be inferred from the development of the material body (Słomkowski, 1957). Thomists are in fact of the opinion that the essence of humanity is the unity of the immaterial element (rational soul) with the material element (body). Man, in this approach is not a cluster of immaterial and material factors, but a monolith, an organic psychophysical whole. This sources the dynamics of human development, the richness of spiritual experiences, and man's cultural creativity, which can be defined as his intrinsic value. Man, in comparison to members of other species is a completely different and unique being. He is an autonomous being, free, rational, acts in his own name and on his own responsibility. He is a psychophysical person-being (Ślipko, Zwoliński, 1999).

Moreover, Thomistic philosophers point out that there is no logical possibility of building bio-centric or eco-centric ethics. Anthropocentrism is inherently inscribed into the practice of any kind of ethics. As Julisław Łukomski states, nature itself does not give us the models of behaviour and is not as idyllic as her supporters would like. Cuckoos lay their eggs in other birds' nests, squirrels devastate other birds' nests. It also happens that tigers and other animals eat their children. However, in the animal world there are actions arising from instincts which are not subject to moral evaluation. Of course, many negative actions can also be observed among people but they constitute a breach of the applicable norm, which by its nature is already immoral. This is because the guilt, the moral responsibility, can only be placed on man because he is able to distinguish right from wrong and understands that he has a moral duty with respect to another person (Łukomski, 1999).

Thomists do not deny that man has a body and as an organism is part of nature. But as a rational and free person he transcends the natural world. However, animals (and other natural beings) are fused with nature to such an extent, that they are unable to free themselves from natural conditions. For this reason, the value of non-human natural beings is replaced by human value. On this basis it is possible to justify man's moral right to appropriately manage nature. Hence, Thomists recognise man-person as an autotelic value in their system of environmental ethics. Man's chief goodness is thus a criterion for the moral evaluation of acts including those with respect to nature. Consequently this places on man a responsibility for the condition of the natural world around him. In this perspective, nature has an instrumental value since by destroying nature we contribute to the destruction of man, exposing him to death and disease. This way, we violate his goodness. Yet, on the other hand, we must remember that in the theocentric paradigm of eco-ethics there is a fundamental issue which revalorises the natural world. Nature is in fact a reflection of the supreme Being who is the cause and source of its existence. In classical philosophy that being is God. God as the Creator of nature still continues to support its existence. However, it should be remembered that the dignity of nature is ranked lower than the-inviolable dignity of man, which according to many Catholic ethicans is the moral norm in their ethical system. This follows on from the assumption that man, understood as a human person, is the material object of Thomistic environmental ethics (Łukomski, 1999, 2000).

4. Man-person as a material object of Thomistic environmental ethics

The material object in Thomistic ethics is man, or more precisely his decision, which arises as a result of a particular dialogue between reason and human volition. Ethics is interested in actions, not in the

general but in the context of their moral value, i.e. those which are morally good and those which are bad. We now arrive at another issue, that of the moral norm. In ethical literature it is accepted that the norm is the source and criterion of an act's moral value (Szostek, 1998). Let us recall that in classical Thomism four types of mutually subordinated measurements (norms) of a human action are recognised: eternal law, natural law, positive law and human conscience (Bocheński, 1950). However nowadays, more and more frequently classical Thomism is combined with ethical personalism. In such a Thomistic-personalistic approach it is accepted that the chief moral norm is the dignity of a human-person. This also applies to environmental ethics. It can even be claimed that it is person-centric.

4.1. Natural law and human conscience versus environmental protection. The environmental dimension of the norms for human action

Natural law on an ecological level is consistent with the previously presented anthropological assumptions of Thomistic philosophy and ethics. It emphasises that, despite the fact that the same material groundwork links human and non-human natural organisms, nevertheless they form two separate worlds. Man lives in nature, without which he cannot do without. However, he is not just nature, since he transcends nature, that is, in a certain sense, he is beyond nature (Ślipko, Zwoliński, 1999). Therefore, one cannot explain the existence of man and his position in the world by referring only to natural laws. It is worth opening up yet to a different perspective - eternal. The argumentation for such a position is based on the assumption that the world created by God is not accidental and chaotic. Even for an atheist, who accepts the existence of order in the world, it is sufficient for him to recognise moral law (Ozorowski, 2002). This eternal law was inscribed by the Creator into the moral consciousness of people and into nature itself, the human being and the created world. It manifests itself as the natural law with objective moral governance and rules of conduct arising from the rational, psychophysical nature of the human person. In the ecological aspect, this means that man, by his nature, will make use of the natural resources he needs for personal development and daily life. However, one cannot talk exclusively about unlimited use of the environment. Natural law also imposes on man an obligation to take rational care of all the elements which make up man's natural environment. Indeed destroying nature, we also destroy man who is anchored in nature, violating his goodness. In an ecological aspect, natural law also finds its dimension in positive law which is determined by authority. The legally binding authority must develop appropriate regulations with the intention to protect man's natural environment. This task can best be accomplished by supporting the ecologically sustainable development of human culture and civilization.

As far as natural law is a measure of moral governance, so conscience is the guardian of morality, applying natural law to specific situations. This also applies to ecological issues. Contrary to popular belief, conscience in terms of Thomistic ethics is not a feeling but syllogism. It is therefore an act of reason, which applies the general moral law to a specific case (Bocheński, 1950). This general moral law can also be interpreted in the spirit of pro-ecological norms. Human actions which destroy nature, nevertheless cause harm to man. It is therefore necessary to evaluate them as morally wrong. To this end, special proposals for the examination of ecological conscience have been developed. For example, in Poland (a country where the majority of the population is Roman Catholic) two models for the examination of ecological conscience have been developed (Czartoszewski, 1999). Their aim is to shape the ecological conscience and to make each person aware of whether his relationship with the natural environment supports his conduct and positive balance, or in an immoral way it contributes to environmental devastation violating human dignity. Here we touch upon an important issue. Currently, more and more frequently Thomistic philosophers make use of the achievements of ethical personalism. Consequently, they accept that the chief moral norm is the dignity of the human-person (personalistic norm). It also has its own ecological dimension.

4.2. The dignity of man as a moral norm for Thomistic environmental protection ethics. The ecological aspect of the personalistic norm

Personalistic ethics states that every man is a person (Latin *persona*) having a unique property – dignity. The dignity of a person is thus considered in this ethical direction as an autotelic (superior) value. Every existing person is entitled to it, thus it is inviolable. For this reason, we must incorporate human dignity into everyday life, acknowledge and maintain it in other people. That act of affirmation of personal dignity is identified in personalism with love which should be the direct goal of our actions. Karol Wojtyła articulated this assumption most fully in the personalism norm, which states: A person is such a being, that a proper and fully valued reference to him constitutes love (Wojtyla 2001, p 43). Love characterises all interpersonal relationships, not only between people but also in the relationship between God and man (Ciszek, 2011).

In Thomistic-personalistic terms it is therefore accepted that in contrast to the existence of things and objects *the dignity of being a person* must be recognised before other beings. Man being a person, is self-determining and consequently, at the same time, the object of all rights and responsibilities. He is also entitled to respect, and thus cannot be treated as a commodity or an object of manipulation (Wojtyła, 1970). This principle also applies to environmental ethics and contrary to popular belief, it is not an expression of a species' chauvinism. The fact that man deserves particularly special treatment is not due to the fact that he is a representative of the *Homo sapiens* species. For this reason human dignity is the prime norm of Catholic environmental ethics, because people are individuals (Szostek, 1998). As noted by Andrzej Szostek, such an approach entails, appropriate consequences such as *if I were to meet individuals who are not human beings (angels, extraterrestrials), I should treat them as humans, even though they are not, from a genetic point of view* (Szostek, 1998, p 103).

The personalistic norm in environmental protection ethics means, that there is a justified duty to recognise the value of man's natural environment. We come to this conclusion by purely rational means. After all, actions which contribute to the destruction of nature lead to harming humans. Human volition should therefore strive towards pro-ecological actions (intellectualism of Thomistic ethics). According to Julisław Łukomski, endorsing the value (goodness) of the environment, we must also recognise the ecological goodness of its main inhabitant man. The respect shown to nature, which forms man's living environment, is an indirect recognition of human dignity. Therefore, when there is human interference in nature, it is important to realise to what extent this action confirms and contradicts a person's dignity. All interpersonal relationships should be supported on mutual respect and love (Łukomski, 1999). Love is also the supreme criterion of man-person's dignity. It governs our actions in relation to others, including the natural environment. The love towards another human being requires preserving for his own good an appropriate state of the natural environment which is the guarantor of his health and life.

4.3. Ethics of respect for a human person (man) as the basis of respect for the natural environment. The person-centric dimension of Thomistic ecoethics

In summarising earlier considerations, it must be mentioned that Thomistic environmental ethics recognises the duty of protecting the natural environment. The respect for nature, which is the habitat for man's life, results from the affirmation of the human person's dignity (Łukomski, 1999). It can therefore be concluded that moderate anthropocentrism in Thomistic eco-ethics also has the person-centric dimension.

Following on from Julisław Lukomski, and based on comments herein, two Thomistic-personalistic postulates of environmental ethics can be mentioned (Łukomski, 1999) and should be accepted:

- An absolute duty to perform actions aimed at protecting a human person's natural environment, which is an expression of acknowledgment of man's dignity and
- 2) an absolute duty not to perform actions which constitute a threat to the natural environment and consequently for the human person.

These two fundamental general postulates justifying moral protection of nature can be further refined within the framework of moral norms, prescribing or prohibiting certain conduct with respect to man's natural environment (e.g. conserve water, don't drop litter in the forest). Deviation or respect for these norms should involve the socially defined moral sanctions (rewards and punishments). However, to achieve this aim which is included in the pro-ecological norms, Thomistic environmental ethics must strive to teach man the relevant moral skills.

5. Ecological *virtues* - the role of moral fitness in pro-ecological education

Thomistic ethics is educational ethics. In accordance with Thomistic assumptions man will not be a good person without an appropriate character, which will enable him to effectively perform morally good acts. Man must therefore teach himself the moral skills (dispositions) i.e. *virtues* (Bocheński, 1950). This also applies to Thomistic environmental ethics. Each of the classic virtues i.e. cardinal virtues (which traditionally include prudence, justice, fortitude, and moderation) may also be adopted in pro-ecological education. Its aim is to shape the character for fulfilling the actions which protect man's natural environment in accordance with the concept of the golden mean (avoiding extremes).

In Thomism it is accepted that the virtue of prudence is the most important virtue. Without it one cannot properly evaluate the situation which allows for a morally fit deed. It is therefore a prerequisite for the existence of other virtues. Without prudence, in principle, it is impossible for other virtues to exist, since only reason can evaluate the situation properly. It is not a recipe, but man characterised by prudence who can assess good and evil. Recipes are characterised by generality, whereas in deeds it is the particular good which is borne in mind and which should be properly identified (Jaroszyński, 2003). The virtue of prudence in the ecological dimension allows for the thoughtful and wise use of natural resources. It also leads to the opposition and disapproval of those actions which lead to the devastation of man's natural environment (Dziekoński, 2002). This virtue also allows the golden mean to be maintained between the two failings (extremes). For example, prudence induces man to the optimal use of natural assets, necessary for his existence, and for the development of culture and civilisation. It does so in such a way so

as to avoid excessive degradation of the natural environment (the extreme is expressed in the excess) and avoiding insufficiency, and thus the extreme expressed in the almost complete abandonment of the use of environmental resources (in accordance with the utopian mottos of some extreme pro-ecological organisations calling for man's return to nature).

The virtue of prudence on the ecological level is closely related to the virtue of moderation (restraint). In Thomism this virtue has a general dimension, since in every virtue there is a certain reasonable restraint present in human behaviour. Also, in an atmosphere of moderation other virtues can actually develop (Wichrowicz, 2002). The virtue of moderation by definition fits perfectly into Thomistic environmental ethics. Excessive and unreasonable exploitation of nature stems from the consumer lifestyle of modern people. Even in ancient times the need for implementing reasonable moderation when experiencing sensory pleasure was recognised. Christian moralists also remind us of this. People must therefore develop within themselves an appropriate restraint in the use of environmental resources and other material goods (e.g. technological achievements) in accordance with the requirements of reason. Without teaching themselves the virtues of prudence and moderation they will be unable to overcome the ecological crisis.

The virtue of fortitude, enabling difficulties to be overcome, on the surface appears to be of little use on the ecological level. But to persevere in pro-ecological acts man must undoubtedly strengthen himself. The ecological crisis arose because of people's passivity towards the environmental protection issue. Sometimes people also lack the courage to speak up and point out to others the major issues concerning environmental protection. The virtue of justice can also help. Let us recall that it facilitates man to give everyone his due, according to a fair measure (Podrez, 2012). The environmental protection postulate remains consistent with social justice. The destruction of nature takes resources from other people, which they will not be able to use, and to which they have an equal right. It is precisely on this foundation that the modern idea of sustainable development is based.

6. Thomistic eco-ethics and the sustainable development concept. An ecological dimension of the common good

Sustainable development is currently a popular concept, developed mainly on the basis of economic and social sciences (Pawłowski, 2008). It seeks to harmonise the country's economic and social developments with the protection of the natural environment. This concept emphasises that the natural environment has a value that must be preserved for future generations (Dołęga, 2007).

Such a view of the development of human civilisation is possible to reconcile with the assumptions in Thomistic eco-ethics discussed in the article. This is due to the fact that the sustainable development concept, as opposed to the idea of sustainability, takes into account social development. Therefore, it is possible to argumentate on the basis of Thomistic ethics that the aim of environmental protection, in the context of sustainable development, is the implementation of the common good. This assumption is consistent with Thomistic social personalism (isolated from ethics), which recognises the primacy of the person over society. From the perspective of classical ontology (metaphysics) a person is a substantial being as opposed to society which is a secondary being (Bocheński, 1950). Society exists only in people. It is a group of people associated with each other through different relationships. The purpose of its existence is the realisation of the common good. The common good is not something abstract, it must take into account the interests of each individual manperson. The common good so understood may also have an ecological dimension. It is difficult to realise man's well-being in a devastated environment that exposes man and society to unnecessary risks. Nature must therefore be preserved for other people, by the moderate use of natural resources. Responsibility for nature results from the responsibility with respect towards another human being, understood as a human person.

Philosophical and ethical justification for this proecological concept therefore requires man's well-being to be recognised as an object of sustainable development. Nature must be protected because its degradation will turn out to be bad for each individual person (and globally for the whole of humanity). It is not hard to see that we are dealing here with an approach called moderate anthropocentrism based on environmental ethics. To some extent it tries to adapt and sustain man's (society's) interests with the development of other species in nature (Ciszek, 2008). It should be emphasised that moderate anthropocentrism so conceived has nothing to do with the now discredited idea of strong anthropocentrism which treats nature as a reservoir of natural resources, that can be freely used.

On this ethical foundation one can justify all proecological ideas, provided however, that they will not equate man's value to that of nature. The idea that man is the object of sustainable development, and not, for example nature can be further justified on the anthropological level. Anthropocentrism in Thomistic eco-ethics is person-centric. It emphasises that man is superior to other living beings in the natural environment. Man in an anthropological analysis appears as a psychophysical being i.e. a person. Thus he is a unique and most perfect of beings inhabiting nature. Only man can be described as a free and rational being who transcends nature which surrounds him. Thus, he is the subject of all pro-ecological actions, and not nature, which can only be the object of such interactions.

Conclusion

Thomistic environmental ethics is ethics with respect for man and nature. Its findings in anthropology and axiology, as well as their resulting imperatives are based on a realistic vision of reality. This reality is structured hierarchically.

This article showed that in Thomistic environmental ethics God is the highest good (summum bonum). This ethic is therefore primarily theocentric, and secondarily anthropocentric which is inscribed into the relationship between humans and other beings (but in a moderate form that is not a threat to nature). This follows on from the assumption, that God is the cause and source of the existence of all beings in nature. In metaphysical terms, they constitute a goodness, which should be cared for. However, not all beings occurring in nature have the same value in axiological terms. In Thomistic environmental ethics the autotelic value is man-person. Anthropocentrism in Thomistic eco-ethics is therefore person-centric. Unlike other natural beings, man is a psychophysical being, transcending nature which surrounds him. Therefore, a human person's dignity is the norm in Thomistic-personalistic eco-ethic morality. This value also regulates the relationship between humans and other beings inhabiting the Earth. However, these relationships cannot be based on man's domination over nature (within the meaning of strong anthropocentrism) or domination of nature over manperson (as proponents of bio-centric and eco-centric axiology would like in the postulates of *equalising* the human person with nature). Theocentric and person-centric axiology imposes on man the duty to care about the natural environment and the well-being of the human person. This duty is inscribed in natural law. An unspoilt natural environment consisting of non-human beings is of instrumental value, i.e. a value which is a means to achieving a superior goal (superior value). Without nature it is impossible to preserve human health and life, and consequently the well-being of each individual person. In this approach, the duty to demand respect for man-person is also the basis of respect for the natural environment. However, we will never achieve the superior goal if we do not change our lifestyle. Therefore, it is necessary to shape the ecological conscience and the necessary actions (moral fitness), which are described as virtues. These are the cardinal virtues of prudence, justice, fortitude and moderation. However, the staple holding together all the moral principles of Thomistic eco-ethics is love which regulates the relations between human individuals, as well as in the socio-natural environment.

The vision of Thomistic eco-ethics, outlined in this article, is consistent with the currently popular concept of sustainable development. In the author's opinion Thomistic ethics is able to show the arguments in favour of accepting such a pro-ecological idea.

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Soundscapes and tourism – towards sustainable tourism

Krajobrazy dźwiękowe a turystyka – w kierunku turystyki zrównoważonej

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Abstract

The paper deals with the relationship between soundscapes and tourism. Its goal is to analyse the impact of tourism on soundscapes and to indicate the opportunities offered by soundscapes for the development of sustainable tourism. A new form of tourism – sound tourism – is based on travelling to places with unique acoustic characteristics or unique soundscapes. The paper demonstrates that sound tourism conforms to the idea of sustainable development. It also highlights the fact that tranquil areas should be protected, given the opportunities they offer for tourism, recreation and sustainable development.

Key words: noise, soundscape, sustainable tourism, quiet areas

Streszczenie

Artykuł dotyczy relacji krajobrazów dźwiękowych i turystyki. Celem artykułu jest analiza wpływu turystyki na krajobrazy dźwiękowe oraz wskazanie potencjału krajobrazów dźwiękowych dla rozwoju turystyki zrównoważonej. Zwrócono uwagę na nową formę turystyki, zwaną turystyką dźwiękową, polegającą na podróżowaniu do miejsc charakteryzujących się wyjątkowością akustyczną lub występowaniem unikalnych krajobrazów dźwiękowych. Turystyka dźwiękowa została ukazana jako zgodna z koncepcją zrównoważonego rozwoju. Ponadto zwrócono uwagę na potrzebę ochrony obszarów cichych z uwagi na ich ogromny potencjał dla turystyki, rekreacji i rozwoju zrównoważonego.

Słowa kluczowe: hałas, krajobraz dźwiękowy, turystyka zrównoważona, obszary ciche

Introduction

Today's world is characterised by extremely fastpaced changes, uncertainty and unpredictability. This is accompanied by a philosophical and ethical crisis in society, increasing the lack of faith, both in the religious and secular dimension, in various spheres of life. Therefore, the revaluation of our lifestyle is necessary. A *conscious* man should be placed on a new path of development, leading towards quality instead of quantity. The satisfaction of the material needs of individuals should be accompanied by their spiritual growth. This conclusion follows from the concept of sustainable development. According to Pawłowski (2011), sustainable development has a multidimensional character and should be viewed from various perspectives: ethical, ecological, social, economic, technical, legal, and political. Ethical reflection constitutes the first level that provides the foundation for the other aspects. The concept of sustainable development envisions a lasting improvement of the quality of life for the contemporary and future generations, which is inextricably linked to improving the condition of the environment. Hence, sustainable development should also consider paying attention to the acoustic and olfactory quality of the air as determinants of the quality of life (Bernat, 2010a).
In modern times, tourism is the fastest developing phenomenon influencing social and economic behaviour. In the light of the new EU policy framework, tourism is one of the branches of economy with the largest potential for generating economic growth and creating jobs (Communication of the Commission...2010). Along with the pressure of mass tourism, environmental hazards are on the rise. The degradation of landscape (Myga-Piatek, 2006) and noise pollution (Lebiedowska, 2010) are among the consequences of uncontrolled development of this form of tourism. Conflicts between the development of tourism on the one hand, and the environment and landscape on the other, are most raised in protected areas, where it is important to consider the permissible scope of human interference (Partyka, 2010).

In view of the above, new forms of tourism are desirable that would conform to the sustainable tourism model; i.e. one that is gentle, environmentallyfriendly and associated with tourist activities, that respect the environment and ensure the lasting preservation of natural and cultural values; as well as activities that are fair and acceptable from the economic and social perspective. The main point for the idea of sustainable tourism is to achieve the harmony between the needs of tourists, the natural environment and local communities. The implementation of sustainable development principles in tourism is aimed at minimising the damages and threats associated with the development of this branch of economy, respecting the natural, cultural and social values of the area where tourists are staying, protecting the natural and cultural resources, showing respect for the identity, tradition and lifestyle of local communities while taking advantage of the economic opportunities offered by tourism in terms of the economic growth of the region (Kowalczyk, 2010). According to Zajadacz (2009), tourism can be the most important factor of sustainable development, because the tourism function can be conducive to the protection of the natural environment, bringing numerous benefits in the social and economic sphere as well as inspiring the revitalisation of degraded areas. According to Myga-Piątek (2006), sustainable tourism can be a beneficial factor in shaping varied landscapes, preserving their identity and familiarity. Hence, it is necessary to develop a concept of landscape-friendly tourism development.

Along with the growth of tourism, the desire to experience the beauty of landscape increases as well¹. Tourists are interested in peculiarities of landscapes or architecture features, other than those they encounter on the daily basis (Urry, 2007). The unusual sites and landscapes seen by tourists are then captured and reproduced in photographs and films,

which can be repeatedly played back and admired. Furthermore, tourists in this post-modernist era not only look for beautiful, unusual or interesting places, but also for new ways of experiencing a travel (Wieczorkiewicz, 2008; Urry, 2007). Visual sensations, on which numerous mass tourism undertakings used to rely, seem to be no longer sufficient to attract today's holidaymakers. The ways and methods of sightseeing are multiplying because the treasures of nature and culture can be perceived in a variety of ways. Urry (2007) observes that a tourist's experience not only consists of visual sensations (although they do play the key role), but also combinations of sounds, scents, gustatory sensations and tangibility. The inclusion of themes that involve listening, tasting, smelling and touching adds a new dimension to travelling, suggesting that the experience will be more direct and complete. The distance that usually exists between seeing or watching and the object of observation is eliminated. Tourism based on discovering a multitude of sensations is being promoted, in which tourists are discoverers of experiences and collectors of sensations. MacCannell (2005) refers to tourists as pilgrims who pay homage to numerous sites and attractions. As Kruczek (2011) observes, due to its dynamic growth, contemporary tourism continually requires new attractions and travel destinations for millions of participants, who have already visited well-known sites. A new quality is being established in tourism, namely the focus is on education and learning, entertainment and excitement. The new tourists have different preferences therefore unique attractions are sought after, and when they are no longer sufficient, new ones are created. Based on them, new forms of tourism are developed, which are close to the sustainable tourism model, e.g. geotourism, ecotourism, literary, wine, ethnic, industrial, culinary, golf and adventure tourism (Kowalczyk, 2010). They also include sound tourism, which is based on travelling to places with unique acoustic properties or unique soundscapes². Soundwalks and sound safaris also belong to this category (Nacher, 2010). Bird-watching, that develops dynamically in the USA and Western Europe, is not limited to watching birds but also involves listening to the sounds they make (Janeczko, Anderwald, 2011). There is also a growing interest in a form of contemplative tourism, that involves abandoning one's place of residence and lifestyle; and moving to a new environment in order to recover physical, mental and spiritual energy, regain motivation and search for answers to questions about the human nature (Markowicz, 2008). This form of tourism requires the experience of tranquillity, which thus acquires the status of sought-after tourist product, that

¹ According to the European Landscape Convention (2000), landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.

² Soundscapes constitute a qualitatively varied layer of landscape distinguished based on sounds, characterised by transience and high susceptibility to changes (Bernat, 1999, 2008a).

is capable of competing with other, more sophisticated sensations and experiences (Lebiedowska, 2009). Tourists are also interested in music, which becomes a basic resource in festival, concert and music tourism (Miedzińska, 2008). We can observe an increasing popularity of travels whose highlight is participation in a short, organised event and experiencing something different than the ordinary things. Referred to as event tourism, it is a form of cultural tourism (Buczkowska, 2009).

In the light of the EU's new tourism policy framework, it is necessary to increase the attractiveness of European destinations to EU tourists, strengthening the development of sustainable tourism, including its new forms, and promoting responsible attitudes among European tourists (Communication of the Commission...2010).

The objective of this paper is to analyse the relationships between soundscape and tourism, characterise the impact of tourism on soundscapes and indicate the opportunities offered by soundscapes for the development of sustainable tourism.

Soundscapes as an object of research

Landscapes are an object of perception, an active process where one becomes familiar with an object or a phenomenon by using their senses (a sensory and motor level). The information thus obtained is then processed in a way, that is conditioned by one's existing knowledge and emotional resources (a semantic and emotional level) and by a specific situation (Pawłowska 2008). According to Wojciechowski (1994), the perception of landscape, alongside experiencing, is an element of the perception of the environment. The stimuli provided by landscape are a source of information about the structure and functioning of a landscape, as well as a source of aesthetic sensations. The experiencing of landscape impacts tourism and recreation activity, which often develop on the basis of landscapes perceived favourably, considered to be beautiful and of high quality.

The perception of landscape is usually multisensory, although visual perception predominates³. However, under certain conditions, it can be dominated by another sense, e.g. hearing (in the case of high noise levels) or smell (in the case of an unpleasant smell). According to one of the supplementary reports to the *European Landscape Convention*, sound and smell, and even touch and taste, contribute to the apprecia-

tion or rejection of landscapes (Landscapes and individual..., 2003). In the Polish literature, the role of multisensory perception of landscapes in tourism and recreation was noted by Kowalczyk (1992), Kożuchowski (2005), Miedzińska (2010), Piechota (2006), Pietrzak (2008), Richling and Solon (2011), as well as other authors. The idea of multisensory landscape has been applied in the description and planning of tourism and recreational areas in the suburban zone of Bydgoszcz (Kowalczyk, 1992).

Based on the diverse stimuli, Kowalczyk and Wiatkin (1998) distinguished the following:

- stimuli-rich landscapes characterised by high quantitative and qualitative diversity of information perceived by the majority of senses; these are landscapes with high relative elevations, transitional zones, landscapes rich in plant and animal species, densely built-up and industrial areas, transport zones with a high intensity of traffic;
- stimuli-rich landscapes with numerous and temporally varying or temporarily disappearing signals; these are undulating and hilly landscapes, featuring short hillsides, large plant associations, arable fields enriched with woodlots and small valleys, streams flowing across fields, small water bodies, lakes covering less than 1 ha, dispersed architecture, local transport zones;
- stimuli-poor landscapes with single signals, or signals showing little variety and low intensity; these are flatland or very gently undulating landscapes, featuring long hillsides, arable fields, cultivated grasslands, economically utilised forests, wet forests and wetlands.

Beside visual stimuli, acoustic stimuli play an important role in the perception of landscape (Carles et al., 1999; Piechota, 2006). Sound is a significant landscape feature and functions with other landscape components, supplementing its image with new content (Bernat, 1999, 2008a). Music (the art of thinking with sounds), noise (undesirable sound) and tranquillity, defined as the audibility of the subtle sounds of nature, represent unique forms of sound. Sound helps one to understand a particular place and find one's way. What is more, it enlivens a particular space, fosters relaxation, and strengthens or reduces aesthetic sensations. Sound impacts the quality of landscape and shapes its character. A number of varied sound fields, each of which has its individual source, overlap and permeate each other and thus form a soundscape⁴, perceived as a sound event that

³ Polish geographers use the concept of *multisensory land-scape* to describe the objectively existing structural and territorial reality, perceived by various senses (Bartkowski, 1985; Kowalczyk, 1992).

⁴ The term *soundscape* was coined by the Canadian composer and music educator R.M. Schafer who, in the 1960s, noticed the need for a change in how we consider noise abatement and suggested a positive approach to the sounds around us. It is essential to recognize which sounds we

wish to preserve, develop, and multiply in order to isolate harmful and wearisome sounds that must be eliminated (Schafer, 1976). The invasion of all-pervading noise can be countered by developing auditory sensitivity and improving the aesthetic quality of the acoustic environment through the soundscape design. It is important to restore order in the soundscape, to improve, modify and eliminate undesirable sounds or to move them to other sites, and to preserve the sounds of the past. In 1970, at Simon Fraser

stands out from the background and was described by Schafer (1976) as a keynote sound. Sound events are analysed according to their source (e.g. nature, human beings), function and social context, as well as associations and symbolism. Certain sound events can constitute a sound signal, i.e. a sound that attracts particular attention. A sound that is unique, or possesses qualities, which make it specially regarded or noticed by people in a local community, is referred to as a soundmark.

Soundscapes are an important element of natural and cultural heritage, particularly sensitive to changes associated with the development of civilisation. They can also be a significant distinguishing feature of places and regions. Sounds that are unique or possess a particular value to a local community occur in nearly every environment. Soundscapes are carriers of content, associations and symbolism. Evoked by remembered sounds, particularly sequences of sounds (a tune, a piece of music), such associations bind a perceived scenery with the information that one has about a given region (Bernat, 1999). The knowledge of sounds leads to understanding of various aspects of life that often cannot be directly observed in other sources (Bernat, 2011a). Plit (2011) regards soundscape studies as part of the geography of cultural landscapes. He stresses, that sound is an actual entity and, in a sense, material phenomenon (particle displacement through a medium), although it is perceived by a sense other than sight. According to Bernat (2011a), soundscapes should be treated as intangible cultural heritage worthy of protection and restoration. Soundwalks are one of methods of studying soundscapes (Bernat, 2002). Furthermore, soundscapes can stimulate the growth of tourism. Discovering soundscapes is becoming a new challenge to contemporary culture (Bernat, 2012). The need for the ecology of tranquillity as a subdivision of general ecology is recognised (Sztumski, 2010). The ecology of space also calls for the preservation of a soundscape. Specialists from various countries collaborate on interdisciplinary scientific projects. Numerous projects emphasise the relationship between soundscapes and sustainable development

(The Global Sustainable..., 2012; Soundscape of European..., 2012). Some of these projects analyse the relationship between soundscape and tourism. The scientific literature (e.g. Adams et al., 2006) uses the term sustainable soundscapes. Strategic documents recognise the design of soundscapes and protection of tranquil areas as a condition of the sustainable development of cities (Designing Soundscape..., 2011; Quietening open spaces..., 2010; City of London..., 2012). Since 2010, creative solutions in the field of noise prevention are awarded the European Soundscape Award⁵. The Careggi Landscape Declaration on Soundscape, soundscape-related activities implemented in the European Capitals of Culture (e.g. Linz, Turku, Tallin) and European Green Capitals (e.g. Stockholm, Vitoria Gasteiz), as well as other initiatives, prove that the role of soundscapes in the modern world is highly appreciated.

Noise threat

The development of civilisation is accompanied by significant changes in the acoustic layer of a landscape, particularly in the urban landscape. In modern times, the acoustic layer shows little variety, as the omnipresent traffic noise, while various sounds intermingle as part of monotonous white noise. Throughout the European Union, noise poses a serious environmental challenges6 and estimated economic and social costs it incurs⁷ amount to EUR 40 billion (Report of the Commission..., 2011). According to the European Environmental Agency, nearly 70 million EU citizens are exposed to noise exceeding mean road noise levels (>55dB), while 44% of the inhabitants of large cities are exposed in their sleep to noise levels that may be detrimental (>50 dB). Therefore, issues associated with noise have to be taken into account in all political processes and initiatives, particularly with regard to environmental protection, healthcare, sustainable transport, regional development and spatial management. Moreover, new noise prevention solutions should be implemented. Attention should also be

University, R. Murray Schafer founded his own research group, the *World Soundscape Project*, guided by the idea to thoroughly examine the soundscape in all its aspects, giving particular consideration to its determinants associated with human beings. The Project sought to build a scientific foundation for acoustic design, a discipline proposing ecological solutions for improving the aesthetics of the sonic environment. As part of the Project, studies were initially conducted in Vancouver (*Vancouver Soundscape*) and five European villages (*Five Village Soundscapes*). Schafer's initiative has led to the development of an international acoustic ecology movement, whose activity includes soundscape studies conducted in many countries, as well as collaboration within the *World Forum for Acoustic Ecology*.

⁵ So far, Stockholm (2010), the Gerderland province (2011) and the city of Berlin (2012) have won the award.

⁶ The problem of assessing and managing noise levels is mentioned in the *Environmental Noise Directive* (2002/49/EC). Among other goals, the Directive seeks to make sure that Member States adopt actions plans to preserve the environmental noise level in areas, where its quality is good (protection of tranquil areas in open countryside). In the light of the *Report of the Commission* (2011), the *Environmental Noise Directive* was a step forward in the development of the EU's noise policy.

⁷ The economic costs of noise threats include lower real estate prices, lower efficiency at work due to effects on health, whereas the social costs include premature death, circulatory system diseases, mental disorders, hearing impairment and tiredness (Report of the Commission..., 2011).

paid to tranquil areas⁸, which exert a beneficial influence on public health. The need to protect tranquil areas has been recognised in the strategy paper entitled *Research for a Quieter Europe in 2020*, which highlights the need to establish indicators helping to identify such areas, both in cities and rural areas.

Noise pollution and emphasis on visual cognition in the world today make it difficult to recognise the quality of sound or compare one place with another (Bernat, 2008b). According to Lebiedowska (2010), the progressing noise pollution may become an effective obstacle to the development of tourism in the future, not only in urban centres but also in the neighbouring recreational areas.

Mass tourism can also be a source of noise pollution, which is confirmed, for example, by the observations of Kapuściński (2002):

Crowds of the Japanese everywhere... They travel in coaches, always in groups. They listen closely to what the guide is saying. They watch her hand pointing at monuments and palaces. You cannot tell from their faces whether they are interested, or bored by it. Everyone takes pictures of everything. And everyone (i.e. everyone who happens to be near the Japanese)... The clicking cameras sound as if a swarm of bees was hovering above the Japanese group.

Capri. Boat after boat is coming into the harbour. Groups of tourists disembark one after another. A crowd forms, like a procession. It sets off from the pier and flows along the narrow streets of the town. The island, quiet in the morning, quickly becomes noisy now. But not because the tourists talk to each other, oh no! It's getting noise because as soon as they set foot on the island, the tourists take their mobile phones from their pockets, bags, briefcases and backpacks, and start talking to Lisbon and Geneva, Philadelphia and Melbourne, gleefully announcing that they have just landed on Capri, they are in Capri, they can see houses, mountains and rocks, gardens and plantations, the sun and the sea, they feel fantastic, they are going to have lunch soon (or, in the afternoon, they have just had lunch), they have bought a T-shirt saying 'Capri', they are leaving Capri in three hours (two hours, one hour, in fifteen minutes, in a minute), and so on and so forth. This waffle, this unrestrained chatter, the yapping and excitement are going on for hours, flooding the streets, and nooks of the island with a chaotic, annoying, multilingual din.

Recently, in Poland it has also been observed that some seaside resorts are overcrowded with noisy conditions. The problem of noise pollution also affects health resorts, e.g. Świnoujście and Nałęczów. The Świnoujście city council passed a resolution in 2007 restricting the use of PA systems in beer gardens in the summer season (June to September) between 10 pm and 10 am. The resolution was a response to the convalescents' complaints about loud music and was based on acoustic measurements indicating, that the permissible noise levels were exceeded, which could lead to the city losing its healthy status (Miszczyk, 2011). Nałęczów faced a similar threat in 2009, due to the noise caused by the intensive traffic and lack of a ring-road around the town (Kozłowski, 2012). The municipal authorities undertook to implement remedial measures, i.e. divert transit traffic from the town centre; thus the health resort status was prolonged conditionally to the year 2019. Unfortunately, the issue of a ring-roads has not been solved yet. Due to the lack of funds, its construction has been postponed to an unspecified time in the future (Mikrut, 2013).

Environmentally valuable areas, particularly the national parks, which are considered sanctuaries of tranquillity and harmony, with which people associate the sounds of nature, are preferred as places of recreation, regeneration of man's physical and mental energy. Hence, they are subject to the intensive pressure of tourism. The effects of human impact include noise intrusions, that are detrimental to the functioning of nature (e.g. Barber et al., 2011) and aesthetic experiences of tourists. The values represented by these areas can only be preserved by ensuring tranquillity, defined as the audibility of the sounds of nature. This challenge has been recognised in e.g. the US national parks, where one can listen to the sounds of nature, uninterrupted by human sounds no longer than five minutes (Hempton, Grossman, 2009). Therefore, a programme for the protection of soundscapes has been launched, tranquil zones are established, the assessment of human impact on soundscapes is carried out, tourists' expectations are surveyed, noise levels are monitored and educational campaigns are conducted (Natural Sounds, 2013). These measures are linked with the tourist traffic and transport management programme.

The Polish Inspection for Environmental Protection has observed the ongoing deterioration of acoustic conditions within routes, that go across protected areas as well as the slow process of degradation of tranquil areas (Stan klimatu..., 2006). According to research conducted by Bernat (2011b), each of Poland's 23 national parks is characterised by the diversity and uniqueness of soundscapes. However, they are subjected to transport and tourism pressure, that gives rise to the noise threat. Alongside motorised transport, noisy groups of tourists are the chief factor that disrupts the perception of landscape. New threats have also been observed: individuals, or

⁸According to Article 3 of the *Environmental Noise Directive*, quiet area in an agglomeration shall mean an area (...) which is not exposed to a value of L_{den} or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source, whereas quiet

area in open country shall mean an area (...) that is undisturbed by noise from traffic, industry or recreational activities. In the light of the *Report of the Commission* (2011), few countries indicated such areas in open country.

larger numbers of people, attending company events ride quads and cross-country motorbikes and violate all kinds of regulations. The results include the destruction of young forests, forest undergrowth, forest lanes as well as gullies and sand dunes, which is tantamount to the destruction of the breeding grounds and habitats of birds, amphibians and reptiles. The roar of these vehicles causes panic among hikers, scares the animals away and disrupts peace. Consequently, places that should be used for recreation close to nature, lose their environmental and aesthetic values, while health and life of people is at risk. The mass media report on the latest incidents (illegal cross-country rallies) and their harmful impact, but they also highlight how difficult it is to mitigate this threat. According to the national park services, it is possible to identify areas in parks, where noise is a particular nuisance as well as areas with particularly attractive soundscapes. The former are areas with considerable motor traffic and high concentration of tourists. The least attractive soundscapes (though not without any value) occur in the most visually attractive parks (in the mountains) and those are subjected to the most intensive tourist traffic (Tatrzański and Karkonoski national parks).9 The most attractive soundscapes are characteristic of parks that are unaffected by intensive tourist pressure and located far from transport routes, namely wetlands and forests (e.g. Ujście Warty; Poleski, Narwiański and Białowieski national parks, Bernat 2011b).

The soundscapes of environmentally valuable areas are also exposed to threats associated with road construction, particularly in countries like Poland, where the network of motorways and expressways is still under construction. The designed roads often cut across protected areas, thus disrupting their tranquillity. Even remote sounds of heavy vehicles can be regarded as a nuisance and intolerable disruption in the perception of landscape. This was the argument for considering the impact of noise on the perception of landscape as part of the environmental impact assessment carried out for the Augustów Ring Road (Raport o oddziaływaniu..., 2009) that was originally designed to cross the environmentally valuable valley of the Rospuda river (a tranquil zone extending to 300 m from the river bank), which led to the protests of environmentalists. The Rospuda Conflict has been extensively covered by the media and has drawn tourists' attention to this small, but valuable river valley; the route of Augustów ring road has been changed too. It is worth noting here, that the construction of noise barriers along roads not only reduces the noise levels but may also cause the degradation of the visual values of landscape. In order to prevent the excessive use of noise barriers, the

Polish Ministry of the Environment increased the admissible noise levels in September 2012 (Stop hałasowi..., 2013). Therefore, the threats to soundscapes in environmentally valuable areas can be expected to increase in connection to road construction projects.

Protection of tranquil areas

Gordon Hempton, an American acoustic ecologist, seeks silence in different parts of the world. He found a symbolic bit of silence in e.g. the Hoh Rain Forest in the centre of the Olympic National Park (Hempton, Grossman, 2009). Silence lasts there for long hours, undisturbed by any anthropogenic sounds, or even by the sound of a flowing river or blowing wind. Hempton called that place One square inch of silence. The effect of his investigation is also a catalogue of the quietest places in the world (The World's Quietest Places, 2012). At the initiative of a British acoustic engineer, Trevor Cox, a guide to the world's most attractive places in terms of acoustics has been created (Sound Tourism..., 2013). One of them is Silence Path on the Italian island of San Giulio (The Sacro Monte hill on the island is on the UNESCO World Heritage List). Marked with signs informing about the value of silence, the path is a place where you can hear silence and experience the sacred.

In response to the provisions of the *Environmental Noise Directive*, in several EU countries tranquil areas have been designated, both in cities and in countryside. Since 2012 an international scientific project has been carried out, focussed on developing coherent methods of assessing and managing tranquil areas in cities (Weber, 2012).

The protection of tranquil areas is consistently implemented in London as part of noise strategy (City of London, 2012). Additionally, attention is paid to the acoustic design of public spaces, e.g. highlighting iconic sounds.

In Great Britain, a campaign to protect and map tranquillity is implemented. Tranquillity is understood as beauty, peace and quiet, balance, diversity, and audibility of the sounds of nature: the singing of birds, the sound of water (Campaign to Protect..., 2013). This approach follows from the belief in the numerous benefits associated with tranquillity from the perspective of health, economy and recreation. Tranquillity is a useful indicator of the quality of rural areas as it determines the character of landscape. The high quality of rural areas is determined by the presence of natural landscapes with forest areas, occurrence and visibility of rivers, open spaces, wild nature (birds), absence of noise hazards and landscape deformations (infrastructure, urbanization). Tranquil areas (of high, medium or low quality) are areas

⁹ According to the *Environmental Protection Yearbook* (2012), the number of tourists visiting the Tatrzański and Karkonoski national parks exceeds two million per year (in

comparison, Narwiański NP is visited by about ten thousand people).

comprising places, that are far enough from the visual and acoustic intrusions caused by economic activity and transport (the criterion of distance from roads, cities, airports, petrol stations and population centres, low population density, minimum noise level). The role of tranquillity in shaping the character of a region was recognised in the Rural White Paper for England (Rural White Paper..., 2000) which indicated the necessity to improve the system for planning, management and protection of tranquil areas.

Programmes for the development of high quality tranquil areas are implemented in the Netherlands¹⁰, where tranquil areas currently cover a total of 650 ha (Wolfert, 2013). These include nature reserves, green areas in urban and rural landscape, and tranquil areas in developed parts of the cities (e.g. yards, squares). Due to their beneficial effect on the quality of life, tranquil areas are also designated in Amsterdam (Booi, Berg, 2012).

In Greece 765 potential tranquil areas have been designated, which constitutes ca. 45% of the country's area (Preserving natural quiet..., 2012; Votsi et al., 2012). It should be noted that environmental noise has been an element of tourist city planning in Greece since 1990s (Vogiatzis et al., 2001). It was also at that time that *Sustainability Reference Values* (SRVs) for noise in tourist places were proposed and the need to protect typical soundscapes was observed.

In the Finnish region of Satakunta, as part of the regional planning process for recreation and environmental protection purposes, several categories of the so-called oasis of silence have been distinguished (9 natural, 13 rural and 4 special ones, Karvinen, Savola, 2004). Natural tranquil areas are the areas where the sounds of nature are predominant while anthropogenic sounds are rare and indistinct; and the mean sound level is below 30-35 dB. These areas constitute protected areas, forests or recreation areas situated far from developed areas. Rural tranquil areas are the areas whose soundscape mainly consists of the sounds of nature, the sounds of culture are sporadic and mostly connected with agriculture, forestry and fishery; distant sounds of transportation and industry can occur and the sound level is 35-40 dB. Special tranquil areas are the areas where the sounds of nature and culture occur and the mean sound level is below 45 dB. These areas are connected with world heritage areas and places that are particularly attractive to tourists. Furthermore, tranquil urban areas have also been distinguished where the sounds of nature are audible and clearly recognised in the soundscape, the sounds of human activity do not mask the sounds of nature, and the mean sound level is below 45 dB.

The agricultural region of Flanders is located between the Dender and Mark river valleys. They are characterized by unique acoustic properties. What is more, there is the Dender-Mark Silence Area Project that has been developed (Portaal van de Stilte..., 2013). Supported by the local authorities, the project is aimed at creating a special policy for preserving and restoring the natural and landscape values of that area (extending across several administrative units). The Department of Environment in Flanders prepared guidelines for the local authorities, entitled Silence Areas in Flanders and containing information, examples and recommendations for the creation of other silence areas. In order to promote silence, tranquillity and landscape, the Waerbeke Centre was established in the Dender-Mark Silence Area. Its main objective is to support the pilot project of the Dender-Mark Silence Area and promote the idea of silence areas in Flanders and outside the region. The Centre coordinates activities aimed at protecting the environment, landscape and cultural heritage, preparing publications, exhibitions, cultural programs, seminaries and training courses for children, youngsters and adults. The inhabitants are involved in all these activities as local consultants and collaborators. Furthermore, the Centre is tasked with preparing the methodology of *cultural heritage and silence* management in Flanders as well as finding practical solutions and technologies which may be implemented in this area.

In Poland, Warszawa, Gdynia and Szczecin are the only cities where efforts are taken to establish tranquil areas, and the failure to do so in other cities should be regarded as a wasted opportunity (Bernat, 2010b). In Opole, a draft civic resolution entitled *The* Green Lungs of Opole was submitted, proposing the establishment of tranquil areas (Janowski, 2012). It is worth appreciating, that an improvement in the quality of public space is taking place in connection with the revitalisation¹¹ efforts carried out in Polish cities. Pedestrian zones and water facilities are designed, which improve the aesthetic value and the acoustic quality of public space, adding in such way the tourist attractiveness of the cities. Bugle calls (iconic sounds) are played from representative buildings, while music and the sound of water can often be heard in the squares and pedestrian zones. The public space in cities becomes polyphonic. The acoustic uniqueness of some cities and regions is recognised in numerous artistic projects (e.g. Sounds of

¹⁰ The report of the Dutch Ministry of Health, Welfare and Sports, entitled *Quiet Areas and Health* (2006), suggests that besides noise indicators (45-50 dB in the daytime), it is necessary to specify the level of noise acceptable by the society, the relations between natural sounds and noise, the significance of sound, the sources of noise, etc.

¹¹ As defined by the Polish association *Forum Rewitalizacji*, revitalisation is a process of spatial, social and economic changes in degraded urban areas, aimed at improving the inhabitants' quality of life, restoring spatial order, achieving economic recovery and rebuilding social ties.

Małopolska, Sound cards from the Benedictine Abbey at Tyniec, Tonopolis, Soundwalks, Sound cards from Bytom). Soundscapes connected both with nature and human activities, including industrial activity, are discovered. Besides the interactive website with the sounds of the Małopolska region, the project entitled Sounds of Małopolska also encompasses exhibitions of earphones, i.e. human-sized ears with speakers emitting sounds of the region arranged thematically. As part of the Soundwalking project, especially addressed to young and older children from small towns in the Kuyavia region, the sounds of specific places, related to everyday life of the local community, are recorded. The results of the young explorers' efforts are presented at exhibitions and in the Internet. Based on the research, a sound map of the Kuyavia-Pomerania Province is being prepared. Besides the aforementioned projects, sensory gardens and interactive museums are established. They appeal to all senses, thus providing a highly realistic illusion of travel in time and space (e.g. Bernat, 2008b; Pawłowska, 2012). The role of soundscape as an element of tourist attractiveness is increasing. There is a growing recognition of noise hazards connected with the development of mass tourism, as well as increasing appreciation of the values of soundscape in sustainable tourism.

Final remarks

Sound is an integral part of landscape and a very important component of the identity of a place as well as of natural and cultural heritage. The acoustic layer of a landscape can be threatened by tourism. The example of national parks in Poland shows that, next to motorised transport, tourist traffic is a key factor disrupting the perception of a landscape. The interest in the relationship between soundscapes and tourism originates from the awareness of noise threats, as well as from the increasing demand for new tourist attractions and high quality of life. A soundscape constitutes an enormous potential for the development of sustainable tourism and can increase the attractiveness of both environmentally valuable and culturally unique areas, which is particularly important given the uneven distribution of tourist traffic. Highlighting soundscapes as a part of the resources of these areas can help raise the public awareness of the beauty of tranquillity (the subtle sounds of nature), which is necessary to preserve the values represented by these environmentally valuable areas. Tranquil areas should be protected due to the opportunities they offer for tourism, recreation and sustainable development.

Sound tourism relying on soundscapes as the basic component of tourist attractiveness is consistent with the sustainable development concept because discovering the acoustic diversity of landscape can not only contribute to the protection of the natural environment against noise, but also bring numerous benefits in the social and economic sphere. Moreover, education and a comprehensive approach to nature and culture play important roles in sound tourism. In order to meet the sustainable development criteria, sound tourism requires planning preceded by learning the preferences of tourists, the analysis of acoustic threats and the identification of places that are attractive or unattractive in terms of acoustics. Proper planning should take into account the need to preserve unique soundscapes, which requires the elimination of factors disrupting the perception of landscape so that high acoustic quality is maintained (valuable and desirable sounds have to be discernible). For instance, it is advisable to restrict tourist traffic, constantly monitor tourist trails, introduce environmentally friendly transport and implement zoning (designation of tranquil areas); which will help minimise damages and threats associated with the development of this branch of economy.

Sound tourism is a new form of tourism which is addressed not only to the visually impaired people or acoustic ecologists. It is important to encourage more people to listen to the sounds of landscape more closely and more consciously.

It is worth noting that tourists can be interested not only in soundscapes but also in smellscapes that form the basis of olfactory tourism (Dann, Jacobsen, 2003). Taking note of soundscapes and smellscapes allows one to appreciate the extraordinary aspects of ordinary, everyday phenomena, and to discover new wonderful worlds. All that is needed is to be willing to set off on this exceptional journey and to listen closely in order to hear and admire the abundance of sounds.

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Sustainable development of rural areas

Zrównoważony rozwój obszarów wiejskich

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Abstract

Economic development of rural areas guarantees stable employment for the local inhabitants and is prerequisite for implementing investments aimed at environmental protection. This article contains a number of examples of actions taken in compliance with the concept of sustainable development in the fields that represent the pillars of economic, environmental and social governance. In addition, the article presents objectives and conditions for the economic development of rural areas in the European Union and Poland. Attention was devoted to the growth of agritourism – especially in the context of sustainable tourism. The authors described the criteria for human resources development as well as the perception of villages as a place where local communities live and work. In addition, the possibilities to produce healthy food were discussed, as well as the methods of obtaining energy from alternative sources and environmentally-friendly technologies of waste treatment. The importance of wide-spread environmental education among rural communities for sustainable development was emphasised.

Key words: sustainable development, rural areas, agriculture, environmental education

Streszczenie

Rozwój ekonomiczny terenów rolniczych gwarantuje stabilizację zawodową mieszkańców wsi oraz warunkuje działalność inwestycyjną w ochronę środowiska. W artykule opisano przykłady działań zgodnych z ideą zrównoważonego rozwoju w dziedzinach reprezentujących filary ładów: ekonomicznego, środowiskowego i społecznego. Scharakteryzowano cele i uwarunkowania rozwoju gospodarczego terenów wiejskich w Unii Europejskiej i w Polsce. Zwrócono uwagę na rozwój agroturystyki, szczególnie w kontekście zrównoważonej turystyki. Przedstawiono kryteria rozwoju kapitału ludzkiego oraz postrzeganie wsi jako miejsca życia i pracy społeczności lokalnych.

Omówiono możliwości produkcji zdrowej żywności, pozyskiwanie energii z alternatywnych źródeł, ekologicznej metody oczyszczania ścieków. Podkreślono rolę powszechnej edukacji ekologicznej społeczeństwa wiejskiego dla zrównoważonego rozwoju.

Słowa kluczowe: rozwój zrównoważony, tereny wiejskie, rolnictwo, edukacja ekologiczna

Upon seeing the beauty of this land, I feel obliged to call for preserving it for future generations. If you truly love your home country, you will not leave my call unanswered John Paul II

Introduction

In 1987, a report by G. H. Brundtland titled *Our Common Future* was published. The document introduced a new concept of sustainable development that took into consideration the opinions of the representatives of natural, philosophical, economic, social and technical sciences (Pieńkowski, 2012). It was stated, that sustainable development should provide a balance between economic growth and environmental protection so that a high standard of living could be offered to the society (WCED, 1987). Rural space comprises the area of human settlements and infrastructure, agricultural activity, woods and surface waters. The rural areas in the Member States of the European Union feature considerable diversity: from remote places undergoing depopulation and deterioration to expanding suburban rural areas which are under constant pressure from city centers. As per the definition of OECD based on population density, rural areas amount to 92% of the EU area, while in the case of states such as Poland – as much as 93% (*GUS Obszary...*, 2011).

In this article, Poland was adopted as an example as this country has been traditionally perceived as a rural one. The rural areas analysed in the paper are *rural* in the strict meaning of the word, namely they are agricultural lands that can be cultivated to yield profits, thus being crucial for sustainable development. Agricultural lands comprise over 50% of Poland (*GUS Obszary*..., 2011). There are strong bounds between inhabitants of villages and the surrounding environment; furthermore, cultivating these areas is an important element of the national culture.

The Strategy of Sustainable Development of Rural Areas, Agriculture and Fishery in 2011-2020, developed by the Polish Ministry of Agriculture and Rural Development, assumes that in 2020 rural areas will be an attractive place to work, live, rest and undertake farming activity, which will contribute to economic growth. These areas will generate public and commercial goods, but at the same time they will help preserve unique natural, landscape and cultural assets for future generations. Rural areas will retain their unique character due to sustainable development of competitive agriculture (Strategia...,

2011). The document facilitates proper financing of investments with the use of domestic and EC funds. The main objective of the Polish strategy is to improve the quality of life in rural areas and to efficiently use the resources and the potential to stimulate sustainable development of the country. Such aspirations are supported by the *National Environmental Policy* which favours economic development of the regions and popularisation of regional produce on an international level (*Polityka Ekologiczna...*, 2008). The proper development benefits from exchanging experiences, establishing a network of offers and providing mutual support for rural areas.

When planning the development of rural areas in Poland, one should bear in mind that it needs to be adapted to development tendencies prevalent in the Member States. Significant help can be obtained in this case from the European Agricultural Fund for Rural Development. The Fund offers resources for stimulating economic development, employment and sustainable development of rural areas. This approach is in line with the Declaration on the Guiding Principles for Sustainable Development and the Renewed Lisbon Strategy, the aim of which is to provide funding for making the EU the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs, greater social cohesion, and respect for the environment (Renewed Strategy...,

2007). Financial assistance is primarily earmarked for investments and job creation in rural areas.

Sustainable development of rural areas

Introduction of sustainable farming opens a window of opportunity for villages and rural areas. The term denotes farming practices that combine three kinds of balances: economic, social and environmental. In this case, the aims include reduction of differences between rural and urban areas when it comes to the quality of life and improvement of the country's cohesion by equalizing differences between particular rural regions, with attention paid to preserving cultural and social identity of rural areas, which is an important niche of development (Hałasiewicz, 2011).

Economic stimulation of rural areas requires the development of appropriate institutional infrastructure (specialized government agencies, NGOs, advisory services supporting the local administration) and technological infrastructure (road systems, water supply systems, sewage systems). Multi-functional development needs to be ensured. Among the various non-farming functions of rural areas in Poland, the following are currently experiencing growth: tourism, services, trade, forestry, and small-scale production.

Economic sustainability

Poland should – in line with EU guidelines – put great weight on the formation of a competitive economic system which would be capable of acquiring and building knowledge. One of the elements of development of such an economic model is increasing competitiveness of regions understood as a capacity to adapt to ever-changing conditions. Competitiveness is perceived as the most important indicator of success in the economic policy of rural areas. Competitiveness factors in rural areas comprise supporting of small and medium enterprises which play a crucial role in job creation and counteracting unemployment. Other indispensable factors include: upskilling the workforce, professional activity, innovation, expanding sales markets, improved access to energy sources. Stimulation in these areas will bring about favourable effects for the society: improvement of living conditions, improving health and social care (Kryk, 2010). Economic growth of the region depends on the value of the capital held, demand for produced goods, skills of workers and possibilities of employment. As it can be observed, the aspects of economic development are strictly related to the social pillar.

GDP *per capita* in rural areas is slightly lower than in cities – i.e. 80% of national average, namely PLN 32,000 *per capita* (EUR 7,769). The case is similar as far as investment and development outlays are concerned. The primary aim of farming is to guarantee food supplies at affordable prices. A measure of food safety is self-sufficiency, which is understood as the ability to produce domestically all or most of the food needed. In the conditions of open economy, a country's food self-sufficiency stands for economic and physical availability of food in the internal market, irrespective of the place of its origin, while a measure of a country's food self-sufficiency is the balance of trade in agri-foods. Poland has favourable natural conditions for agricultural production (*GUS Obszary...*, 2011).

The indicator of economic governance is the activity of certified organic farms. Organic farming is a system of management of sustainable crop and livestock production on a farm. It relies on biological and mineral resources that have not been technologically processed. The basic rule of organic farming is abstaining from the use of farming, veterinary and food chemicals in the process of food production.

Organic farming plays an important economic role in the European Union. As part of the common agricultural policy, organic farming is supported with subsidies, strategies and regulations the aim of which is to increase consumers' trust and to create conditions advantageous for fair competition between organic farmers in particular EU Member States.

The criteria for organic farming adopted in Poland are in line with the requirements of the European Union and the *International Federation of Organic Agriculture Movement*. Programmes aimed at making agriculture more environmentally-friendly are being implemented in cooperation with the directors of national and landscape parks.

The number of organic farms in Poland keeps increasing. At the end of December 2011, there were more than 23,000 organic farms utilising 3% of arable lands. To compare – in the European Union 5% of arable lands have been dedicated to organic farming (*Raport*, 2011). It seems that this level can be attained in Poland as well, however the process may take several years. The high prices of produce in this sector and insufficient number of shops that offer organic food are a barrier to the development of green agriculture in Poland.

Application of environmentally-friendly methods is a good solution for areas featuring high quality environment. A key to the success of sustainable agriculture is cooperation of farms and food industry that operate in the same area. This enhances the pro-environmental image of a region and eliminates the need to transport fruit and vegetable over long distances (Sobczyk, 2013).

The success of an undertaking comprising production of regional produce depends on the popularity of the region and its specificity. Areas exist which for long have been renowned for, e.g., growing hop or fruit-farming (Photo 1).

Concentrating on regional production is conducive to conquering the market for a certain type of pro-



Photo 1. Apricot orchards in Strochocice near Sandomierz (photo: Z. Rosowicz).

duce in the whole of Poland and abroad. A case in point is sheep cheese (oscypki) from Małopolska (Photo 2). Unfortunately, high transport costs increase produce prices significantly. An important factor that needs to be considered when developing a strategy for this type of production is using the ecological labelling, referring to the concept of *biological quality mark*. A special role is played by the *ecofarming* certificate which boosts the sales level.



Photo 2. Sheep cheese – produce of the mountain region (photo: W. Sobczyk).

However, food production is not the only task to be performed by ecological farming.

A multi-functional development of rural areas consists in the development of their other functions (in addition to agricultural production). A field which gives hope that the current functions of agriculture will expand is production of energy from alternative sources. The subject is described in the section on the ecological pillar.

One of the solutions, in the context of sustainable development of rural areas, can be the production of renewable raw materials as well – they can substitute synthetic masses generated through processing of crude oil and natural gas (Otoliński, Wielicki, 2003). These products are used in our daily lives. From agricultural produce substitutes for plastics can be derived, such as starch polystyrene, lacquers and paints from vegetable oils, objects from bioplastics, bottles and packages from cellulose and protein bilayers. Substituting synthetics with natural products may create a large sales market for agricultural commodities. As we can see, the range of possibilities for agriculture (and the resultant opportunities for its multi-functionality) is very wide (Table 1).

Table 1. Functions of traditional and sustainable agriculture.

Functions of traditional	Functions of sustainable
agriculture	agriculture
food production	production of safe food,
	identity of rural areas,
	generation of renewable
	materials for the produc-
	tion of bioplastics
production of raw materi-	production of energy
als for the farming indus-	from biomass (biogas,
try	bio-alcohols, biodiesel)
production of raw materi-	production of energy
als for the food industry	from the Sun, wind, force
	of falling water and geo-
	thermal
production of raw mate-	
rial for the food pro-	
cessing industry	

An important element in the economic development and stimulation of Polish rural areas is agritourism, i.e. accommodation offered at active farmsteads whose owners render tourist services. Agritourism allows farmers to expand their non-agricultural activity; it is also a source of additional income, constituting a specific type of rural tourism (Winnicki, 2006). Involvement of the entire family in the agritourism activity improves the chances for the undertaking to be successful. When launching tourismrelated activity, farmers invest their own financial means (it is estimated that 80% of agritourist farms support their operations with their own funds). Selffinancing builds strong ties between the farm and the planned investment as a new quality is achieved. Agritourist business - when treated as a long-term activity - becomes a stable business provided that proper promotion means are applied (web portal, local agritourist association, etc). In addition, such promotion builds greater trust among tourists who use the services (Sobczyk, 2013). To yield larger profits new offers are created: healthy organic food, regional cuisine, direct contact with hosts and experiencing different life styles, new forms of leisure, such as scenic tours, horse riding, angling, mushroom picking, sport tournaments for holidaymakers and their children, barbecuing, etc. In addition to appreciating a close contact with nature, tourists are welcome to sightsee e.g. regional attractions, monuments of nature and culture and so on. This facilitates discovering the tradition, customs and regional culture. The development of agritourism as a form of entrepreneurship is a great chance for sustainable development of rural areas; it increases farmers' income and contributes to the development of related areas, such as trade, catering businesses, craft.

Ecological sustainability

The ecological factor is represented by the resources of natural environment: air, water, soil, fauna, flora, but also by forms of inanimate nature as well as landscape aesthetics. Humans – through their economic activity – deteriorate the quality of the environment. Reasonable and rational management can slow down these processes or even eliminate them. A measure of sustainable development as regards this pillar is widespread availability in a region of modern methods and technologies of environmental protection with respect to water treatment, waste management, reduction of emissions into the air. Environmental governance in rural areas is expressed in preserving the elements of the natural environment.

In terms of water conservation, one can build domestic hydrobotanical sewage treatment plants. These facilities utilise the filtration properties of such waterphilic plants as: common reed (Phragmites australis), sweet flag (Acorus calamus), mannagrass (Glyceria aquatica), common bulrush (Typha latifolia) and duckweed (Lemna minor) (Gajewska, Obarska-Pempkowiak, 2009). Being affected by interrelated biochemical processes, the substances present in wastewater are subjected to natural processing as a result of which they decompose into compounds easily absorbed by both microorganisms and plants. Microorganisms can utilize a significant proportion (up to 85%) of the resulting components in their biological processes. A small part of the components (10-15%) is assimilated by green plants (Kuczewski, Pawęska, 2005; Przybyła et al., 2009; Sadecka, 2005). Currently, there are many different domestic sewage treatment plants on the market. Systems capable of disposing of small amounts of wastewater are increasingly popular in rural areas (constructed wetland systems, hydrobotanical systems, soil and plant systems, Bugajski, 2006; Jóźwiakowski, 2003).

The use of alternative energy sources is beneficial for the protection of air. Growing energy crops, however, causes controversy in some circles. D. Piementel emphasises that ethanol production from corn is highly unecological and it pollutes the environment to a significant degree. The analysis by D. Pimentel goes against the opinion that biomassbased liquid fuels are an alternative to crude oilbased fuels. In the opinion of that scientist, the introduction of biomass-based liquid fuels is contrary to the idea of sustainable development (Piementel, Patzek, 2008). Therefore the use of biomass calls for special attention.

On arable lands the energetic willow can be grown (Photo 3), so later its biomass can be used for heating purposes (Sobczyk, 2011; Styszko et al., 2010). In Poland, this type of willow is grown on 2,000 hectares (in Europe the biggest cultivation area is in Sweden – 17,000 ha). The balance of carbon dioxide is close to zero: during combustion CO_2 is released into the atmosphere, but the growing plants absorb it. The willow grows 14 times faster on idle agricultural land than forest trees. It is resistant to the vagaries of weather: it grows well both in cold weather, as well as in times of drought. However, forest animals do not feed on it, because it contains salicylates.



Photo 3. Experimental plantation of the energetic willow in Brodła Forest District, Śląskie Province (photo: W. Sobczyk).

In the Polish agriculture, the most important source of alternative energy is biomass (mainly forest biomass). The total use of biomass in Poland in 2009 amounted to 217 PJ, while the energy consumption of biomass in agriculture – 78 PJ. Biomass is used directly in agriculture (irrigation, drying, greenhouse crops, livestock, fuel for machines) and for domestic purposes (heating of rooms, preparation of domestic hot water).

In addition to biomass for energy production, farms also employ solar installations (Photo 4), but solar panels are not widespread in Polish agriculture. They are usually installed on single-family houses, in housing cooperatives and – more and more frequently – in small and medium-sized service companies. Of the total cumulative area of over 656,000 m² of solar panels installed in our country, only approx. 10% were located on farms (*Fundacja...*, 2011).

At breeding farms, energy can also be obtained as a result of manure combustion, but a precondition to the profitability of such a venture is its large scale. Dried poultry manure can be used to produce biogas and compost. However, biogas production requires a large expenditure (Banaś, 2006). Although there are many various technologies available, non-conventional energy sources in Polish rural areas have been used so far only to a small extent.



Photo 4. Utilisation of alternative energy sources. Photovoltaic panels in Kalinowo near Piotrków Trybunalski (photo: W. Sobczyk).

Sustainable rural development in the field of environmental protection goes beyond energy issues. It is also conditioned by restoration and permanent protection of biodiversity, elimination of dangerous chemicals from farming processes, keeping the limits of environmental impact imposed by the assimilative capacity of the environment (Sobczyk, 2013). One should also make an effort to preserve the natural and landscape values of rural areas (Photo 5).



Photo 5. Rural areas of unique natural values. Farming landscape. Żegocina near Limanowa (photo: W. Walat).

Social sustainability

The social pillar, which refers to humans and their living conditions, plays an important role in efficient implementation of sustainable rural development (Hull, 2008). It is represented by such indicators as: unemployment rate, education level, access to the Internet. The leaders of local communities manage regional development, using the most important assets in rural areas. The proposed directions of economic development should satisfy the inhabitants of the region. Activity, entrepreneurial spirit and ingenuity in solving economic, social and environmental issues guarantee the success of interesting projects. This improves the quality of life of rural communities, increases the sense of satisfaction, a belief in the possibility to realise one's ideas and goals, and the feeling of safety (Korol, 2007).

Persistent financial and communication barriers make it harder for the inhabitants of Polish rural areas to gain access to education on all levels. This applies to both formal and informal education. The records show a low quality of education of children and youth from rural areas, as well as inadequate education of adults. This also applies to pre-schools, which are a very important instrument of the policies advocating education, integration and equal development opportunities (Hałasiewicz, 2011). Even in the early 21st century (2002), among the people working exclusively or primarily on their farms only just a few percent of them had higher education: 4.3% (Sobczyk et al., 2008). In recent years, however, the situation has improved, access to knowledge has become open to all social groups. Thanks to this, the percentage of well-educated and highly-qualified people increased dynamically: from 5.3% in 2007 to 9.8% in 2011 (GUS, 2012). In addition, with the development of new technologies (including information solutions), entrepreneurship and innovation have begun to develop. A great chance has opened up for rural youth, full of new ideas and better educated. Measures aimed at improving the level of general and vocational education are an attempt to meet the basic condition for equal opportunities for inhabitants of rural areas in terms of their professional activity. Farmers have understood that professional qualifications are the right way to achieve a sense of stability, improve their families' living conditions, satisfy their aspirations in life. Unfortunately, there are times, when the traditionalist attitudes of many people in rural areas, frequently resulting from the lack of self-confidence and fear of the consequences of risk, lead to stagnation and resignation. In such cases, unemployment and crime rates are on the rise. The percentage of unemployed in the country exceeds the value of this indicator in urban areas (in cities - 12.3%, in rural areas - 13.8%, GUS, 2012). Despite the huge economic potential of rural areas, a massive migration of young people from rural areas to cities can still be observed. Similar trends are noticeable in many countries of the European Union. The consequence of this phenomenon is not only the loss of labour force, but also cultural impoverishment and loss of agricultural and folk traditions. In view of the danger of depopulated villages, it is necessary to change the mentality of the young generation: encourage young people to pursue the best possible education, strengthen their respect for every job and adherence to the tradition.

The role of environmental education in sustainable rural development

Implementation of the assumptions of sustainable rural development should proceed in parallel with effective environmental education of the society, which builds a sense of community with nature. Poland, as one of the EU Member States, has a policy of co-financing vocational training and consulting services for farmers (*Strategia*..., 2011). The development of a consultancy system is conditioned by the scale of organic production. Farmers improve their professional skills during short courses and holiday practices. The most common forms are meetings of regional groups of farmers, associated in consumer organisations, but the lack of experienced advisory personnel and IT facilities (online databases) is noticeable.

The basic element of farmers' environmental education is the knowledge of the Code of Good Agricultural Practice. This document contains a collection of environmentally-friendly agricultural practices, the use of which will ensure sustainable development in the sphere of agricultural production. The purpose of the Code is to raise the level of knowledge of the protection of air, water and soil, as well as enhancing the landscape assets of the countryside. The farmer is also required to comply with the Code of Practice for Plant Conservation (Pruszyński, Wolny, 2009). It is a legal act but also a source of information necessary for the proper and safe use of plant protection products. It explains the rules of selecting crop protection techniques, as well as the rules of preparation for work and operation of appropriate equipment, and the impact of pesticides on the population dynamics of the perpetrators of diseases, pests and weeds (Sobczyk, 2004, 2013).

Environmental education is also promoted by the Agri-Environmental Programme, implemented in all Member States of the European Union. The Programme was established on the basis of Council Regulation (EC) 1257/1999 and EC Regulation 445/2002. The Polish National Agri-Environmental Programme has been adapted to the specificity of Polish agriculture and environmental conditions. The Project is targeted directly at farms (Rozporządzenie..., 2008) and aims to involve agricultural producers in improving the quality of the environment and conservation of natural values of rural areas. The Programme comprises the so-called agrienvironment packages: organic farming, sustainable agriculture, maintaining extensive meadows and pastures, soil and water protection, buffer zones, protection of indigenous livestock breeds. An organic farm should be harmoniously integrated with a properly shaped area; it should also take up an optimal area in economic and technological terms. From the point of view of environmental protection policy, an Eco-audit is highly recommended for the agricultural sector. Its objective would be to determine the

methods of minimizing negative impacts on the environment.

An equally important issue, having a significant educational value, is the improvement of the aesthetic image of the farms and villages. It is a subject of workshops, demonstrations, competitions and seminars. Classes in growing ornamental plants, arranging kitchen gardens, leisure areas and playgrounds are highly popular.

Measures to improve the level of environmental awareness among rural residents, according to European Union standards, take a variety of forms, ranging from educational activities (seminars and regular trainings), through the promotion of the rules governing the protection of the environment, emphasizing the role of agriculture in development of the rural natural landscape, cooperation with *green* organizations and foundations, etc.

These, so far, have brought only limited results. The barrier in this case is very modest tradition of environmental education and a low income bracket of many rural families. But in fact, control systems and farmers' sense of responsibility for the social, environmental and economic aspects of environmental protection are a guarantee of safety for this generation and for generations to come.

Conclusions

Rural areas in the EU Member States are facing particular challenges in terms of sustainable development. They can be a place of both agricultural production and other sectors: trade in agri-food, recreation, tourism and forestry.

The countryside is an attractive place to live and work and a reservoir of natural resources and unique landscapes.

In Poland, demographic processes (including the aging of the population), territorial displacement between urban and rural areas and the restructuring of Polish agriculture after the accession to the European Union are of great importance for the development of rural areas. Since Poland's accession to the EU, one can observe a multifunctional development of rural areas, indicating the economic strengthening of farms, as well as an increase in the competitiveness of the agri-food sector. Also growing is the importance of the countryside being a place of residence of the people working in cities. Members of the rural population can also make their living themselves by rendering (very popular) rural tourism services. Non-agricultural activity is supported with public funds under the programs co-financed by the European Union.

The situation may be improved by the consistent implementation of sustainable development. It should, in conjunction with environmental protection, become trendy, popular and understandable to everyone. Indeed, it is not only an abstract idea, but also a pragmatic code of conduct that is advantageous from the economic point of view. In order to make the respect for the environment a commonplace, the renewal must begin in each of us with the rediscovery of our attachment to nature and animals. The ethical stance of the man towards animals should be based on the defence of their specific interest. *Shame on a civilization that cares only about people, but cares not about animals* – said Schopenhauer.

The strategy of rural sustainable development calls for taking into consideration of the tasks related to comprehensively conducted environmental education of the rural population: organization of trainings and mobilization of young people have a significant impact on the life of the region; what is more, they provide an inspiration for solving environmental problems in one's immediate surroundings. Development of the education offer and adapting curricula to the needs of local farmers will create the right attitude to nature among them.

The concept of sustainable development of agriculture must take root in the public consciousness. To make it happen, a multi-prong, comprehensive, systemic action is needed, aimed at *improving the quality of life in rural areas and the efficient use of agricultural resources and potential* (...) for the sustain*able development of the country* (Strategia..., 2011). The economic development of a region in the spirit of respect for the environment requires full acceptance of the local population.

Thus, we have two alternatives: agricultural intensification and the resultant environmental degradation or sustainable agriculture. The choice is up to us.

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Theoretical aspects of the integrated protection of suburban areas

Teoretyczne aspekty zintegrowanej ochrony terenów podmiejskich

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Abstract

This paper draws attention to the usefulness of developing the methodology of the integrated protection of suburban areas, based on the holistic concept of space, with particular consideration to harmony among society, the environment and economy, against the recommendations and requirements posed by the European Union for modern cities. In addition, it contains an analysis of modern concepts concerning the sustainability of the city and its surroundings. Assumed population density is the most important element diversifying individual ideas of a sustainable city, though at commonly approved demand for increased compactness. It should be recognised that currently there is no generally accepted, optimal strategy of sustaining the city and its surroundings. The new needs of the information society should be the basis to search for other forms of sustainable development for cities. Development of the methodology of the integrated protection of suburban zones and their formation, based on culturally-conditioned visions of the quality of life, will enable the sustainable development of urban areas.

Key words: suburban areas, integrated protection, sustainable development

Streszczenie

W artykule zwrócono uwagę na celowość wypracowania metodologii zintegrowanej ochrony stref podmiejskich, której podstawą jest holistyczna koncepcja przestrzeni, ze szczególnym uwzględnieniem harmonii między: społeczeństwem, środowiskiem i ekonomią, na tle zaleceń i wymagań stawianym miastom współczesnym przez Unię Europejską. Przeprowadzono również analizę współczesnych koncepcji równoważenia miasta i jego otoczenia. Najważniejszym elementem różnicującym poszczególne koncepcje *sustainable city* jest zakładana gęstość zaludnienia, jednak przy powszechnej akceptacji postulatu wzrostu zwartości. Trzeba uznać, że nie ma obecnie powszechnie akceptowanej, optymalnej strategii równoważenia miasta i jego otoczenia. Nowe potrzeby społeczeństwa informatycznego powinny być podstawą do poszukiwania kolejnych form zrównoważonego rozwoju miast. Opracowanie metodologii zintegrowanej ochrony stref podmiejskich oraz ich kształtowanie na podstawie kulturowo warunkowanych wyobrażeń jakości życia, umożliwi zrównoważony rozwój terenów zurbanizowanych.

Słowa kluczowe: tereny podmiejskie, zintegrowana ochrona, zrównoważony rozwój

Introduction

The quality of human life constitutes one of the determinants of sustainable development - achievement of a balance among all elements of the environment in which the human being exists, so that satisfaction of the needs of present and future generations is possible at reasonable use of environmental potential (Krajewski, 2012). To a great extent, the quality of city residents' life depends on the methodology of spatial development of suburban zones. It is related to ecological problems that will occur, and to their consequences for the entire city and its surrounding open landscape areas (Żarska, 2003; Zimny, 2005). Reasonable spatial development constitutes a strategic element of sustainable development (Pawłowski, 2008). It should be respected in the method of forming suburban zones, where undeveloped areas - a basic environmental resource - are currently devastated (Drapella-Hermansdorfer, 2002; Żarska, 2003; Dylewski, 2004a; Stuczyński et al., 2008). In Poland, the Spatial Planning and Land Development Act (Journal of Laws 80/2003, item 717) defines a commune - a basic unit of local government - as the authority deciding directly on landscape protection and formation within its borders. Commune authorities are obliged to accept the idea of sustainable development as the basis for all planning measures, concerning both the creation of new (or changes in currently valid) spatial development plans, as well as when issuing a decision on land development and management, or a decision on a site designated for public purposes (Krajewski, 2012). Yet sustainable development declared in politics and plans does not fully correspond to management methods in suburban zones applied in practice (Dubel, 2003; Kozłowski, 2005). Dylewski (2004a) emphasises that in old member states (EU-15) the spatial development acts do not emphasise that everybody has the right to manage land, to which they have a legal title (...), as the Polish Act of 1994 defines it in Article 3 (Act..., 1994). However, they emphasise the superiority of public welfare: Spatial planning systems aim at securing conditions of efficient and effective growth and development of areas for public welfare, as e.g. corresponding British governmental documents state (The Planning System..., 1994). Moreover, in spite of mature democracy and recognition of the subsidiarity principle, including a commune's right to manage its own area, obligations under spatial planning are transferred to communes with great care, gradually and only when they manifest the appropriate potential of substantive and staff capabilities. The central authority supports them in this – by the system of planning advice and recommendations concerning crucial and current problems. It supervises them strictly too, with regard to the main goal, i.e. compliance with conditions of sustainable development and broadly understood public welfare (Dylewski, 2004a).

In Poland, since the political transformation, the development of suburban zones is very often converted into a non-controlled process of land development extension and landscape degradation (Drapella-Hermansdorfer, 2002; Zebura, 2007). Currently, changes in lifestyle and higher income cause significant urbanisation pressure and expansion of private housing in suburbs, often without consideration of the needs of protecting the environment and its characteristic functions (retention, buffering, biological). Therefore, sustainable development of the suburban zone is related to rationalisation of spatial management principles, including protection of landscape structures that connect the city's environmental system and the ecological system of protected areas beyond its borders. This is one of the basic conditions of urban environment revalorisation and of the health of city residents (Przewoźniak, 2002; Zimny, 2005).

The *Habitat* Report of the National Secretariat (HABITAT, 2003), appointed according to the UN guidelines, includes broad assessment of the weaknesses and disadvantages of the Polish spatial management system. The system's weakness hampers reasonable spatial management and reasonable land development, often making them near-impossible. This negatively affects the quality of life of the residents, as well as the conditions and possibilities of the sustainable development of Polish cities, communes and regions (Dylewski, 2004a). Highly critical assessment of the Report (HABITAT, 2003) mainly concerns:

- absolute domination of private interest over public interest (meeting the immediate demands of land owners and investors), which has affected the very essence of modern urbanism,
- underestimation of the higher needs of residents, especially prospective needs,

- lack of a substantially and competently strong central institute (department) ultimately responsible for Polish land management, substantively supporting and supervising communes, competent to stop detrimental investment or planning decisions,
- substantive weakness of communes, especially the majority of small communes,
- practical non-functionality of the whole system, resulting from unclear relations among planning at central, regional and communal levels.

This becomes the reason for, among others: the practically unhampered, spontaneous phenomenon of the *extension* of urban development into surrounding areas, damage to preserved natural and cultural values, deterioration in the quality of the functional and spatial structure of urbanised areas and the quality of life within them. The *Report of the National Secretariat* (HABITAT, 2003) proposes taking comprehensive actions to repair and reform the spatial development system in Poland.

Therefore, suburban zone protection should constitute an integral part of the comprehensively considered problems of urban landscape protection and utilisation. Protection of suburban zones will not be efficient without consideration of landscape scale (Żarska, 2005). On 27 August 2004, Poland ratified the *European Landscape Convention*. This obliges the state-signatories to promote landscape protection, management and planning, as well as to organise cooperation within the scope of landscape-related issues at European level. The level of social maturity expressed by the level of its needs certainly constitutes the crucial (and key) condition for the implementation of protection and sustainable development of the suburbs (Dylewski, 2004).

Sustainable protection of urbanised areas should include the following tactical elements in its implementation strategy (Szulczewska, 2002):

- incorporation of knowledge about functionalspatial, socio-economic and environmental considerations,
- identification of conflicts in the present state,
- ecological, social and economic consequences of applied protective measures,
- integration of sustainable management concepts in the diversity of spatial and temporal scales,
- recognition of prospects of the developmental dynamics of a city and a region, including their association with global changes,
- implementation of flexible management based on the ecosystem's evolutionary character,
- consideration of the aspirations of local communities.

It is impossible to conduct unilateral remedial measures in suburban areas under the conditions of sustainable development, e.g. only within the scope of improvement of environmental conditions or modernisation of the technical infrastructure. These measures are mutually dependent; therefore, they require comprehensive scientific, design and implementation considerations, in accordance with the concept of integrated urban and environmental revitalisation (Przewoźniak, 2002).

This paper draws attention to the usefulness of developing the methodology of the integrated protection of suburban areas, based on the holistic concept of space, with particular consideration to harmony among society, the environment and economy, against the recommendations and requirements posed by the European Union for modern cities. In addition, it contains an analysis of modern concepts concerning the sustainability of the city and its surroundings.

The scientific literature contains few comprehensive studies that synthesise knowledge within the scope of the integrated protection of suburban zones. In addition, there are no popularised studies concerning methods to assess the condition of housing spatial order and environmental protection in suburban zones.

Recommendations and requirements for modern cities imposed by the European Union

Cities provide the motor power of every country's development. Therefore, EU institutions take great interest in the issue of urbanisation of its member states. The number and rank of documents and reports issued within this scope, for example: *Green Paper* (1990); *New Athens Charter* (1998); *ESDP* (1999); *CEMAT* (2000), prove this statement. These documents may be treated as sets of criteria for the development of modern European cities, their quality in environmental, social, economic and prospective aspects (Dylewski, 2004b; Petryshyn, 2012). General conditions of development in the abovementioned EU documents include:

- The principle of the sustainable development of the European continent. According to the meaning of the notion *sustainability*, this considers the needs of all European regions' residents, without prejudice to the rights of future generations, aimed at the harmonisation of economic and social requirements with the ecological and cultural functions of particular territories, which contributes to long-term, broad and sustainable spatial development (CEMAT, 2000).
- A polycentric model of development. This is consistent with the principle of sustainable spatial development historically established in Europe, and should be maintained. Therefore, development should include the entire settlement structures of regions and countries, in their full hierarchy – from small towns, through mediumsized ones, to the largest cities. This will prevent formation of the *centre – periphery* model, i.e. the establishment of isolated growth areas. In this context, the leading role in the development

of entire settlement structures, and consequently of whole regions, is assigned to metropolises and metropolitan areas. Among metropolises, cities of supra-regional, European (Europolis) significance are especially significant; this particularly concerns the so-called *Gateway Cities* of the European Union, which connect Europe with other global zones.

- General European quality standards for cities determine the criteria of *Europolis* status. They include primarily:
 - ✓ appropriate demographical potential (at least 0.5 million residents);
 - ✓ multifunctional character, capable of developing functions of European significance;
 - ✓ established centres of science, higher education and national culture;
 - ✓ crucial location in the European communication system;
 - ✓ high environmental and cultural values.
- Conditions for the development of cities (metropolises). According to the EU documents, these conditions mainly include (Dylewski, 2004b):
 - ✓ quality of communication links of the city with the state and the wider world;
 - ✓ quality and amount of development that the area offers, especially with city-forming potential;
 - ✓ quality of the city environment, its appeal and strength of attraction.

At the same time, reports confirm that the development of city-metropolises aims to activate development of the regions they serve. In free market conditions, competition among cities on a national and European scale is the road to development. The offer of development must be accordingly attractive, inspiring and encouraging for potential investors.

- Town-planning management tasks. Limitation of the growth tendency of suburban areas for the benefit of increased access to other areas.
- City plan. Town-planning designs, i.e. plans of development and management in general and detailed scales, should primarily constitute the development offer. The principle of permanent and sustainable development must be the basis of all planning studies (New Athens Charter, 1998). According to EU experts, correctly prepared plans require:
 - ✓ high expertise of the town-planning staff;
 - ✓ cooperation with scientific, professional and political communities, social organisations, and dialogue with society;
 - ✓ town-planning competitions, in search of a more accurate vision;

✓ guidelines, support and substantial supervision of the department, region and persons jointly responsible for the results.

EU documents emphasise that the basic task of spatial planning is constituted by protection of the public interest in the dimension both of current and prospective needs, i.e. significantly, qualitatively higher social requirements (Dylewski, 2004b). The guidelines of the European Union (Green Paper, 1990; New Athens Charter, 1998; ESDP, 1999; CEMAT, 2000) give special significance to the current and prospective quality of the city. The quality of the city and its surroundings, considering the natural and cultural environment, their structures and functioning, is regarded as a prevalent criterion of assessing the state and conditions of development. It is also the main goal of town planning. Requirements within this scope increase together with the development of the society and maturation of the quality of its needs. According to the EU experts, factors on which this quality is based include:

- Quality of the environment. Priorities includes protection, revitalisation and development of natural recreational areas, increased efficiency of environmental functioning (to reduce the anthropogenic load), as well as its increased potential for influencing perception and behaviour. The amount and quality of open areas constitutes the quality measure of the city.
- Quality of the cultural environment. Strong emphasis is put on the need for improved protection of the city's cultural heritage, both within the scope of historical heritage and modern urban and architectural structures (the spatial culture of the city), as well as in development of the network of cities. In addition, *protection of cities against trivial standardisation in the international style* is necessary.
- Quality of the city structure. According to the recommendations of the EU experts, this is indicated by the achievement of fair living conditions for the residents, at the highest possible saving of area and land, and by minimum transport needs. It requires compact but healthy land development with mixed functions that reduce transport needs (accommodation, services, recreation and workplaces that are not a burden on the environment), near larger open areas. Only problematic structures - those that put health and safety at risk – or structures requiring special exposure need to be isolated. This model is defined as a *complex of small towns*. Towns with deliberately different characters meet the condition of *wide choice*, allowing for fuller satisfaction of the diverse needs of residents. In addition, one restores the special role to actual centres of the structure, instead of the periphery, as locations to integrate the city and shape its

identity and image. These centres should be developed above all. The necessity of non-violation of open areas is also emphasised. Open areas in present towns should be enlarged, e.g. by using post-industrial areas. City structure must be formed according to the principle of sustainable development, where open areas with significant ecological, cultural and social functions have permanent, indefensible positions.

- Careful management of the city's ecological system. Preventing and inhibiting environmental degradation, especially in reference to public places, as well as with regard to infrastructure, water, power, waste and noise levels.
- Public transport. Development of efficient and ecological means of public transport which may contribute to sustainable mobility, and the development of bicycle lanes and passageways – collision-free, separated, attractive, welcoming and environmentally friendly.
- Peripheries (suburban zones). Despite various regulatory and protective measures, often insufficiently effective against the power of the phenomenon, increasing town-planning chaos in suburbs has unambiguously negative social, economic and ecological consequences. EU recommendations aim in two directions. Firstly, asefficient-as-possible stoppage of the uncontrolled extension of cities through creation of socalled green belts of high ecological and landscape value, balancing the settlement macrostructure - the direct surroundings of the city should be permanently green. Secondly, reasonable development of settlement in the crucial areas of the city's functional zone, i.e. creation of agglomeration structures enriching the central city, increasing its economic and marketing power and its chance of being selected, therefore its appeal and power of attraction - the main assets of competitiveness. Revitalisation of the present state of suburbs is also necessary. Wherever possible, introduction of the spatial order of land development in these areas and implementation of its functional integration with the city is recommended, assuming preservation of as many open areas as possible.

Analysis of modern concepts of the sustainability of the city and its surroundings

Compact city

The idea of the compact city refers to the belief that liveliness, diversity and cultural richness constitute the essence of urban life. In fact, more than half the human population participates in this, so the problem of its quality becomes increasingly significant (Górka, 2002). The amorphous growth of cities threatens rural areas. Housing concentration inside present urban areas is the remedy (Fauset, 1999). As Górka (2002) emphasises, the aspect of the quality of life in the city and the aspect of rural area protection both connect the *compact city* concept with the idea of sustainable development. Fauset (1999) indicates new ecological standards which should be met by buildings in a compact city, based on the principle of sustainable development (high thermal insulation, passive use of solar power, natural ventilation, environmentally-friendly building materials, recycling of building materials, locally produced materials, alternative power sources, energy-efficient heating systems, conversion of existing buildings), as well as by means to achieve a higher quality of life in the city:

- increased population density from 100% to 300%;
- diversification of the methods of utilising urban areas;
- consideration of energy-saving rules when designing new structures.

Masnari (2001) mentions the following factors as indicators of the quality of life: access to urban facilities and services, car travel time, public health and social relationships. According to Fauset (1999) and Masnari (2001), increased density of urban areas to 500 or even 700 persons per hectare does not have to be related to significant growth in housing density. Increased density of population may be achieved through:

- limitation of the number of parking lots to one parking place per apartment, or their complete elimination, which would allow the acquisition of space for, respectively, 500 persons/ha or 700 persons/ha;
- construction of houses on existing free plots of land;
- introduction of residential development in areas with previously different functions, as well as opening ground floors and first floors for services;
- conversion of residential buildings into tenement blocks;
- conversion of courtyards and backyards, *economic* views of buildings.

The cited authors prove that practical implementation of these means allows for construction of 3-4storey buildings, or 5-6-storey buildings in the case of keeping the tendency of one- and two-person households. Mansari (2001) indicates that the idea of the compact city allows for reduction of passenger car use by up to 70%. In addition, it reduces the distance of car travel, except for commuting and periodical larger shopping. Therefore, it does not eliminate private car use. The diversity of functions and high density of population do not cause increased use of public transport (Harvey, 1996). According to Harvey (1996), one cannot just say that higher city density results in reduced car traffic. Significant disadvantages of the compact city include also smaller amounts of greenery and open areas, and privacy limitation (Górka, 2002). The highest efficiency of actions towards the *compact city* has been observed

in towns with a high share of multi-family residential developments and local services (Burton, 2001).

Urban village

The idea of the urban village is based on traditional aesthetics. It adopts the organic, holistic, urban, polycentric nature of pre-industrial districts of large and small towns (Górka, 2002). The British movement promoting the development of urban villages – Urban Villages Campaign – began its activity in 1992 under the patronage of Prince Charles. It takes actions for the benefit of economic, ecological and social sustainability in the developed urban environment (Colquhoun, 1994). The following features characterise the urban village concept (Górka, 2002):

- multifunctionality and self-reliance;
- diverse forms of ownership of residential developments and commerce;
- compactness beneficial for various forms of activity;
- site significance, diverse architecture;
- walking access to urban services and attractions;
 the impact of residents on planning and team management.

The perfect urban village has 3-5 thousand residents and workers, and occupies an area of 40 hectares, which gives a diameter of 900 meters in a circular shape, as well as walking access within no more than 10 minutes. The adoption of sufficient critical mass and diverse ownership forms are beneficial for rich social life: heterogeneity, participation, and the establishment of contacts (Colquhoun, 1994). Social participation in planning and management constitutes an important proposal in the formation of urban villages. Public spaces also play an important role in the urban village concept. Due to clear plans and reference to existing historic elements, they enable residents to identify with a place and construct their identity (Górka, 2002). A clear plan of streets which radiate from small quarters around the central square to larger residential blocks benefits pedestrians and cyclists. Car access to the city centre should be limited but not excluded. Functions generating car traffic should be located at the periphery of urban villages, preferably between them (Colquhoun, 1994). The urban village should constitute a compromise between centralisation and decentralisation (Górka, 2002).

Important epistemological and ontological issues at the grassroots level of this model are the subject of criticism of the urban village concept (Harvey, 1996; Górka, 2002). Harvey (1996) bases them on the following premises:

- searching for the *shape of the future* in the past fixes out-of-date city forms and out-of-date ways of thinking;
- in the epistemological and ontological sense, social processes, instead of the city – as a *thing* – should be a priority when thinking about the

city. The rank of social processes should not be limited to the dimension of spatial forms relevant for them;

 the modern city is a kind of *palimpsest* including various layers established in various time periods.

Harvey (1996) emphasises that space cannot be divided from time, as there exists an *indefinite number* of non-convergent time series and indefinite number of separate spaces. Space is not a passive vessel of social actions in the Cartesian-Newtonian understanding. Social processes create spaces and space-times, remaining in continuous relation with them. According to Harvey (1996), the idea of a society constituted by urban villages has three disadvantages: 1) the mythical belief that an *object* called society may be created as an independently existing, autonomous whole, 2) the belief that the qualitative features of this *object* can be defined from the inside, 3) the belief that its external relations are more fragmentary and accidental than integral and continuous.

New Urbanism

At the turn of 1980s and 1990s in the USA, the New Urbanism trend was established, also defined as the New Urban Design movement (Newman, Kenworthy, 2001). The concept of this trend converges significantly with the goals of the British Urban Villages Campaign (Górka, 2002). Towns proposed under New Urbanism are clearly aimed at suburban areas, where multi-functional centres are to be developed, integrating residential functions with trade, social instruments and workplaces. All facilities inside the complex are to be available within a five-minute walk of the stop. The town (settlement) should occupy a surface area of max. 100 acres (approx. 40 ha), have five thousand residents, and offer three thousand workplaces. Its population density should amount to 50 persons/acre (approx. 125 persons/ha). The main criteria of New Urbanism include (Hasic, 2001):

- the centre of each neighbourhood should be defined by public space and animated by local public and commercial activities;
- each residential complex should offer many types of apartment and function;
- the role of the car should be limited in the future;
- new architecture should correspond with the surrounding architectural tissue.

The New Urbanism concept emphasises the significance of traditional neighbourhoods and the importance of social problems. The development of an integrated, heterogeneous society, which is *more interactive, less individualistic and separatist, oriented towards public life* (Górka, 2002), is postulated.

Permaculture

Permaculture (permanent agriculture) is the idea of growing agricultural products in the city, in all areas

not included in *municipal* use, i.e. on waste ground, roadsides and near houses (Kennedy, 1992). Kennedy (1992) claims that this is a method of planning and designing based on sustainable economy and cultivation that provides healthy food, power, heat and beauty. Permaculture systems try to comprehensively create relations among many elements of city life. They build vision and ethical bases. In the United Kingdom and the Netherlands, municipal waste grounds, which are public property, are divided into plots of land whose area comprises approx. 500 m². These plots are leased for growing vegetables and flowers. Garden Clubs in the Netherlands and Australia constitute a form of popularising permaculture. Such clubs are established as close to the city as possible, while their members visit at least once a week. So-called cluster-title is a more extensive form of space utilisation. Ten or more persons purchase 150 acres (approx. 60 ha) of land. They divide this into plots, each of 1,000 m² surface area, and rent these to city residents (Mollison, Holmgren, 1987). According to Mollison and Holmgren (1987), extensive public recreational areas maintained by permanent residents will be a consequence of combining the principles of permaculture, Garden Clubs and cluster-title. The idea of permanent agriculture evokes the tradition of municipal garden plots. Their goal was to provide the possibility of contact with nature and to provide fresh fruit and vegetables for poorer people. The first garden plot was established in Leipzig in 1864. Subsequently, they became popular throughout Germany and other European cities. In Poland, the first garden plots were established in 1908 in Gniezno and Poznań. In 1949, the legislator imposed the obligation of establishing garden plots on towns in which 20% of the population lived in multi-family buildings. In the 1960s, the typical garden colony in Poland included 200-500 garden plots, whose area amounted to 100-500 m² each. The transformation of garden colonies to wild settlements was quite a frequent phenomenon (Górka, 2002). Drapella-Hermansdorfer (2008) emphasises that the employee garden plot movement has been the only force able to defy the investment lobby in post-war Poland.

Jurydyka

According to Bogdanowski (1982), *jurydyka* is an attempt at developing spatial structure based on the analysis of Polish city traditions. It constitutes a continuation of such analysis in response to the social, cultural and environmental problems created by housing estates. *Jurydyka* was to be a formally, organisationally separate and independent spatial unit as a *small town*, or to constitute part of a big town as a *district* (Bogdanowski, 1982). This concept integrates well with the urban village theory. At town-planning scale, the basis of this model is constituted by the market square, the street, the plot of land, and by sequences: street – pre-garden plot – house (2-4)

floors) – courtyard – garden and apartment – tenement – commercial *boulevard* street – market square. The concentric model enables free distribution of non-residential functions. According to the *jurydyka* concept, the modern housing complex should meet specific requirements within the scope of its content, form and function (Bogdanowski, 1982):

- through richness of social and cultural content, as well as defined borders of the complex, it should enable identification of residents with the place and development of their own traditions;
- the form of a complex should be original, both in the surrounding landscape and in the landscape of urban interiors;
- distribution of functions should meet the requirement of efficient operation through connection of elements in all possible relations.

Ecosystem model

In her concept of the city-ecosystem, Szulczewska (2002) formulates the *principles of sustainable de-velopment of the city* and divides them as follows: 1) city-surroundings relation – *responsible city*; 2) desired (optimal) city size – *middle-sized city*; 3) required spatial structure of the city – *compact, diverse, integrated city*; 4) city functioning (use of resources) – *economical city*; 5) recommended sectoral policy and its rules – *functional city*; 6) organisation of social life in the city – *friendly city*; 7) creation of economic basis for city development – *prosperous city*; 8) city management – *skilfully managed city*; 9) city development planning – *city with a vision*. She also presents relationships and dependencies among specified groups of principles (Fig. 1).



Figure 1. Relations and dependencies among specified groups of principles in the sustainable development process (Szulczewska, 2002).

According to Zimny (2005), the ecosystem model proposed by Szulczewska (2002) enables one to obtain the current recommendations and directions of sustainable city development. However, it does not exhaust all the issues within this scope, and neither is it fully precise. Zimny (2005) emphasises that it is difficult to separate some issues, such as planning city development and forming the required structure. Moreover, it is a concept designed only for mediumsized cities, while the leading role in development of whole settlement structures in the European Union is assigned to metropolises and metropolitan areas (CEMAT, 2000).

Interesting proposals for a new form of city functioning in Poland also include Kowicki's (1997) concept of the – town in a rural enclave. This is the concept of a farmers' and non-farmers' settlement in rural areas. It assumes that it is possible to maintain essential elements of the rural enclave landscape in conditions of ecological agriculture (Górka, 2002). The proposed model aims at recreating or strengthening an *authentic village and authentic town*, co-creating a sustainable environment (Kowicki, 1997). In Kowicki's concept (1997), rural enclaves constitute areas of stabilised settlement and agriculture. Nonfarmers move from rural enclaves to towns within their area or beyond it. Kowicki (1997) lists the following features of such towns:

- the number and size of towns is balanced against the natural resources of enclaves;
- impassable town borders are permanently designated;
- the individually defined size of a town is not larger than 1,000 residents per five hectares;
- prohibition of town development and the order to establish new ones in different areas;
- lack of a transitional zone at the border of towns and agricultural lands;
- sport and recreational belts around towns;
- housing development as an external ring; parking, administration, manufacturing and commercial functions are located inside;
- localisation in the least agriculturally useful areas;
- creation of a network of nodes compositional dominants in the landscape;
- respect for present divisions of arable land.

Kowicki (1997) bases his model on the hierarchic network of communal, rural and neighbourly social and service centres. Notable Italian architect, Paolo Portoghesi, one of the main representatives of postmodernism in architecture, designed such small towns for permanent and temporary populations in Vallo di Diano (Górka, 2002).

To sum up, it must be recognised that there is no commonly accepted optimal strategy of sustainability for the city and its surroundings. Various spatial scenarios are possible – from the compact city to housing extension (Domański, 2000). The models discussed should not be regarded as universal, as they were established in a specific socio-cultural environment and respond to its specific needs in a way conditioned by its features. Therefore, the sustainable city cannot be a specific structure created on the basis of rules adopted *a priori* (Górka, 2002). Attempts to define urban forms responding to the proposals of sustainable development are not proceeding smoothly. The very term *sustainable city* raises doubts. Orrskog (1999) quotes the following arguments of opponents:

- the city does not exist without its neighbourhood;
- the city concept is an anachronism in an entirely urbanised society;
- the city as a physical structure and organisation cannot be sustainable or non-sustainable;
- nobody manages the city as a whole;
- functional territorial connections lose their significance for the benefit of network connections;
- utopia cannot exist in the postmodern society.

Kistowski (2008) claims that The category of 'sustainability' cannot be applied to the landscape in the same way that development can. Sustainable development is often understood as permanent (in time and space), while permanent landscape does not have to be sustainable (and vice versa), because it may require continuous delivery of matter and power to maintain its permanence. Sustainable landscapes may occur when they meet the criteria of sustainability in all three layers of its understanding: functional, structural and physiognomic.

According to Kistowski (2008), so far the concept of sustainable landscape has not found sufficiently broad application in spatial planning, which may result from subjectivism, the difficulty of the application of some methods of assessing the sustainability of landscape, as well as the lack of terminological standardisation. In addition, it is worth drawing attention to the fact that next to the trend of sustainable cities, the opinion of the city not differing essentially from natural ecosystems in its manner of functioning (manifested in the pro-social vision of the *ecopolis*) has been initially approved (Tjallingii, 1995). The modern state of knowledge within the scope of designing and building cities (e.g. the Dongtan ecopolis in the Shanghai region) eliminates artificial divisions into natural and anthropogenic environments. It is connected with the notion of cities as a kind of third nature, constituting the highest evolutionary field of first nature (natural or quasi-natural ecosystems in urban areas) in the process of nature urbanisation (Drapella-Hermansdorfer, 2008).

It should be emphasised that the idea of city sustainability reminds us that it is part of the world of nature transformed by the human being. The traditional town (active element) – village (passive element) dichotomy has given way to an urban-rural partnership, which brings bilateral benefits and the chance of a higher quality of life in the whole *ecological region* (Górka, 2002). Co-participation of urban society is necessary in the process of forming the sustainable development of cities, which usually means a fight for the quality of space and life in the city of today and for future generations. Recognition of the leading role of the socio-cultural aspect in defining spatial features of sustainable settlement will enable research that has a more integrated and design-oriented approach (Górka, 2002).

Delimitation of suburban zones

Structures of various, often mutually exclusive, functions have emerged in suburban zones. In such conditions, delimitation of the suburban zone from the city part encounters significant difficulties (Kostrowicki, 1990; Zimny, 2005). Determination of the external borders of the suburban zone has been the subject of much research and inquiries by various specialists (Burton, 2001; Górka, 2002; Markowski, 2002; Pawłowski, Szymski, 2002; Zimny, 2005). Considering this issue historically, the suburban zone has been determined by its distance from the city and its accessibility, although these criteria are not always appropriate (Kostrowicki, 1990). Environmental criteria applied at delimitation of suburban zones consider, among others, the level of air and soil contamination. Many studies (De Kimpe, Morel, 2000; Kahle, 2000; Baran et al., 2010) show, that the level of urban environment contamination depends strictly on the urbanised area. These studies demonstrate a much higher concentration of anthropogenic contamination in city centres rather than in suburban zones.

In addition, a method based on assessment of the level of mosaicism and synanthropisation of ecological systems is recommended. General regularity has been identified, according to which the mosaicism of ecosystems in the suburban zone is the largest, and is gradually decreasing both in the direction of city and rural areas (Markowski, 2002). Cities are developing in range and in many directions, thus delimitation of the borders of the suburban zone with this method encounters significant difficulties (Zimny, 2005). Complex analysis of mutual relations and dependencies between natural and social factors and the economy in typically rural, urban and suburban environments is best for this purpose. Every spatial system (downtown, suburban zones, rural areas) includes five sub-systems. These contain natural, social, technical, manufacturing and management subsystems (Kostrowicki, 1990). Specific interactions occur among particular sub-systems and create a specific style of functioning through modification of their state. The character and strength of relations among system elements, and among these elements and external open areas, have been adopted as the basis for allocation of spatial systems (Morawska, 2003; Zimny, 2005).

While examining the significance of sub-systems as a source of influence on the city, suburban zones and typical rural areas, Kostrowicki (1990) proved that the following sub-systems had the largest impact on functioning of the suburban zone: technical, manufacturing and social (Tab. 1). While analysing the same dependencies from the point of view of a receiver, i.e. the strength of adopted interactions, the author claims that the suburban zone had the strongest impact on the natural and social environment (Tab. 2).

Table 1. Significance of sub-systems as a source of influence on the city centre, suburban zone and typical rural area (Kostrowicki, 1990).

	System type			
Source	City	Suburban	Village	
		zone		
	(values of multiple regression			
	coefficients)			
Natural				
sub-system	19	49	74	
Social sub-				
system	87	79	58	
Technical				
sub-system	96	89	51	
Manufac-				
turing sub-	97	81	63	
system				
Manage-				
ment sub-	84	68	65	
system				

Table 2. Significance of the city centre, suburban zone and typical rural area as receivers of influence (Kostrowicki, 1990).

	Sub-systems				
Receiver	Natural	Social	Technical	Manufactur- ing	Manage- ment
	(values of multiple regression coeffi- cients)				
City			,		
5	92	87	77	69	70
Suburban					
zone	83	80	63	76	58
Village					
	53	72	55	79	55

The summarised data (Tab. 1-2) indicates that the most changeable sub-systems include society, nature and the manufacturing-consumption system, while management and technical investment systems are the most durable. Whilst analysing the sum of differences, it should be emphasised that the suburban zone is closer to the city than to the village, which is related mainly to the process of urbanisation (Zimny, 2005).

Suburban zones are characterised by internal diversity of the environment and the method of their functioning. This is different from analogous features both in urban and in typical rural areas. This diversity concerns all natural components, both biotic and abiotic (Zimny, 2005). The difference is most strongly expressed in the structure of vegetation cover (Tab. 3). The data in Table 3 show that the suburban zone is characterised by a 4.5x higher number of biocenosis types, much larger mosaicism of vegetation systems, and an almost 5x higher share of the number of synanthropic species, as well as by a significant decrease in the stability of ecological systems (approx. 50%) than in typically rural areas. As opposed to the city centre, the suburban zone clearly includes less synanthropic species, less mosaicism of vegetation cover, but a higher number of species as calculated per 1 km², and far greater durability of ecological systems (Tab. 3).

Table 3. Diversification of vegetation in the city and suburban zone as compared to rural areas – adopted as indicator 1 (Zimny, 2005).

	Type of area			
Properties	City	Subur- ban zone	Village	
Number of types of				
biocenoses	0,6	2,7	1	
Share of synan-				
thropic species	0,4	4,8	1	
Average number of species per km ²	0,7	2,3	1	
Stability of ecologi- cal systems	0,2	0,6	1	
Mosaicism of vege- tation systems	0,3	5,8	1	

In summary, it may be ascertained that the suburban zone has been established and formed by the city, whose influence has many directions: direct and indirect, both positive and negative. Cities increase the capacity of socio-economic development, deliver workplaces, and provide access to education and culture, but at the same time they negatively affect the environment through emission of pollutants. In recent years, individual location decisions, as well as the aesthetic and economic calculations of particular investors, have affected the state of suburban landscapes. Here, different impacts and interests collide, whose consequence is the location of, for example, dumping grounds, sewage treatments and warehouses. These strange spatial structures become a source of various social conflicts and landscape degradation. In addition, investments related to the creation of pan-European systems of technical infrastructure, particularly motorways and dual carriageways, contribute to the threat for suburban landscapes.

Integrated protection of suburban areas

Due to the fuzzy definition of the suburban zone, the issue of the sustainable development of suburban areas is very seldom undertaken as an independent research subject (Parteka, 2001). However, proposals in documents of the European Commission (*White Book*, 1995; *New Athens' Charter*, 1998; *ESDP*, 1999) prove that the term *sustainable city* cannot be limited to the area of strict urban investment: it includes regional relations including suburban areas (Górka, 2002). Sustainable cities are to ensure: a) welfare in the whole region, b) the chance for satisfaction of the needs of future generations, c) no threat to neighbouring regions and beyond (Domański, 2000). The depth of the suburban zone depends on the character and function of these areas, and does not always overlap with administrative boundaries. A suburban zone may be described through functional-spatial, natural and landscape relations occurring among neighbouring areas. These relations have decisive impact on the functioning of the zone (Morawska, 2003). The concept of protection of the suburban zone should include all the significant processes, relations and dependencies occurring in suburbs.

The issue of the integrated protection of suburbs has the following basic aspects:

- substantial aspect physiological, ecological, environmental, resource-functional, landscape issues;
- spatial aspect (internal and external protective measures);
- temporal aspect (period and durability of obtained protective effects);
- legal aspect (legal considerations of active protection);
- conflict aspect protection as the source of spatial and social conflicts (Dubel, 2003).

The substantial aspect generally has ordinal and systematisation significance. All ecophysiographic, environmental, resource-functional and landscape structures are mutually related. They create a complicated system of processes and phenomena, whose comprehensive research, design and formation are very difficult (Dubel, 2003; Morawska, 2003; Zimny, 2005). Ecophysiographic measures include four main phases: diagnosis, assessment, forecasting and guidelines (Majer, 2007). Diagnosis includes recognition and characterisation of the structure and functioning of the environment, sources of anthropopressure, the state of development and use of the environment, and description of previous changes in the environment (retrospection). Objectivism and the full characteristics of processes occurring in the environment require long-term monitoring. The assessment stage consists in analysis of information obtained in the diagnostic phase, including the evaluation of quality and resistance of the environment to degradation, the state of landscape value preservation, the character and intensity of changes occurring in the environment, threats and possibilities to limit them, the scope of protection of environmental values and resources, the usefulness of the environment for performance of socio-economic functions, compliance of current use and development with environmental considerations, and the occurrence of conflict situations in the environment. The forecasting stage includes initial assessment of directions and intensity of changes in the environment occurring under the influence of present land use and development, as well as evaluation of the occurrence of potential conflict situations in the environment. The guideline stage constitutes the synthesis of arrangements from the preceding phases. It should include three main groups of guidelines concerning: the capacity of limiting or eliminating environmental threats, the indication of areas predisposed to perform environmental functions (greenery) in the spatial structure of the area, as well as areas useful for performing various socio-economic functions (Majer, 2007). The environmental problems of the integrated protection of suburbs include two complementary issues: reduction of anthropopressure, and increased resistance of the environment to anthropogenic loads. The first issue is technical and organisational, while the second is ecophysiographic (Przewoźniak, 2002). The resource-functional and landscape scope mainly concerns protection of the attractiveness and recreational usefulness of suburban zones (Pawłowski, Szymski, 2002).

The spatial aspect is related to the need of protection both of urban and suburban zones (internal measures) and external open areas (external measures), with regard to diffusive migration of anthropogenic contaminants, as well as fauna and flora, due to their ability to move and implement the most important natural connections in space (Żarska, 2003; Mackenzie et al., 2005). Internal and external measures will enable achievement of the higher goal of protecting suburbs – improvement of the ecological conditions of human life, for example through protection and connection of the city's ecological system with its natural surroundings.

The temporal aspect concerns the duration and durability of obtaining the results of suburban zone protection. The durability of results of protecting suburbs depends on environmental and anthropogenic considerations. Both may stimulate or limit the effects of protective measures (Baranowski, 2000). In the case of environmental considerations, this depends mainly on the character of local environmental dynamics and the trend of changes. In the case of anthropogenic pressure, it depends on the type, intensity and scope of anthropopressure (Janikowski, 2004).

The legal aspect includes regulations concerning environment and landscape protection, along with conditions of using the environment within the scope of the emission of pollution and maintenance of environmental resources (Dubel, 2003; Żarska, 2005). The protection of suburbs is hampered both by the changeability and ambiguity of the law, as well as by methods of suburban zone management applied in practice (Dubel, 2003; Dylewski, 2004a; Kozłowski, 2005). The legal provisions themselves do not protect endangered landscape resources – they need to be properly utilised to transform the possibility of protection into efficient operation.

The economic aspect concerns incurred costs, which increase together with the application of efficient, integrated means of protecting suburbs. Here, efficiency refers not only to the reduction of negative physical, chemical and biological impacts, but also to aesthetic, landscape, cultural, functional and health impacts, which are very difficult or impossible to quantify.

The nature of the conflict is often spatial (especially infrastructural) and economic. It results mainly from incorrect information policy and improper organisation of suburban protection implementation (Baranowski, 2000). Reduced consumption, and the necessity of taking into account the needs of future generations constitute the foundations of sustainable development (Pawłowski, 2008; Dabrowski et al., 2012). The theory, that each element – society, environment and the economy – while adopting extreme values is able to disturb other components, is obvious and does not require special documentation. It seems that that economy on a global scale has entirely dominated all areas of socio-economic life, and even such areas as environmental protection and education are strongly dependent on it. It causes problems with ranking the scale of needs and selecting the sequence of their implementation in the context of the limited financial capacity of a region or commune, as well as the expected social costs of implementing the integrated protection of suburbs. In suburbs, a compromise among different purposes and different spatial users is necessary. Usually, its achievement is not simple - it requires the comparison of irreconcilable phenomena and values (Sas-Bojarska, 2003). Integrated protection of the suburban zone, being subject to intensified investment pressure, should constitute the main direction of suburban zone development. This is influenced by inefficient use of space, the chaos of town-planning structures, negative social and ecological phenomena, and increased operating costs. The improvement of human living conditions, including ecological conditions, is the higher goal of protecting suburbs.

Conclusions

- 1. The suburban zone is the sight of occurrence of a series of environmental, functional, spatial and landscape processes, which are rarely subject to comprehensive and systematic assessment during creation of development policy and the development of plans.
- Conducted analysis of modern concepts of the sustainability of the city and its surroundings indicates that there is no commonly accepted, optimal strategy within this scope. Different scenarios from the compact city to housing extension are proposed.

- Assumed density of population is the most important element diversifying particular concepts of the sustainable city, providing that the demand for increased compactness is commonly accepted.
- The new needs of the information society should be the basis for seeking other forms of sustainable development of the city and its surroundings.
- 5. Development of the methodology of integrated protection of suburban zones and their formation, based on culturally-conditioned concepts of the quality of life, will enable sustainable development of urbanised areas.

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Selected methods of water resources accounting in the aspect of sustainable development

Wybrane metody bilansowania zasobów wody w świetle koncepcji zrównoważonego rozwoju

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Abstract

Fresh water is one of the most important natural resources required by the societies' proper operation to meet their biological and industrial needs. Thus, water is a key resource, which availability or scarcity, should be considered carefully in strategies of sustainable social, economic and technical development, with full respect to nature and rules of intergenerational justice. Preservation of fresh water resources for the next generations is highly required by the rule of sustainable development, which results in the need for water accounting for industry and services located in the given watershed as well as for the proper, sustainable water management. This paper contains presentation and analysis of five popular methods used in industrial water accounting i.e. Water Footprint, Life Cycle Assessment, Global Water Tool, Water Sustainability Tools and the exemplary industrial method developed by Schornagel. The apllicational abilities of the described methods and the attempt of the presented methods assessment in compliance to the three main priorities of sustainable development was also presented.

Key words: sustainable development, water resources, industrial water demand, waste water, industrial water balance, sustainable water management

Streszczenie

Słodka woda, poprzez zaspokajanie potrzeb biologicznych i przemysłowych ludzi, stanowi jeden z podstawowych surowców naturalnych niezbędnych do prawidłowego funkcjonowania człowieka. Woda jest więc jednym z kluczowych surowców naturalnych, którego dostępność lub brak powinny być brane pod uwagę w strategiach zrównoważonego rozwoju społecznego, ekonomicznego i technicznego, realizowanego z poszanowaniem natury oraz sprawiedliwości międzypokoleniowej. Zachowanie zasady zrównoważonego rozwoju wymaga zachowania zasobów wody dla przyszłych pokoleń, stąd konieczność dokładnego określenia zapotrzebowania wody na cele produkcyjne i usługowe w danej zlewni oraz zrównoważonego nimi gospodarowania. W pracy niniejszej przedstawiono i omówiono pięć popularnych metod bilansowania zasobów wodnych na cele przemysłowe oraz prowadzenia obliczeń bilansu wodnego przedsiębiorstwa, tj. Water Footprint, Life Cycle Assessment, Global Water Tool, Water Sustainability Tools oraz metodę przemysłową Schornagela. Uwypuklono możliwości aplikacyjne omawianych metod oraz dokonano próby ich oceny w aspekcie trzech podstawowych płaszczyzn zrównoważonego rozwoju. Przedstawiono także podstawowe wymagania jakie powinna spełniać metoda bilansowania zasobów wodnych zorientowana na zrównoważony rozwój.

Slowa kluczowe: zrównoważony rozwój, zasoby wody, zużycie wody na cele produkcyjne, ścieki, bilans wodny przedsiębiorstwa, zrównoważona gospodarka wodna

Introduction

The concept of sustainable development, defined by Our Common Future report (WCED, 1987) presents the idea of development not based on the unlimited consumption but guaranteeing the needs of the current generation as well as of the generations to come. The sustainable development is usually considered on three independent but linked areas: environmental (ecological), social and economic (e.g. Harris et al. 2001; Harding, 2006). These three basic pillars of sustainable development may be additionally supported by technical, legal, moral and political aspects (Pawłowski, 2008). Integration of the all mentioned above circles of sustainability allows development of complicated and complex strategies of conscious and directed sustainable development realized with respect to nature and intergenerational justice. Meeting the needs of the current and future generations, indicating ensuring resources, including energy carriers, and intact quality of the natural environment in exploited ecosystems may be achieved by the rational resources and wastes management (partial or total limiting of resources flow together with implementation of resources of lower environmental harmfulness) application of clean and energy efficient technologies of production, use of by-products and recycling of wastes (Kozłowski, 2000). The important contribution in realization of technical and ecological (environmental) aspects of sustainable development is made by the environmental engineering, understood as a science using knowledge of basic science (physics, chemistry, biology) and technical knowledge in preservation, conservation and usage of inner and outer human environment to, inter alia, fresh water supply for domestic and industrial purposes, assuring the proper quality of air, soil and water (surface and groundwater) as well as the proper thermal comfort etc. (e.g. Bhamidimarri and Butler, 1998). Preventing the increasing degradation of the natural environment, resulting in deterioration and pollution of the actually available and possible to use in future water sources is one of the basic research and application tasks for the environmental engineering, because the amount and quality of limited water resources of ecosystems are directly connected to precipitation and surface and underground inflows supplying the basin as well as to discharge of sewages of various origin and anthropogenically modified quality (Palme et al., 2005; Marialokas, 2007; Palme and Tillman, 2008). Thus, we may state that realization of intergenerational justice will depend to the proper management of non-renewable energy carries (Pawłowski, 2010) and to the availability of water of the proper quality required for domestic, municipal and industrial demands.

1. Water resources and their usage

Water on Earth, creating the balanced system, is in continuous movement on, above and below surface of the planet, between atmosphere, hydrosphere and lithosphere, known as the water cycle or hydrologic cycle consisting of processes in atmosphere (evaporation, condensation, precipitation and transport), biosphere (transpiration, interception) and lithosphere (infiltration, underground and surface flow, runoff) (Guan and Hubacek, 2008). The graphical statement of water cycle components for selected areas (e.g. river basin), including the distinction between inflows and outflows was presented in Fig. 1. Exploitation of water resources disturbs the natural water cycle in the environment due to direct usage of water in various technological processes, rivers engineering, drainage of wetlands and increased sealing of urbanized catchments surface etc. etc. (Postel et al., 1996; Kestemont et al., 2011). Interferences of the natural water cycle in hydrosphere may also result from phase transitions of water occurring in different industrial processes, e.g. evaporation of water used to cooling.



Fig. 1. Components of water cycle in the ecosystems – graphical interpretation of water balance for the hydrologic basin.

Water resources of the Earth equal to approx. 1 385 984 000 km³ (Chełmicki, 2002) seems to be unlimited. However, one should underline that 96.7% of these resources is a saline seawater hold by oceans and seas and containing salinity of between 3.1% and 3.8%. The remaining 3.3% is a fresh water available in various forms: ice sheet, icebergs, glaciers as well as surface water and groundwater. Thus, only about 1% of water on the Earth is a fresh water, available to the direct consumption by humans in domestic, agricultural and industrial activities (Bajkiewicz-Grabowska and Mikulski, 1999). Water is withdrawn from two basic sources: i) surface water in rivers, lakes and retention reservoirs supplied by precipitation and snow melting; ii) groundwater located in void space of aquifers supplied by infiltration (Guan and Hubacek, 2008). The allowable,

ready to use, water resources are non-uniformly distributed, it is assumed that the amount of available water in Europe is three times higher than in Africa (Kestemont et al., 2011). In the global scale, the mankind uses about half of the available water resources, from which 70% is used in developing countries for agricultural needs. Considering the natural birth rate in these countries, climate changes, increased production of bio-fuels or minerals mining (including fracturing used during shale gas extraction) the farther increase of water demand may be expected, especially in agricultural and, self-contradictory, highly urbanized areas. The increased water demand and uptake will be followed by discharge of enlarged amount of municipal and industrial sewages to the natural environment. The good example of water stress resulting from the rapid urbanization may be observed in Beijing, China, where the amount of available water per one resident is limited to 300 m^3 /year (Huang et al., 2012).

Water, despite its renewability and common availability should be treated as the significant and scare natural resource in goods production and services, which shortage in the proper quantity and quality may negatively influence the various economic activities (starting from agriculture to industrial processes) located in the given watershed (Guan and Hubacek, 2008). The excessive water withdrawal from surface sources may result in disadvantageous ecological changes in ecosystem of the stream (deterioration of breeding conditions, degradation of vegetation, disturbance of thermal-oxygen relations) leading to decrease of self-purification capabilities of the stream, which in turn, as a characteristic feedback loop, may cause the decrease of available fresh water of required quality coming from the surface intakes (Chełmicki, 2002). The renewable resources of groundwater, in hydraulic contact with the basin surface and supplied by infiltrating rain or melting water may be easily polluted by the substances hardly absorbed on particles of soil solid phase - e.g. industrial wastewater containing huge amounts of heavy metals or the other toxins. Thus, the amount and quality of available raw surface waters and groundwater is directly connected to water management of human settlements and industrial sites localized in the given basin, volume of local raw water withdrawal for domestic, municipal and industrial purposes, and finally efficiency of local waste water treatment plants. Pollutants migrating together with the untreated or treated improperly wastewater to the ecosystem of the basin spread in streams and aquifers reducing the amount of available raw water of required quality. Additionally, pollutants transported downstream the rivers may negatively affect the water resources located in the lower parts of the basin, reducing also the economic potential and quality of the environment and life of the residents of the involved regions (Guan and Hubacek, 2008). The another threat may be posed by the pollutants migrating from outside the borders of the considered catchment e.g. transported by precipitation.

During investigation of industrial sites localization, exploitation of the natural resources or any business operation requiring fresh water delivery, one should remember that the discussed in this paper, or statistical annals and other media water resources commonly are related to a larger area, e.g. area of the whole country, administrative division or hydrographical units e.g. drainage basins. But in fact, water uptake from surface and underground resources is, on the one hand, practically a spot process (in relation to the area of catchment) and on the other has a significant ecological, economic and social influence on the distant areas from the location of water intake or sewage discharge (Chełmicki, 2002; Schornagel et al., 2012). Particular care should be taken with regard to the analysis of available renewable water resources in cases of technologies characterized by a significant water demand and generating huge amounts of highly polluted and difficult to treat wastewaters. The example of such technology may be, nowadays commonly discussed, the hydraulic fracturing applied to shale gas extraction, in which water, the main component of the fracturing liquid, is used in the amount of 7500 - 19000 m³ (Arthur et al., 2010; EPA, 2010) for fracturing of one horizontal shaft. From 20% to 80% of the fracturing liquid, containing various amendments (polymers, scale and corrosion inhibitors, iron controllers, friction reducers, surfactants, gelling agents, disinfectants, crosslinkers etc.) returns to the surface establishing the potential threat, considerably reduced by the proper reprocessing e.g. secondary usage in fracturing, pollutants treatment or depositing in impermeable soil layers. The well-known extreme historical example of improper accounting and management of water resources combined with mining activities is groundwater pollution in the area of nowadays abandoned city of Picher, Oklahoma, the USA. In the first half of the 20th century Picher was one of the most important zinc and led mining center in the USA. The extensive management, accumulating spoils in spoil tips and pollution of groundwater, infiltrating into unsecured abandoned mining shafts resulted in the fact than population of Picher in 2010 was equal to 10 persons (starting from 9766 in 1920, 5848 in 1950, 3951 in 1960, 2363 in 1970 and finally 1640 in 2000).

Conservation of principles of the sustainable development requires preservation of water resources for the future generations, which in turn leads to necessity of the precise water resources accounting for municipal and industrial requirements in the given basin and their sustainable management.

2. Methods of water accounting

Among all known methods of water accounting – beside the traditional industrial method – it is advisable
to consider methods presented in the report *Corporate Water Accounting* prepared in 2010 for UNEP (United Nations Environment Programme) (Morrison et al., 2010). The four main modern, proecological and, more or less, orientated towards the sustainable development methods of water resources accounting were presented in the report: Water Footprint, Life Cycle Assessment, WBCSD (World Business Council for Sustainable Development) Global Water Tool and GEMI (Global Environmental Management Initiative) Water Sustainability Tools. There are also the alternative methods, e.g. recently proposed by Schornagel et al. (2012) the generic method of water accounting for industrial sites.

2.1. Industrial water resources accounting

The traditional industrial method of water resources accounting orientated towards meeting the technological requirements and decreasing the water related risks as well as ensuring the financial profits assumes quantitative and qualitative analyses of water uptake, usage (used irrecoverably in production process) and discharge to the natural environment (Schornagel et al., 2012). The effects of quantity and quality of available water for technological purposes and quality of sewage discharged to the wastewater receiver as well as the amounts of water lost are being assessed from a point of view of a company, necessity of the additional water related charges, adjustments of technology and used equipment. The assessments of water account performed in this way consider only the selected environmental and economic issues, thus its application in sustainable development assessment is limited.

2.2. Water Footprint

Water Footprint is a method allowing to determine the total yearly amount of water used in production of goods and services for the precisely defined consumer: a family, settlement, city, region, catchment, country or industrial site. Water Footprint is based on the virtual water concept understood as the volume of water used to production of goods and services on every step of the production in a given time and in a given watershed. This method does not consider the properties of a basin and its condition before water intake and after discharge of the wastewaters. Water resources in Water Footprint method are divided into three independent components, which may be compared singularly or in groups: blue, green and gray water (Hoekstra et al., 2011). The blue water footprint is the volume of water consumed (evaporated or incorporated into the product) to produce the goods or services withdrawn from surface and groundwater resources, the green water footprint is the volume of rainwater consumed during the production also from moisture soil, the gray water footprint is the hypothetical volume of water required to dilute polluted wastewater to such an extent that the quality of the water meets the local

water quality standards (Morrison et al., 2010; Schornagel et al., 2012). Thus, the amount of water for production is determined by totally consumed and withdrawn from the ecosystem blue and green waters. This method does not manage directly the amount of water abstracted and withdrawn to the source. The quality of water is defined indirectly, the qualitative characteristics is presented as the virtual indicator – the gray water. Distinguishing the green waters seems to be highly substantial for the users of agricultural ecosystems in which the production capabilities are directly connected to water availability for plants in soils. The comparison of water balance components, especially the available soil retention, presented usually in millimeters of water per given area, to the required green water for the selected cropping may help to improve the cultivation practices, including irrigation. Water Footprint in industrial applications allows analysis of water volume used directly in production in the scale of the company or a selected part of the production process line or even the single production unit. Water Footprint is suggested to be positively rated by the business side as the basic platform for understanding the usage of water in production and services and water related risk assessment, especially in case of the strategic analyses and setting the long-term goals (Morrison et al., 2010). Unfortunately this method does not allow application of the basin properties, water availability and spatial development of water consumer to water related analyses. Additionally, Water Footprint allows no qualitative assessment of influence of the industrial site on the natural environment besides the simplified virtual grey water. The validation of the Water Footprint method from the positions of the sustainable development shows considerable application potential on the environmental area allowing to introduce the amount of production water and, in limited degree and simplified manner, the water quality into environmental analyses. Thus, its wide range of popularity becomes understandable. Unfortunately, environmental analyses performed by this method do not cover the properties of the basin and its condition after wastewater discharge. Application of the Water Footprint in economic field of sustainable development may be helpful in understanding the use and consumption of water in production process. Usage of green water concept allows crops management planning, including irrigation which is a basic procedure in the agricultural water management. The discussed method has no application in the field of social area of sustainable development, because there is no possibility to determine the social influence of studied investment.

2.3. Life Cycle Assesment

Life Cycle Assessment (LCA) is a highly popular tool method allowing the determination of environmental effects of a product or a service during the time duration of product existence - life. Life cycle

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of the product covers the time period from obtaining raw materials through the each stage of production, distribution and usage, until the utilization of wastes derived from this product. The principles of environmental analyses performed with use of the LCA are given by ISO 14040 and 14044 standards of 2006. According to ISO standards, the LCA analyses are conducted in four separate, but complementary, blocks covering (ISO 14040, 2006; ISO 14044, 2006): determination of goal and scope, inventory analysis, impact assessment and interpretation. Determination of goal and scope covers the definition of analyzed system boundaries and functional measures of a given product or service. Inventory analysis covers determination of input-output data significantly influencing the natural environment; in case of LCA application to water balance analysis it can be: volume of drawn water, spatial localization of its use and consumption, concentrations or loads of pollutants discharged to the environment with wastewaters. The assessment of product life cycle effects covers the conversion of previously defined environmental input-output variables into respective categories of environmental impacts: quality of public health, fresh water resources, global warming etc. etc. Then, the interpretation covers quantification of impacts on environment determined on the previous stage in order to allow conclusions concerning effects of a given product or service on the natural environment. The LCA is being commonly applied in the different branches multi-level analyses (since a singular industrial site, through catchment, administrative region, to the whole countries) of three main groups: engineering decision making concerning technology of production, political regulations of several levels and economic decisions covering environmental charges (Koehler, 2008; Bayart et al., 2010; Morrison et al., 2010).

The analysis of LCA capabilities in environmental level of sustainable development shows numerous possibilities of this method applications resulting from including quantitative and qualitative characteristics of water source, drawing and using of water in the production, impacts of investment on resources and receivers quality etc. etc. This method allows development of environmental impacts assignments of the industrial site practically on the ever step of product life cycle, including also factors unrelated to water management: emission of greenhouse gasses and volatile pollutants. However, LCA does not consider the influence of pollution or draining of the water resources on the natural environment of the basin and the water source is treated in a simplified way, without taking into account its renewability. The applicational abilities of LCA on the economic field of the sustainable development seems to be extraordinary vast. This method allows different, environment related, decision of economic and political character, including e.g. determination of environmental charges. The LCA has also some significant potential in the social field of sustainability. It allows assessment of water related impacts of the company on the social life, public health and life quality of the studied catchment population.

Despite its high popularity, especially in agriculture or food production, the LCA was not completely and comprehensively applied to water accounting (Morrison, 2010). Usually water related issues in LCA were considered as the total volume of water drawn from the environment to produce a given product or service (Morrison, 2010). It results from the lack of the proper precise tools allowing consideration of water source, its renewability, characteristics of water consumption in the process of production and environmental impacts of water draining and its qualitative deterioration in the analyses (Owens, 2001; Koehler, 2008; Schornagel et al., 2012). Therefore, new modifications of the standard LCA procedures allowing better introduction of this method into water resources and consumption accounting appear. Bayart et al. (2010) proposed the method enabling cataloging and assessment of use of water from the retention reservoirs basing on the impacts of the reduced water resources. The analyzed environmental impacts may be recognized and assessed according to the new, proposed by the authors, categories: humans as well as biotic and abiotic factors. Additionally the quantitative water resources may be classified according to the distance between location of water source and place of its consumption, thus, expenditures required for water transport and functionality of water usage for individual users. The next attempt of LCA adaptation to water resources accounting is a method proposed by Mila et al. (2009). The LCA assessment is in this case based on four paths of impact (Mila et al., 2009): i) changes in availability of fresh water affecting the human health, ii) changes in availability of fresh water affecting quality of the ecosystem, iii) groundwater drawing resulting in its deficit, iv) soils usage affecting the water balance and quality of the ecosystem. Therefore, the manners of water stress quantification basing on indicators of evaporative water use in the second path and decrease of water potential of ecosystem in the third path are presented. According to Schornagel (2012) both described modifications to the LCA do not fulfill the requirements of industrial water accounting because the assessment of water resources quality by application of the criterion of distance between water source and water use locations is often impossible (in cases when the used water is not treated to the level of source) and the water withdrawn from the cycle is not a part of a cycle containing components of water intake and evaporative use. However, the both mentioned modifications of LCA clearly expend the possibility of the method application, assessed from the point of view of sustainable development, especially at the environmental level, due to including the impacts of reduced water resources on the environment and effects of changes in water availability on ecosystem. Additionally, the range of LCA application is also increased in the social circle of sustainable development by including to analyses the changes of fresh water availability impacting the quality of life and public health of human population.

2.4. WBCSD Global Water Tool

Global Water Tool is a free, MS Excel based tool, developed by World Business Council for Sustainable Development and allowing companies and organizations to analyze water use and water related risk in connection to enterprise activity, investment or its full supply chain. The above analyses are performed basing on the total water demand, water withdrawn to the environment, information about technical and industrial infrastructure related to the range of basin or administrative unit (Morrison et al. 2010). Application of Global Water Tool allowing information about water balance of the investment by clear, but not directly connected, indicators (e.g. water demand, volume of returned or reused water and volume of discharged wastewaters) and information presenting the relation between the investment and water management and water resources for catchment, region or the whole country. Water Global Tool seems to be a simple, useful tool allowing the identification of dubious, from the point of view of risk management, links of water management of the company (Morrison et al., 2010). Though, this assessment is performed mainly based on geographical data, such as spatial development of the several divisions of the technological chain of the investment, localization of water sources, intake and discharge points. The discussed method works well in cases in which it is necessary to obtain the information concerning the percentage of investment, or any other activity, localization in regions characterized by water stress, the amount of employee affected by water deficit (Morrison et al., 2010), thus, the recognition of territories covered by enterprise activity endangered by water stress of various types. Unfortunately, the Global Water Tool does not allow the rigorous analyses of environmental impacts of the investments because the qualitative issues are defined in a strongly simplified way. The analyzed streams may represent only fresh or polluted water, without any intermediate conditions, types of water use or including the selected indicators of water quality. Taking into account the general description of water streams in water management (water drawn, returned/consumed and discharged), simplified formulation of qualitative issues and lack of possibility to include the effects of water drawing and wastewater discharge to the analyses one should state that accomplishment of full and comprehensive assessment of investment's environmental impact is impossible. Global Water Tool allows the basic,

based on risk assessment, connected to water management of the investment economic and political analyses throughout allowing the identification of hotspots in technological and production line of the industrial site endangered by water stress, including the spatial development of the individual stages of production in the analyzed catchment and relation between volume of water drawn for production purposes and the total water demand on the studied basin. Consequently, the main possibility of Global Water Tool on the social field of sustainable development allows assessment of the range of social impacts of the investment, e.g. by determination of the geographical range of water stress caused by the industrial activities and affecting the spatially developed population of the basin. The application of Global Water Tool into full range of sustainable development analyses is limited by the lack of precise quantitative and qualitative assessment on the environmental field which also limits the applicability on economic and social fields (Morrison et al., 2010; Schornagel et al., 2012).

2.5. GEMI Water Sustainability Tools

The next free, accessible by the Internet, collection of tools allowing industrial water accounting is Collecting the Drops: Water Sustainability Tool and Water Sustainability Planner developed by the American non-profit organization GEMI - Global Environment Management Initiative (gemi.org). The Water Sustainability Tool, developed in 2002, allows formulation of water management strategy for the industry, basing on five separated modules covering water use, impact and sources assessment, business risk and opportunity assessment, strategic direction and goals setting and, finally, strategic development and implementation. The presented modules, however, do not allow the quantitative and qualitative analyses of water management of the company but the rater is confronted with the series of questions setting the base for establishing the water strategy for the investment. Water Sustainability Planner, on the other hand, is a tool introducing a user of a given object to the process of water demand assessment related to water availability in the region of the industrial site, impacts of the site on existing water resources and identification of factors endangering the continuity of production. Water Sustainability Planner is consisting of two main modules covering water use by the facility and impact assessment program as well as water management risk assessment. Assessment of facility water use is based on the flow diagram representing water supply and sewage removal for the industrial process or site and performing the calculations of the simple water balance of process/site covering inputs and outputs: total water used, the volume of overall losses in production (evaporation, infiltration, water contained in the product, surface runoff etc. etc.) and wastewater dis-

scheme of the industrial site. Water withdrawals in this method are categorized according to their source, volume, quality, location and time,

ply for the industrial site allowing the assessment of possible improvement of its water use layout by recycling of the selected water streams. Water quality in this method is not determined in quantitative manner but is only presented as fresh water and discharged wastewater which permits the precise environmental impact analyses for the individual stage of production. The risk assessment in water management of the company is a questionnaire providing questions from six independent categories related to operation of the investment and the other users of water in the same area (watershed, reliability of water supply, efficiency of water supply, compliance, economics of water supply and social context) which enable categorization of water related risk for an investment in the scale from 0 to 5. Water Sustainability Tools present the wide approach to problem of company functioning and its presence in the watershed already occupied by the other users of water, however the applied methods of analyses should be treated as simplified, performing of which should be, after collection of required data, available for beginning users (Morrison et al., 2010). The main simplification reducing application of Water Sustainability Tools on the environmental field of the sustainable development is the lacking possibility to include to the analyses the quantifiable indicators of pollution in water discharged to the watershed. Despite the fact that, the Water Sustainability Planner as a tool covering water sources assessment, values of its uses, loss and discharge allows the simplified quantitative assessment of investment impacts on water resources of the basin, the lacking possibility of qualitative assessments significantly decreases the range of potential application of this method to environmental analyses of the sustainable development. The GEMI tools, however, can be successfully applied in economic and social field of the sustainable development. Risk management, strategic management and planning in relation to water resources of the watershed and water management of the industrial site or investment, basing mainly on the outer factors influence analyses are possible in Water Sustainability Tools by GEMI. Additionally, the social context, legalities and presence of the other users of water in the basin, including the analyses of possible interactions between the individual users of water may be introduced to impact assessment performed by these tools.

charged. The above enable the analysis of water sup-

2.6. Alternate methods

The new method of industrial water accounting, proposed recently by Schornagel et al. (2012) and successfully applied to analysis of water balance for energy production may be the example of the alternate method to the four presented in UNEP Corporate Water Accounting report. This method assumes application of measurable and classifiable intakes, discharges and losses of water in the technological this method are categorized according to their source, volume, quality, location and time, wastewater discharge by volume, quality, location and time, while water consumption (losses) are defined by volume and quality in the context of a given object location in the production line of the company. The streams of withdrawn water may be assigned to six possible sources: sea, surface water, groundwater, collected storm water, municipal water and off-site wastewater. Their quality may be determined by freely selected physical, chemical and biological parameters. Streams of post-production water (wastewater) discharged to the environment are analyzed basing on meeting the requirements of local standards for tested water basin. The water lost during the production process (evaporation, transpiration, part of a product) is handled in similar way. Thereafter, the measurable and categorized individual streams of water withdrawn, discharge and loss are combined into streams describing the properly grouped technological scheme of production (including chain of supply) in regard to a given energy carrier. Thus, the combination of economic aspect of the company functioning, its technological structure, water supply and wastewater removal, the natural environment (source of water and receiver of discharged wastewater) and risk assessment connected to quantity and quality of water and wastewater is possible. The generic method should be rated as complex, allowing to reflect the industrial connections regarding to a selected energy carrier, various elements of production line and supply chain, localized in different, distant parts of watershed or using various technologies, of varied quantitative and qualitative water demands. The mapping of spatial development of technologically diversified elements of the production line allows introduction of legal limitations of water withdrawal from the ecosystem and sewage removal (water intake costs, environmental charges etc. etc.) to the analyses. Additionally, it is possible to analyze the selection of the individual technologies in relation to their water demand and their qualitative requirements in the aspect of the water sources availability, i.e. location, reserves and quality. In order to illustrate the possible technologies and their spatial development values of water streams are presented for the integrated industrial supply chains, as the range values, mean values of which may be applied to the direct comparisons (Schornagel et al., 2012). This method can be easily adjusted and applied to the freely selected technological chain, not only to the energy production. However, the generic methods excludes application of directly used green water (precipitation or melting water retention in soil) in cropping and food production. Additionally, this method focuses basically, at first, at the water management of the industrial site, the impacts of the facility on the natural environment of the catchment is a secondary goal. The quantitative

and qualitative impacts assessment is possible but the result would be slightly simplified because the emphasis would be placed on the allowable values of pollutants concentrations determined in the requirements for a given watershed instead of the precise analyses of water quantity and quality. Additionally, the generic method of industrial water accounting, as focused on manufacturing demands, excludes the assessments of sustainable development on the social, and partially on economic field.

The basic capabilities of all discussed industrial water accounting methods on the three main fields of the sustainable development are presented in Tab 1.

Conclusions

It was demonstrated in this paper that fresh water, withdrawn from surface of groundwater sources, is one of a basic natural resources required to sustainable functioning and development of the population inhabiting the given watershed. Availability of water of proper quality and in required quantity allows the sustainable biological development of mankind, but also of industry, infrastructure, economy, social life etc. etc. together with sustaining the proper level of natural environment. Similarly, the wastewater discharge to natural environment may create a serious threat on the environmental and in the effect, on the social and economic area according to limitation of available fresh water, required to the proper biological and economic functioning of the society. Thus, water is one of main sustainable development indicators in environmental, social and economic field. The awareness of quantitative and qualitative water balance of the industrial site or investment, its impacts on the environment quality and water resources, economy and life of the watershed population as well as the proper water management combined with risk analysis become the pivotal needs in planning the sustainable strategy of company development. The five most popular complex methods of industrial water accounting in relation to natural water resources of the watershed, its infrastructure, social needs, actual standards and requirements, economic aspect of company and society functioning were presented. Unfortunately not all of the presented methods allow the simultaneous analyses of company functioning in aspects of water resources and water management of both industrial site and watershed on all three fields of the sustainable development - ecological, economic and social. Assessing from the point of view of rule of the sustainable development, the most suitable seems to be the Life Cycle Assessment method, especially modified, because it allows, more or less complex, analyses on all the three fields, environmental, economic and social, including characteristics of water sources, quantitatively and qualitatively described water streams used by the investment or discharged to the environment, environmental impacts (including, after modification, impacts of reduced water resources and effects of changed availability of water or even water deficit on ecosystem functioning), quality of life and health of the population. The LCA method may be assumed as the most developed, complete and complex of the all methods discussed in this paper.

Analyses of sustainable development on all the three levels are also possible when Global Water Tools, Water Sustainability Tool and Water Sustainability Planner are applied, however these analyses may be shallow and simplified. Despite the fact that qualitative environmental impacts analyses include geographical and demographic data they are markedly simplified or, in some cases, even impossible (in case of Water Sustainability Planner excluding quantifiable wastewater quality). Additionally, the social analyses are limited to determination of the range of water stress zone in the watershed. The limited applicability seems to be characteristic for the another methods presented in this paper, the Water Footprint and industrial methods, e.g. generic by Schornagel, which exclude the direct conducting of the social analyses. On the other hand, it is advised to remember that the industrial methods are characterized by the significant specificity, accuracy and precision in quantitative and qualitative quantification of water and wastewater streams in water management of the company and the whole watershed, including sources of water and receivers of sewage and possible changes caused by investment functioning into analyses. These methods are also orientated towards the risk assessment and economic aspects of water management. It is clearly visible that to define strategy of the sustainable development for the industry, on environmental, economic and social level, including also political and legal areas, the simultaneous application of several tools may be necessary.

The alternative for the presented situation may be the development of a new, complex and adjusted to the sustainable development method of water management analysis and industrial water accounting allowing:

- Quantitative and qualitative definition of water sources in the catchment, streams or volume of water withdrawn from the ecosystem, used, consumed and discharged after the technological process as wastewater to the environment;
- Inclusion of spatial development of water sources, elements of production chain, localization and range of the investment and position of wastewater receiver;
- Determination of quantitative and qualitative impacts of the investment on the water management in the basin, water sources and quality of wastewater receivers, including their biodiversity, also in the watershed located downstream the river;
- Identification of potential threats and disturbances of the natural quantitative and qualitative water balance of the watershed;

	Environmental field	Economic field	Social field
Water	Includes the volume of water used	Includes green water helpful in	Excludes possibility to de
Footprint	for production:	irrigation planning:	termine the social impacts
Pootprint	Plue groop and grov water	Allows simplified analyses	of the investment
	- blue, green and gray water,	- Allows simplified analyses –	of the investment.
	- Simplified pollution. Hypothetic	played by water in production	
	mailuted services to volves allowable	played by water in production.	
	by the local requirements:		
	Wide range of application:		
	- while range of application,		
	- Excludes watershed properties and		
	abargo		
Life Cycle	Includes volume and location of we	Allows political and aconomia	Includes imposts of the in
Assess	- Includes volume and location of wa-	- Anows pointical and economic	- includes impacts of the in-
Assess-	Includes environmental impacts of	Helpful in colculating the onvi	and health quality of wa
ment	- Includes environmental impacts of	- Helpful III calculating the envi-	tarshad population
	Wide range of application:	Tonnentai charges.	tersned population.
	- while range of application,		
	- Simplified description of water		
	- Excludes effects of water source		
	pollution or draining on watershed		
	environment		
Global	- Includes water demand and	- Allows only political and eco-	- Allows only to determine
Water	wastewater discharge to the envi-	nomic analyses related to range	the range of social impacts
Tool	ronment and their location:	of investments impacts:	of the investment (e.g.
1001	- Analyses based mainly on geo-	- Allows water related risk man-	range of water deficit)
	graphical data:	agement including the spatial de-	range of water deficit).
	- Simplified qualitative issues	velopment of production chain.	
	- Excludes quantitative and qualita-	veroprient of production ename	
	tive environmental impacts analyses		
	of the investment.		
Water	- Includes water withdrawn and water	- Allows risk management, strate-	- Includes presence of the
Sustaina-	sources assessment, water losses	gic management and strategic	other users of water in the
bility Tool	and sewage discharges;	development planning.	watershed, allows interac-
and	- Allows impacts assessment of the		tion between water con-
Water	investment on the water resources		sumers.
Sustaina-	of basin.		
bility	- Excludes qualitative analyses – no		
Planner	capabilities to quantify the pollu-		
	tants.		
Generic in-	- Precisely defined streams of with-	- Allows risk management in wa-	- Excludes possibility of so-
dustrial	drawn water, its sources and	ter management;	cial analyses.
method	wastewater discharges as well pro-	- May allow the economic deci-	
(Schor-	duction losses.	sion making, or concerning the	
nagel et al.,	- Freely defined quality of analyzed	technical infrastructure and af-	
2012)	water streams by optional physical,	fecting the economy of the com-	
	chemical and biological parameters.	pany.	
	- Simplified environmental analyses		
	(compliance to local requirements).		
1			

Table 1. The basic characteristics of discussed methods of industrial water accounting

- Risk management in water management of the company through selection of hotspots and areas of production chain highly endangered by water stress;
- Strategic planning and economic decision making considering development of the company in relation to its water management and availability of water as a natural resource;
- Determination of range of industrial site impacts on the water management in the watershed;
- Calculation water and environmental charges, identification of reasons and location of streams, processes etc. etc. in the technological line leading to exceeding the allowable by the local requirements concentrations of pollutants in wastewater discharged to the environment;
- Predicting the effects of investment functioning in the given water related conditions on the industrial development of the region, increase of arable areas, decrease of fallow lands etc. etc. directly influencing the economic potential of

the basin and social issues: employment, unemployment, migrations.

- Determination of investment impacts on life quality of population inhabiting the watershed, water availability for municipal demands, quality of water for household, recreation and industrial requirements;
- Predicting the eventual threats for population health consequent on water stress or pollution of water sources;
- Determination of range of water deficit for watershed population caused by the investment functioning, decrease of fresh water availability for household, municipal and industrial purposes of the society.

The method of industrial water accounting meeting the requirements defined above should allow the planning, analyses and inference an environmental, economic and social level according to requirements of the sustainable development.

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Ecological deontology in the context of solving the task of ecologization of modern man thinking

Deontologia ekologiczna w kontekście ekologizacji myślenia współczesnego człowieka

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Abstract

This article is dedicated to ground the philosophical and methodological concept of a new scientific discipline – ecological deontology (ecodeontology). The author considers ecological deontology as one of the means to address global problems of humanity. Thus, timeliness and prospects of ecological deontology in addressing the issues of *greening* of a modern man and society subject to practical activity is shown in the article. Scientific background of ecodeontology, its general principles are outlined, object and subject of the research as well as objectives and tasks of a new scientific discipline are defined.

Key words: sustainable development, ecological deontology, ecological knowledge, transformation of consciousness

Streszczenie

Materiał poświęcony jest uzasadnieniu koncepcji filozoficznej i metodologicznej nowej dyscypliny naukowej – deontologii ekologicznej. Autor rozpatruje deontologię ekologiczną jako jeden ze sposobów rozwiązania problemów globalnych. W artykule wskazuje się na znaczenie i perspektywy deontologii ekologicznej w rozwiązaniu problemów ekologizacji działalności przedmiotowo-praktycznej człowieka współczesnego i społeczeństwa. W artykule charakteryzuje się pochodzenie ekodeontologii, ogólne zasady, obiekt i przedmiot badania, a także cel i zadania tej nowej dyscypliny naukowej.

Słowa kluczowe: zrównoważony rozwój deontologii ekologicznej, wiedza ekologiczna, transformacja świadomości

Introduction

The growing awareness of hazards from ecological and anthropological disasters, which in recent decades have become threatening, stimulated the rethinking of the *Man* – *Nature* correlation. As such, searching for new values and ethical regulations will contribute to its harmonization. Thus, a firm conviction was formed, that the existing, as well as potential environmental problems humanity faced at the turn of 21^{st} century, was the primary evidence of a crisis of the belief system and the thinking paradigm

of a modern man. Unrestrained dehumanization of social relations, valuing anarchy, thirst of consumption, all-absorbing technocracy – this is a partial list of defects of the modern civilization which eventually materialized in the selfish and irrational use of natural resources, the polluting of the environment, the systematic extermination of various forms of life and the reduction in biodiversity.

However, man must face the problematic relationship with the world of nature (environment). It is our belief that – according to the standpoint of global evolutional approach – man is simultaneously a protagonist (an actor) of several independent, but correlated, forms of evolution. It is referred to as biological human evolution (activity aimed at survival in the circumstances of changeable environment), sociocultural evolution (activity aimed at improvement of social environment) and related technological evolution (transformation of the environment - natural and social, as well as a man, using various technologies). In this case, the last two forms of evolution relate to the significant impact on the outside world, and primarily on nature (which is the base for the human existence). Therefore, the three-way conflict between man, nature, and society exists a priori. However, the initiator of the conflict was, and will remain, man. Ukrainian philosopher Anatoliy Yermolenko notices that the contradiction between a man and the nature is ontologically given, which always accompanied with ecological crisis of one kind or another (Yermolenko, 2010, p. 398). Therefore, the relationship between man and nature is considered as a global environmental problem concerning the natural conditions of human and society existence.

Prerequisites for deontological approach

In order to minimize the negative consequences, which have resulted from man's doing, the concept of sustainable development was conceived. Recently, this idea has gained considerable popularity. In our research we used the definition from the fundamental international document – Agenda 21, which was approved at the International Conference on Environment and Development in Rio de Janeiro (Earth Summit, 1992). This document discusses the need for all countries to take collective responsibility for the strengthening and the consolidation relating to interconnected foundations of sustainable development – namely economic and social development, as well as environmental protection at local, national, regional and global levels.

Meanwhile, a twenty-year implementation practice of the Agenda 21 objectives demonstrates the key factor in the realization of sustainable development strategies, that is, values and principles that define the philosophical and ideological frames of society and state development, as well as the individual development of a person. The formation of a thorough and systematic environmental knowledge and environmental responsibility, forms a new environmental philosophy of modern man. Despite several decades of intense debate, there still remains the current task of understanding general planetary character to prove it, it is enough to look through the publications of authors from different countries in recent years (Smith, 2000; Rhodes, 2003; Hardashuk, 2005; Reitan, 2005; Gore, 2006).

We think, that the harmonization of the Man - Na-ture correlation, in practice, includes the development and implementation of new standards for such

a relationship to ensue. Thus, the concept of behavior standard (in contrast to the term behavior model) is understood as something obligatory, unexceptionable, and proper. Meanwhile, a discipline that researches a proper sphere, is denoted by the term deontology (from Greek deon - proper). We are convinced that the real solution to environmental problems requires the deontological approach to solve issues of the Man – Nature correlation, as deontology distinctly defines the system of requirements for human's behavior in a particular sphere of life, as well as identifies their specific implementation. As a result, we consistently defend the idea that the means of greening of society practical activity could become a new discipline, which we define as ecological deontology (Matviychuk, 2006, 2009, 2010). To understand the scientific concept of ecological deontology, it is necessary to specify the term deontological approach. Primarily, it is significant, that categories of appropriate, ideal, universal, normative are fundamental for analyzing social factors (Gaus, 2001). The central subject of the deontological approach consists of problems of an ideal world and norms, as well as their nature and validity as an important factor for moral regulation (Gert, 1988). The concept of procedure is extremely important for deontology, because compliance with certain procedures in deontological theories is the key to having good results. Rational limitation of absolute rights and responsibilities of individuals is also important for the deontological approach. This is caused by a generic link between deontology and moral theory, which poses the question about the correlation between being and existence (Guseinov, 1974). Moreover, contradictory-tense correspondence between the concepts, being and essence, act as some sort of structure for moral consciousness change throughout the history of its development (Drobnytskyi, 1974). Nikolai Berdyayev emphasizes that ethics begins with the opposition of being and essence (Berdyayev, 1902). Thus, the study of deontological issues necessitates uncovering the contents of the concepts essence and being.

We understand the most general idea of essence as ontological and ethically absolute, while being is a combination of various aspects of existence. The crucial point for our study on the concept of ecological deontology is that defined categories reflect significant moral contrast between the actual and morally-valuable positive state of circumstances. Moreover, essence in its axiological status, is something fundamentally higher than being. In other words, essence permeating the whole structure of human activity is intentional, procedural and resultative comparison of actual reality and its value-oriented modification that goes into the long term and is converted by people from the potential into the actual reality (Amelchenko, 2009, p. 81). Taking into consideration the aforementioned, we understand essence as the appeal to a certain ideal (individual or

social), as a special means by which man is directed towards progressive changes (or directed to weal). However, the problem of argumentation of the ideal (or weal), always arises in the moral theory. Yet, in the case of ecological deontology, such ideal (weal) – to a large extend – is the harmony of the *Man* – *Nature* correlation (or, in the most pragmatic terms, a question of the human survival).

Studying the features of deontological traditions and the application of deontological approach, we notice they are closely linked with the history of formation of ethical knowledge. The theoretical argument of deontology (conceptualization of the problem of proper behavior, obligation, its nature and socio-historical specificity) was carried out by representatives of many philosophical and ethical schools, and only in the 19th has it formed into a holistic study. Still, deontological study has formulated its own terminological and conceptual apparatus. The principal concepts for deontology are the concepts of obligation, essence, imperative of behavior, responsibility, sacrifice and practical interest. However, currently, many of these terms are a matter of considerable debate. For example, the question of the initial role of obligation in the ethical theory has not been solved yet, although such solution is of current concern since it determines the possibility of an adequate understanding of the role of holistic and active semantic field of culture in the formation of an individual. Ethicists also note that the ethical requirements and understanding on what actions people need to commit emerge from the notion proper. For a man these requirements are obligations; an aggregate form of general rules formulated by moral precepts, rules, and commandments (Gaus, 2001; Stratton-Lake, 2005). It should be recognized that the regulatory approach is common not only for deontology, but any ethical. Moreover, language, games and laws illustrate the way of action regulation through standards and rules. On this subject, the American philosopher Herbert Hart observed that a lot of groups of common rules, standards and principles are the main way of social life regulation (Hart, 1961).

In reference to the term *deontology*, it should be noted that it was implemented in the scientific field by the English philosopher and lawyer Jeremy Bentham. He introduced the term in the paper, Deontology or Science of Morality, which was published in 1834. Bentham used the term *deontology* to specify the theory of morality as a science of proper individual behavior or morals of in order to achieve a proper purpose - some kind of conduct rules. Today, the term *deontology* has a different meaning. The most common application of this concept is to indicate the direction of the applied or professional field of ethics (e.g., deontological ethics and legal deontology). The American scholar Samuel Freeman points out that in modern moral philosophy, the term deontology is mostly used to refer to moral concepts that explore the issue of obligation (right), the nature of values (weal), and the link between ethical concepts of rights and weal (Freeman, 1994). However, Freeman notes that in addition to the designation of the moral concepts, the notion *deontology* is also used to refer to moral principles or moral rules at all levels of generalization. Another American scholar Gerald House, formulates ten modern ways of understanding the concept of *deontology*:

- 1. as an ethical theory in which the right does not maximize production of the good;
- 2. as an ethical theory admitting considerations of justice;
- 3. as a moral theory that advances absolute moral commands or prohibitions;
- as an ethical theory, such as Prichard's, in which duties and obligations are justified independently of the concept of the good;
- 5. as an ethical theory, such as Gauthier's moral contractualism, in which the concept of the right is not defined in terms of a substantive notion of the good;
- as an ethical theory according to which our values and conceptions of the good presuppose justified moral principles;
- 7. as an ethical theory which holds that we have reasons to respect as well as to promote value;
- 8. as an ethical theory founded on, or giving a large role to, the concept of respect for person;
- 9. as an ethical theory in which gives pride of place to moral rules;
- 10. as an imperatival ethical theory (Gaus, 2001).

It should be noted that Gaus was not studying environmental ethics. His moral theories can be described as *deontological*, though he was not using the term *ecological deontology*.

The diversity of definitions regarding *deontology*, indicates that deontology – as a scientific phenomenon – has not received adequate philosophical and methodological conceptualization. On the other hand, the appeal of the theory of proper is caused by the need to search for effective forms which could contribute to various philosophical ideas and concepts in the area of practice. The research carried out on deontological theories suggests formulation of following thesis:

- 1. The original meaning of deontology is that a moral proper action is determined by a subject of an action and its notions of morality;
- 2. The source of deontological requirements can be both a subject of an action and an object of an action – another person (here the key notion for us is the concept of *another* because this *another* can be Nature as a complex of various forms of life);
- 3. Deontological conceptions generally focus on an action as the implementation of the rights or responsibilities, the compliance

with rules and regulations or achievement of moral goals – all of which are actions – makes deontology potentially practical.

The mentioned points are another argument in favor of our interest in deontology.

It is worth to mention, that in the past decade new types of professional ethics began to appear in the scientific literature: deontology of journalism, deontology of education, deontology of management, deontology of economics, political deontology and others. We believe the increasing interest of researchers from different scientific fields to deontology is caused by:

- the need for a transition from general considerations on the change of ideological beliefs and values of modern man (which, obviously, are largely caused by current global crisis), to setting effective schemes of mechanisms' activation for the formation of new, more humanistic (in particular environmental),
- awareness and appropriate style of thinking and behavior in the modern world.

On the other hand, appeal to the deontological approach generally corresponds to a trend typical for the modern ethics – its practical character and transformation into a legal regulative mechanism. We think it can be explained in two ways:

- it can be caused by excessive pragmatism and utilitarianism common for our contemporaries (including the knowledge of philosophy);
- on the other hand a modern man faces a number of very specific problems in which the solution involves deep philosophical conceptualization (e.g., within ethical knowledge) and simultaneously requires immediate actions to resolve these problems or minimize their negative effects. As a result, deontological theory is increasingly perceived as relevant tools in solving these issues.

Ecological Deontology and its Conceptual Characteristics

We consider ecological deontology as a theoretical science and an academic discipline that is defined by a system of special knowledge (ecodeontological) in regards to the effects of human activities on nature and a system of principles, requirements and norms of proper, environmentally oriented subject-practical or social (including professional) activity. Therefore, ecological deontology serves not just to fix the gap between proper (from an environmental point of view) and real life of man, but aims to search for values and moral standards that will eventually be reflected in formal and informal requirements and directives of psychological, ethical, legal, political and economic nature. Compliance with these requirements and their implementation in everyday life and professional activity will overcome the disharmony in the Man-Nature correlation.

We believe ecological deontology as a philosophical discipline will facilitate the rational and critical response to emergencies, which are accompanied by various problems that threaten human spirituality as well as human physicality. At the same time, the norms of ecodeontological morality pave the way for the creation of new strategies for human existence and progress which do not disturb harmony with nature. This harmonious message of ecological deontology is correlated with the paradigm of common world that was developed by German philosopher K.Mayer-Abikh (Meyer-Abikh, 2004). According to it, man is a part of nature, and culture is a human contribution to the history of nature. The philosopher believes even though a man diversifies and enriches the world of nature and holds a special place therein, but he cannot go beyond it. Thus, a person must withdraw from anthropocentrism which interprets nature as an environment in favor of nature centrism with a leading idea of a common world.

The common world according to its definition, requires common rules and implies a formation of the corresponding deontological space. If we discuss the space, expressed by the *Man – Nature* correlation, that is, we have the right to talk about the rules and norms of this coexistence – how it should be from an ecological point of view. Otherwise, we should talk about the ecological deontological space, and this, in our opinion, forms the true understanding of ecological deontology. The absence or nonfulfillment of such rules – in other words, neglecting of ecodeontological requirements – questions the possibility of harmony between man, society and nature.

In the context of revealing the philosophical and methodological concept of ecological deontology, we must emphasize that the object of study is the system expressed by the *Man – Nature* correlation; that is, the practice and specificity of human activity in nature, which is to meet basic human and societal needs. In this case, ecological deontology, in our opinion, should answer the following questions: What should be the content of such practice? What means, techniques and methods should it use to meet the needs of people with minimal environmental damage and, therefore, the life of a man? How should effective and reasonable conditions of such practice be created? What should a man of the 21st be like to overcome critical phenomena of our time? What personal qualities must such a man possess and what standards and rules of conduct be guided?

These issues are of fundamental significance for defining the subject of ecological deontology. Since the object of any science revealing different aspects of the research object determines its systematic content, we believe that the *subject* of ecological deontology covers the following points:

- 1. The problem of balance and correlation of proper and existing in human life;
- 2. Research of the content of actual consciousness of a modern man, which includes visual embod-

iment (in a form and content) of values, knowledge, skills, abilities, needs, interests etc.;

- 3. Development and codification of rules, requirements and standards of proper behavior in human life;
- 4. The study of the diversity of ecological relationships and actual human behavior, nature and methods of human activities as well as development of recommendations for their improvement;
- 5. Studying environmental expectations of different social groups and demands they put forward to the result of human activity practices as well as searching for ways of compliance of actual activity and human behavior in the nature to the defined environmental expectations;
- Studying the possibility of universal system development of environmental requirements of human behavior as well as the development and formation of a motivation system and encouraging man to proper behavior from an environmental point of view in the *Man Nature* system;
- Studying and summarizing the experience of environmental organizations (governmental and non-governmental) of leading world countries to create prerequisites and organize environmentally motivated human behavior;
- 8. Development of a reasonable, ecological and moral point of view, system of requirements, norms and rules of human behavior in the modern world (primarily, in the world of nature).

Thus, ecological deontology aims to summarize the ecological system of human knowledge and provide it with the tools necessary to create environmentally defined principles, standards and rules which a man should guide in his object-practical activity, and a social sphere for the spiritual process of self-creation. In this case, the applicable objective of ecological deontology standards should be a person, society or individual professional groups involved in the practical aspects of implementation of the *Man* – *Nature* correlation that eventually will contribute to of the moral and ecological motivation of human activity.

Conclusion

After reading the above stated, a critically minded reader will question, why the author did not focus on current environmental and ethical concepts in the problem solution of ecologization consciousness of modern man and society. Why not use the achievements of environmental ethics as a moral foundation to address modern global challenges? Why does necessity of ecological deontology eventually occur? To answer these questions:

First, we note that heuristic and methodological potencies of ecological deontology are determined by its generic relation to ecological and ethical knowledge, spheres that in modern science nowadays have definitely particular status.

Secondly, we consider ecological deontology as a special area of research for combining two method-ological approaches:

- *substantial*, applied in environmental knowledge, when the nature of environmental problems are determined on the basis of knowledge on what it should be and fixing of what it is in the environment;
- *functional*, that is characteristic of ethical knowledge and helps to understand what needs to be done to restore harmony in the *Man Na*-*ture* correlation.

Ecological deontology, due to its integrative nature, creates opportunities for combining defined approaches, directs theoretical works on greening the consciousness of our contemporary into practice, and gives valuable and imperative prominence to environmental knowledge and ethical considerations that ensures compliance with environmental liability of a person.

It is worth to remembering, that ecological knowledge itself, as any natural knowledge, leaves no space for human subjectivity: here we are interested in an investigation of the truth, in particular, studying of environmental laws, as well as the possible consequences of their violation. However, understanding the admissibility of such violations, or more globally, the possibility of human interference in the nature and its laws, directs our considerations on an ethical level, and construction and conclusions we can make here will always be subjective and outlast other values and ethical beliefs we share. Thus, there is a need for a scientific discipline, which basing on environmental and ethical knowledge can formulate principles, requirements and regulations of the highest possible subject-positive human activities (narrower, a representative of particular profession). On the other hand, ecological deontology may be considered as a practical attempt to minimize the threats and risks of modern civilization, which are connected with its independence of the value-normative structures rapid dynamic of its development.

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The concept of corporate social responsibility and sustainable development

Koncepcja zrównoważonego rozwoju a koncepcja społecznej odpowiedzialności biznesu

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Abstract

This article aims to analyse the key assumptions of corporate social responsibility (CSR). Furthermore it discusses issues related to its practical implementation and its role in the realisation of sustainable development. The article adopts the theory that although the concept of corporate social responsibility is based on different theoretical grounds to that of the concept of sustainable development, they have a commonality and their key objective is to undertake actions to improve the quality of life for people on a global scale.

Key words: Corporate Social Responsibility, sustainable development

Streszczenie

Prezentowany artykuł ma na celu analizę kluczowych założeń koncepcji zrównoważonego rozwoju oraz koncepcji społecznej odpowiedzialności biznesu. Ponadto poruszone zostaną zagadnienia związane z praktycznym zastosowaniem obu koncepcji. W artykule przyjęto tezę, że obie koncepcje, choć bazują na odrębnych podstawach teoretycznych, posiadają cechy wspólne a ich kluczowym celem jest podejmowanie działań na rzecz poprawy jakości życia ludzi w wymiarze globalnym.

Słowa kluczowe: społeczna odpowiedzialność biznesu, rozwój zrównoważony

Introduction

Analysing the international community's declarations (issued frequently) and actions (rarely undertaken) agreed upon during the Earth Summits organised by the United Nations, it can be concluded that we are dealing with the formation and attempted realisation of a new concept of development of the human race - the concept of sustainable development. It is to be a development, which, on the one hand, satisfies the needs of the today's living, whilst on the other hand, does not restrict the ability to meet the needs of future generations. For such a development to be realised, it is necessary to integrate three areas: environmental, social and economic, in order to improve the quality of life of human society on a global scale. In turn, for human civilisation to develop in a sustainable way, it is very important for business, as

understood in a broad sense, being a major player today in the international arena, to operate in accordance with the concept of *sustainable development*. To apply this concept in practice, a business must make axiological changes. The current business objective to maximise profit, must be replaced by an objective which takes into account environmental and social issues. The attempt to shift business in new directions of thought and action is the concept of *Corporate Social Responsibility* (CSR).

The origins and development of the concept of Corporate Social Responsibility

Corporate social responsibility (CSR) is a concept which for several decades has gained increasing interest over the world. In management theory, CSR nowadays is understood as *a modern instrument to* build company values and its competitive advantage (Pańków et al., 2010). Some even believe, that this is one of the most dynamic, complex and challenging issues that currently face business leaders (Gustafson, 2007). The growing importance of CSR results from the fact that today the level of demand required from firms is rising. Currently, companies are seen as important entities forming part of the reality that surrounds us and often shape it. Not only the delivery of needed goods and services are expected from the business world, but also that it will be involved in solving complex social problems (Adamczyk, 2009). An increased interest in CSR, noticeable in recent years, is the result of the following events (Rok, 2004; Baron, 2008; Adamczyk, 2009; Elfenbein and McManus, 2010):

- 1. Growing public expectations in relation to businesses due to the inability of state institutions to provide basic social and welfare needs as well as environmental protection.
- 2. Progressive globalisation of the economy, in which product homogeneity means that the brand name becomes more important than the product, hence the tendency to build competitive advantage based on the company's social sensitivity.
- Growing expectations of operational transparency and improving the credibility of companies.
- 4. Tendency of consumers, for whom a company's social responsibility is an important consideration when making purchasing decisions, to pay a higher price for products from those companies operating in accordance with CSR.
- 5. The non-acceptance of aggressive marketing and exploring new ways of competing based on trust.
- 6. Tendency of employees to be more effective and more willing to work in socially responsible companies, which translates into increased productivity, and lower levels of staff turnover.
- 7. An increase in investor confidence towards CSR. Investors are increasingly turning their attention not only to the financial performance of companies, but also to their strategies with respect to stakeholders, assuming that maintaining good relations with stakeholders is one of the guarantees of permanent and long-term growth of the company.
- 8. Increasing social activity and a growth in the professionalism of Non-Government Organisations (NGO). On the one hand, NGOs are increasingly able to be a responsible and demanding partner for business, whilst on the other they are becoming increasingly better at acting against unfair practices in business.
- 9. The evolution of the relationship between business and NGOs from a *paternalistic* philanthropy to a partnership. NGOs have ceased being only a *recipient of help* and have become a

broker allowing companies to engage in longterm social programs which are beneficial for all stakeholders.

10. The progression of the alter-globalisation movements. A fall in trust towards big transnational companies suspected of unfair business practices and non-compliance with international standards such as human rights or environmental standards, particularly in developing countries, forces companies into *good behaviour*.

It is worth considering the origins of CSR and its main assumptions. In what sort of views, publications or documents, do we find the foundations of CSR?

In his search for the publication, to which the first attempts at formulating CSR can be traced, W. Kaczocha draws our attention to the book The Gospel of Wealth by Andrew Carnegie, published in 1899 (Kaczocha, 2009). On the basis of the Christian theological principle of trustworthiness and Christian virtue of mercy, Carnegie accepted the ethical principle of beneficence as a justification for the proposed concept of business responsibility, In a nutshell, every wealthy person (including the businessman and manager), after satisfying his own needs, should freely fulfil his moral and material obligation to provide charitable assistance (i.e. without interest) to other people or institutions whose activities are designed to implement widely understood social objectives. W. Kaczocha proposed to supplement Carnegie's approach to CSR with the principle of usability of manufactured goods produced by business. Here usability is understood to be the manufacture of such products, which should serve the health of every consumer. Kaczocha states that only companies who voluntarily implement the above three CSR principles act in accordance with the spirit of Carnegie's ethical idea (Kaczocha, 2009).

Further analysis on the origins and development of CSR shows, that at the root of the modern view and understanding lies the philosophical idea of responsibility, born in the early 20th century. This idea assumes that man's responsibility for his actions is a logical consequence of assigning him freedom. If we transfer this philosophical assumption into the realities of the business world, it must be accepted that businessmen taking advantage of the freedom of choice in the economy must take responsibility for their decisions and actions (Filek, 2006). According to J. McGuire companies not only bear economic and legal responsibility, typical for them, but also a responsibility to society as a whole (Rybak, 2004).

Business ethics understood as *the body of knowledge* concerning the moral dimensions of economic activity, which is a set of legitimate moral standards for deciding what in business is morally right and what is not (Gasparski, 2012) also contributed to the development of CSR. When considering the birth of business ethics, Pope Benedict XIV's encyclical Vix pervenit from 1745 can be acknowledged to be its symbolic beginning, in which usury, or lending money at interest, is strongly condemned (Benedict XIV, 1745). However, in the literature one can also point to events such as the proclamation of Pope Leo XIII's encyclical Rerum Novarum in 1891 which widely addresses social issues (Leo XIII, 1891) or the publication in 1926 in the U.S. the book The Fundamentals of Business Ethics in which E.W. Lord, a professor at Boston University, presented the basic moral principles of the then business (Lord, 1926). During the 1960s business ethics flourished, and contributed to the change in the perception of economic activities carried out by businessmen. More attention began to be paid to whether businessmen, undertaking activities to generate profits, comply with the rules of ethics.

In turn, H.R. Bowen is considered to be the originator of the first CSR definition. In 1953 he published his book entitled *Social Responsibilities of the Businessman* in which he first used the term *social responsibility*, defining it as *the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society* (Bowen, 1953). Since then, many new CSR definitions have appeared in the literature. Table 1 shows some of them taken mainly from Polish literature on the subject.

Looking at the above definitions it can be said that some of them emphasise the strategic approach to CSR¹. This is a very important assumption, since, as M.E. Porter and M. R. Kramer put it, currently among businesses, such an approach to CSR prevails, which is inconsistent with their strategies, which means that actions undertaken in the field of social responsibility do not produce a significant social impact, nor guarantee the company long-term benefits in terms of an improved competitive position. Porter and Kramer believe that the company preparing its program of work should seek such a solution from CSR which will give the opportunity to simultaneously achieve social and economic benefits. Such an approach is perceived as a strategic approach to CSR, which involves focusing on undertaking a few initiatives which bring distinctive social and economic benefits for the company. The strategic CSR consists of introducing innovative solutions within the value chain and to respond to the social determinants of competitiveness through strategic philanthropy (Porter and Kramer, 2007).

One can risk theorising that only a strategic approach to CSR gives the possibility of obtaining mutual benefit for the businesses and their stakeholders Wołczek, 2010). CSR should be the foundation on (which the company bases all its activities. ConseTable 1. CSR Definitions. Source: author's own version based on: (Klimczak, 2002; Rok, 2004; Griffin, 2005; Korpus, 2006; Adamczyk, 2009; Gasiński and Piskalski, 2009; odpowiedzialnybiznes.pl (25.03.2013).

Author/	Definition
year	
B. Klimczak	Corporate Social Responsibility is
(2002)	the responsibility for the conse-
	quences of actions against third par-
	ties.
B. Rok	Responsible business is a strategic
(2004)	and long-term approach, based on
	the principles of social dialogue and
	all.
R.W. Griffin	Social responsibility is an organisa-
(2005)	tion's set of obligations to protect
	and strengthen the social context in
	which it operates.
J. Korpus	Corporate social responsibility is an
(2006)	effective management strategy, an
	innovative way to build a competi-
	tive advantage in the market.
J. Adamczyk	The social responsibility strategy is
(2009)	complex, formulated and pro-
	grammed actions, including not
	stakeholders such as sustemers
	stakenoiders, such as customers,
	ners but also with social organisa-
	tions the media authorities local
	and global communities.
T. Gasiński.	CSR is an anticipatory approach to
G. Piskalski	running a business involving the in-
(2009)	tegrated management of economic,
, , ,	social, environmental and ethical is-
	sues, in accordance with the objec-
	tives of sustainable development.
Responsible	CSR is the responsibility of com-
Busines Fo-	panies for their impact on society.
rum	It is:
	1. A management strategy, which
	allows to minimise the risks and
	maximise the probability of com-
	2. The shility to conduct husiness
	2. The ability to conduct business
	nositive contribution to society
	while at the same time minimising
	the negative effects of actions
	3. The way the company treats its
	stakeholders: customers and busi-
	ness partners, employees, the local
	community on a daily basis.

quently CSR is somewhat primary, compared to the strategy, which means that the business wishing to be proud of being known as a socially responsible organisation cannot in its strategy include or accept actions contrary to this concept (Wołczek, 2011).

¹Such an approach is also characterised by the definition of CSR proposed by the author of this article, which reads: *Corporate social responsibility is a philosophy of doing business, having a strategic, anticipatory and comprehen*-

sive approach to the management of the enterprise, designed to search for solutions which give the ability to meet the needs of both the company and its key stakeholders (Wołczek, 2011).

When considering CSR development one cannot forget about the important events, documents or actions that have contributed to its global promotion.

One such document, the so-called Davos Manifesto was adopted in 1973 by the Third European Management symposium. The manifesto states that the company should act as a servant in relation to its stakeholders, its profits should be considered as a necessary means of meeting this service function and not as a final objective (Steinmann, Schreyögg, 2001). J. Filek believes that the Davos Manifesto can be viewed as an initial step to awareness by participants of economic life taking on their responsibility (Filek, 2013). The position adopted in Davos, Switzerland, quite strongly weakened Friedman's theory, who affirmed that business is responsible only for the economy of its actions (Drucker, 1999). It is worth referring to a radical criticism here of the CSR concept as presented by Friedman. The author presented an extremely individualistic anthropological stance believing that man as an autonomous entity is not responsible for the fate of others. This assumption in turn implies that the sole aim of the company is to look after the interests of its shareholders by maximising the profits generated during the course of business (Friedman, 1962). Friedman believed that CSR promotes socialism, since it accepts that business has a social conscience, which imposes a duty to take measures aimed at the common good, such as taking care of the natural environment. However, according to Friedman, only individuals can have commitments, whereas the company's only obligation is to guarantee profit for its shareholders (Friedman, 1997). Friedman's claims can be polemicized. The practice of economic life really shows that increasing profits and value for the shareholders in the long term is essential to the functioning of any business. However, this does not mean that the company is not responsible for how the profit is generated. Moreover, K. Davis and R. Blomstrom write that management should make decisions that not only contribute to maximising their profits, but also for the protection and growth of social welfare (Davis and Blomstrom, 1975).

Another important document in the history of CSR is the *Principles for Business* published in 1994 by the Caux Round Table (CRT). That year European, US and Japanese representatives from the business world met in the Swiss village of Caux, The principles presented in the document are rooted in two ideals: the Japanese concept of *kyosei* and the European concept of human dignity. The concept of *kyosei* means living and working together for the common good, enabling cooperation and mutual prosperity to coexist with healthy and fair competition. However, the concept of *human dignity* refers to the sacredness of each person, understood as an end in itself, and not as a means to the fulfilment of others' purposes or even majority prescription (*Principles for Busi*-

ness). In the published document a vision of an economy is proposed, based on seven key principles: (1) migration away from responsibility only to shareholders towards responsibility to stakeholders, (2) the contribution of business to economic and social development not only in countries in which it operates, but also to the global community, (3 and 4) exceeding the accepted mandatory rules of law in the spirit of mutual trust when conducting business, (5) support for the multilateral trading system (6) respect for the natural environment and promoting sustainable development and (7) avoiding illegal activities. In J. Filek's opinion, in the CRT document the idea of service to has been replaced by the idea of responsibility for, and the published principles were to be the foundation for the development of friendship and cooperation based on mutual respect for the highest moral values, were to also have contributed to the expansion of responsibilities of individuals and companies (responsibility not only for undertaking actions, but also for the future of society) (Filek, 2013).

Another important event in the development of CSR on a global scale was the Global Compact Initiative, presented by Kofi Annan (United Nations Secretary General) in 1999, which encourages businesses to support, adopt and implement, in all spheres of activity, ten fundamental principles of human rights, labour standards, environmental protection and anticorruption. These principles are (*Global Compact*):

- A. Human Rights:
 - 1. Businesses should support and respect the protection of internationally proclaimed human rights.
 - 2. Businesses should make sure they are not complicit in human rights abuses.
- B. Labour:
 - Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining.
 - 4. Businesses should uphold the elimination of all forms of forced and compulsory labour.
 - 5. Businesses should uphold the effective abolition of child labour.
 - 6. Businesses should uphold the elimination of discrimination in respect of employment and occupation.
- C. Environment:
 - 7. Businesses should support a precautionary approach to environmental challenges.
 - 8. Businesses should undertake initiatives to promote greater environmental responsibility.
 - 9. Businesses should encourage the development and diffusion of environmentally friendly technologies.

D. Anti-Corruption:

10. Businesses should work against corruption in all its forms, including extortion and bribery.

The Global Compact Initiative can be considered as an event which constituted the basic principles of CSR that are universal. Irrespective of which corner of the world a company conducts its business, in order to claim to be socially responsible, it should recognise the above ten principles.

Another important CSR document is the European Commission's Green Paper. Promoting a European framework for Corporate Social Responsibility published in July 2001. In this document, the Commission states that corporate social responsibility is essentially a concept whereby companies decide voluntarily to contribute to a better society and a cleaner environment. (...) a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. Being socially responsible means not only fulfilling legal expectations, but also going beyond compliance and investing 'more' into human capital, the environment and the relations with stakeholders (Green Paper, 2001).

When summarising the issues relating to the origins and development of CSR, its basic assumptions should be codified. It can be argued that CSR is embedded in the ethical principle of Carnegie's beneficence and philosophical idea of responsibility, which in the early 20th century acquired new meanings. In turn, business ethics made an important contribution to its development. The very concept implies a company's voluntary commitment to take actions which, generally speaking, bring benefit of all stakeholders. In order for such actions to be effective they must be strategic and long-term. To this end, a company conducting its business must skilfully manage economic, social and environmental issues. It must also remember that although profit is essential for smooth functioning in the long term, it should not be the company's ultimate goal, but only the means of providing an opportunity to implement measures beneficial for its stakeholders.

Corporate Social Responsibility Models

In analysing CSR issues it is worth considering what we really mean by socially responsible actions, what the levels of responsibility are and what attitudes companies adopt in relation to CSR. Some CSR models may help to answer these questions.

One can find various CSR models in the literature on the subject. One of the most well-known is A.B. Carroll's CSR pyramid model (Figure 1).

An analysis of the pyramid shows that Archie Carroll distinguishes four types of CSR: economic, legal, ethical and philanthropic. There are different expectations from society to the different types of corporate responsibility and society requires from business above all economic and legal responsibility. Furthermore, society expects ethical responsibility and considers philanthropic responsibility to be desirable. In Archie Carroll's model, at the base of the CSR pyramid is economic responsibility, which is the foundation for all other types of responsibility. One level up is the legal responsibility, since it is expected that companies seeking to generate profits, will obey the law. The next level up is ethical responsibility, linked to the company's moral behaviour with respect to all of its stakeholders. At the summit of the pyramid Archie Carroll placed philanthropic responsibility, in the form of allocating a percentage of a company's resources for the benefit of society in order to improve its quality of life.

In turn, according to Filek we can distinguish the different types, stages and levels of responsibility. With regard to the types of responsibilities Filek distinguishes *negative responsibility (restrictive), predominantly past-orientated and taking into consideration some harm done, and positive responsibility, predominantly future-orientated and taking into consideration some, dependent on the entity, good*



Figure 1. A.B. Carroll's CSR pyramid model. Source: author's own work based on: A.B. Carroll, 1991, 2009.

(Filek, 2006). In addition, she distinguishes three stages leading to full corporate responsibility:

- Stage 1 the business becomes aware of its responsibility.
- Stage 2 the business feels responsible for its actions.
- Stage 3 the business takes responsibility for the consequences of its activities.

However, when analysing the motives for the company taking responsibility, Filek distinguishes three types of responsibility:

- imposed, to which businesses acknowledge the responsibility, only because of the law,
- forced, to which businesses acknowledge the responsibility due to strong pressures from the consumers, society and other organisations,
- voluntary, which the businessmen adopt due to their awareness of their role in society (Filek, 2006).

Based on the above considerations, Filek distinguishes six stages of CSR development in the economic area (Table 2). Analysing the data in Table 2, it is clear that the social responsibility of business, treated as voluntary and aware of the company's commitment to activities designed to benefit its stakeholders, can only really be discussed from the fourth stage in Filek's typology. The presented stages do not mean that every company starts from zero on the responsibility scale. In fact, we will find businesses (and they are probably in the majority) that are in the early stages (up to the third inclusive), as well as those which are in the advanced stages of responsibility. Some of them arduously reached the fifth stage, whilst others at the point of starting business decisively opted for operating on the basis of advanced CSR (e.g. companies like Innocent Drinks or Toms)².

In turn, R.W. Griffin taking the degree of social responsibility as a criterion identifies four company stances towards CSR: obstructionist, defensive, accommodative and proactive (Figure 2).

The obstructionist stance is an approach by business towards social responsibility, whereby it does as little as possible, to solve social or environmental issues. An entity which adopts this stance usually pays little attention to ethical behaviour and is generally prepared to do much to hide any irregularities.

A defensive stance is characterised by the fact that the business does everything required by law, and nothing else. An entity adopting this stance will not take unethical actions, and generally is willing to admit to mistakes and take appropriate corrective actions. Table 2. Stages in building a business's social responsibility. Source: J. Filek, 2006, p. 8.

1	ility. Source: J. Filek, 2006, p. 8.						
	CSR Stages	Types of Re- sponsibility	Levels of Re- sponsibility				
	Introductory Stage (pre-le- gal and pre- ethical)	Avoiding le- gal responsi- bility	Lack of aware- ness of any re- sponsibility				
	Stage 1 (legal) compliance with the appli- cable laws	Negative re- sponsibility (restrictive) (for what has happened or could happen)	Responsibility imposed by law – the business becomes aware of the validity of responsibility for illegal activities				
	Stage 2 (ethi- cal) fair behav- iour, based on the common compliance with the law, duly taking into considera- tion the cus- tomers' and employees' rights	Negative re- sponsibility (restrictive) (for what has happened or could happen)	Responsibility imposed by law – the business is committed to le- gal responsibility				
	Stage 3 (be- ginnings of CSR) develop- ment of appro- priate relation- ships with all stakeholder groups and at- tempts to bal- ance their con- flicting inter- ests	Mixed re- sponsibility restrictive re- sponsibility with elements of positive re- sponsibility	Responsibility forced on by so- ciety – the busi- ness is commit- ted to imple- menting the ex- pectations of the employees and consumers, who have legal pro- tection, but also takes into ac- count those ex- pectations that have strong so- cial support				
	Stage 4 (de- veloped CSR) social commit- ment, involv- ing the devel- opment of so- cial relation- ships, care about sustaina- ble develop- ment	Positive re- sponsibility considering the good that a company can do	Awareness of responsibility – the business con- sciously includes certain social ob- jectives into its activities				
	Stage 5 (ad- vanced CSR) commitment to improve the lives of all so- ciety members	Positive re- sponsibility considering the good that a company can do	Voluntary re- sponsibility – the business knowingly and willingly under- takes social re- sponsibility thus contributing to improving the quality of life				

² More information, regarding advanced CSR for these companies, can be found on their websites: http://www.in-nocentdrinks.co.uk/; http://www.toms.com/.



Figure 2. Approaches to Corporate Social Responsibility. Source: (Griffin, 2005, p. 123).



Figure 3. Reports prepared in accordance with GRI guidelines for the years 1999-2010. Source: (GRI, 2010, p. 2).

In turn, an accommodative stance is one where a company fulfils its basic legal and ethical obligations, and in selected cases, does a lot more than is apparent from its responsibilities. It adds environmental protection and actions for its other stakeholders to its objectives.

However, the proactive stance is an approach to social responsibility which is dependent on the business seeing itself as a citizen in the community and actively seeks opportunities to improve general social welfare.

It should be recognised that a business's mindful and voluntary responsibility begins when it adopts at least the accommodative stance.

From the analysis of the above CSR models it can be concluded that *true* CSR begins when the business realises how important a role it plays for its stakeholders and voluntarily begins to integrate objectives into its business, the implementation of which will contribute to meeting, at least partially, the requirements reported by them. In this process, it will always act ethically. It is not difficult to conclude that the vast majority of modern businesses are far from this ideal.

The reality of corporate social responsibility

Reflecting on the reality of CSR one should analyse how the concept is realised in the economic environment. This is linked with the response to the question of how many companies follow CSR principles. The answer to such a basic question will not be easy. The main difficulty stems from the fact that we know practically nothing about the nature of the majority of company activities (in terms of how appropriate they are). However, there is a certain solution that can shed some light on the question of the reality of CSR. Relating to CSR there is the question of informing stakeholders about the business activities carried out and the impact on the wider environment. One way to provide information about how the company complies with CSR is to create and publish public reports³. To facilitate the assessment and allow for the comparison of the level of responsibility in the different companies various international organisations (e.g. Global Reporting Initiative, Accountability, and International Organisation for Standardisation) try to develop a common framework for CSR reporting. Currently, the most commonly used CSR reporting standards by companies is considered to be GRI's Sustainability Reporting

³ Social reports are also known as CSR reports, Sustainability reports or Social responsibility reports.

Guidelines developed by *Global Reporting Initiative* (*KPMG International*).

From the data published by CorporateRegister.com it turns out that the number of companies publishing CSR reports is rapidly rising. In 1998 less than 500 companies published this type of document but by 2011 this had risen to almost 6,000 businesses. It is evident that over nearly 15 years the number of companies reporting increased almost twelvefold (EIU, 2010; Global trends ...; 2012 Global Winners, 2013). Moreover, from the information provided by Global Reporting Initiative, it turns out that for more than a decade the number of companies publishing social reports, created on the basis of uniform reporting standards, is systematically rising. Figure 3 shows that in 2010 the number of organisations registering their reports in GRI's database exceeded 1800, an increase of 22% compared with 2009, and more than a forty-fold increase compared to 2000! (GRI, 2011). A confirmation of these trends are the results of a study carried out by KPMG of the 250 largest companies in the world (selected from the Fortune 500 companies list). In 2011, 95% of them published social reports. For comparison, in 2008 it was about 80%, and in 2005 about 50% (KPMG, 2013).

From the above data it is clear that CSR increasingly emphasises its presence in the economic reality. One can even argue quite confidently that in the not too distant future it will be impossible to do long-term business without adopting a socially responsible stance. To help businesses adopt such a stance the International Organisation for Standardisation (ISO) published the ISO 26000 Guidance on Social Responsibility standard in November 2010. It provides guidance to encourage companies and other organisations to such actions which contribute to sustainable development, taking into account the expectations of stakeholders, comply with the applicable laws, and which are implemented into their activities (ISO 26000). It seems, therefore, that those companies that do not take CSR into account in their strategies, not only will fail to achieve sustainable competitive advantage, but will also condemn themselves into marginal positions in areas they operate (Wołczek, 2011a).

Conclusions

R. Janikowski believes that *sustainable development is now a fundamental category of civilization* (Janikowski, 2007). One must bear in mind that the correctness of the assumption about the reality of sustainable development is still an open question and under discussion (Hull, 2008). This is because the main difficulty in implementing sustainable development lies in the fact that to realise its lofty objectives most of the global community needs to be convinced. This, in turn, requires an axiological change – humanity must realise that its subsequent development is dependent on changes in hierarchical values. There must be a shift from short-sighted thinking on the basis of counts here and now to a strategic, longterm, responsible thinking on the basis of our actions have a material impact on the future state of the Earth and the possibility of survival of our (and other) species. Is such a transformation possible? The key to realising sustainable development is the transition from the conceptual phase to the implementation phase, in which at least the majority, if not the whole, of the global community will take part. G. According to A. Pawlowski a true revolution must take place on a personal level (Pawłowski, 2008). Everybody must realise that his daily choices have an impact on the implementation (or not) of sustainable development. That is why it is so important for modern man to be more aware when undertaking his own individual decisions.

With reference to the economic sphere, it should be stated that the business world is trying to carry out the above-mentioned change based on CSR. Some believe that CSR is a business response to the challenges posed by sustainable development (Gasiński and Piskalski, 2009). One can also frequently come across current opinions that the implementation of sustainable development at the corporate level is realised through the implementation of CSR principles (Mazur-Wierzbicka, 2012). The growing role of CSR in implementing sustainable development was also noted during the last Earth Summit held in Rio de Janeiro in 2012. The final conference report clearly underlines the importance of CSR, calling on businessmen to develop responsible business practices (Jaszewska, 2013). However, the businessmen themselves are increasingly willing to integrate sustainable development issues into their strategies. Evidence of this comes from the fact that 62% of 378 companies from around the world, surveyed by KPMG in 2010, had a sustainable development strategy (Corporate Sustainability). The growing importance of sustainable development in the functioning of companies may also be due to the fact that in 2010, 96% of CEOs whose company had joined the UN Global Compact Initiative, said that sustainable development issues should be fully integrated into the strategy and operations of the company (for comparison, in 2007 such an answer was provided by 72% of those surveyed) (UN, 2010).

Companies who voluntarily integrate social and environmental objectives into their strategies, being guided by an awareness of unforced responsibility for their actions contribute to improving the lives of modern societies. At the same time CSR contributes to the implementation of sustainable development. It is so important that if it comes to discouraging *sustainable development* in the international arena, its fate will rest with the individual decisions made by us, individual countries or representatives from the business world and then the role of CSR in the implementation of a new concept in human development will increase even more.

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Technological development of wind energy and compliance with the requirements for sustainable development

Postęp technologiczny energetyki wiatrowej a spełnienie wymagań zrównoważonego rozwoju

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Abstract

This article raises the issue of sustainable development in the context of technological advances in wind power. The authors focus mainly on identifying the risks which are inherent in the development of wind power and on the search for the answer to whether technological progress is conducive to reducing these risks. The evaluation of the impact of this progress is assessed in terms of: electric generator solutions, operational reliability, cost-effectiveness, site selection and optimal matching of generators to the environmental conditions. The community category is an additional non-technological category which is a deciding factor in democratic countries during investment decisions. The authors analysed a number of factors in this category, and concluded that only a responsible policy of providing information, fair treatment of the local community and a clearly defined distribution of profits contribute to long-term positive shaping of social attitudes.

Key words: sustainable development, wind energy, negative impact of wind turbines, wind power plant, localization of wind turbines, social factors of development

Streszczenie

Prezentowany artykuł porusza problematykę zrównoważonego rozwoju w kontekście postępu technologicznego elektrowni wiatrowych. Główna uwaga autorów skupiona jest na określeniu zagrożeń jakie niesie za sobą rozwój energetyki wiatrowej oraz na poszukiwaniu odpowiedzi, czy postęp technologiczny sprzyja ograniczeniu tych zagrożeń. Ocena wpływu tego postępu badana jest w kategoriach: rozwiązań generatorów elektrycznych, nieza-wodności pracy, opłacalności ekonomicznej, wyboru lokalizacji i optymalnego dopasowania elektrowni do wa-runków terenowych. Dodatkową nietechnologiczną kategorią, która w krajach demokratycznych decyduje o przeprowadzeniu inwestycji, jest kategoria społeczna. Autorzy analizują szereg czynników tej kategorii, a w konkluzji zwracają uwagę, że tylko odpowiedzialna polityka informacyjna, rzetelne traktowanie społeczności lokalnej i wyraźnie określony podział zysków przyczyniają się do długofalowego pozytywnego kształtowania postaw społecznych.

Słowa kluczowe: rozwój zrównoważony, energia wiatru, negatywne oddziaływanie turbin wiatrowych, lokalizzacja turbin wiatrowych, elektrownie wiatrowe, społeczne czynniki rozwoju

Introduction

Sustainable development is a priority in today's economy (Piontek, 2000; Szkarowski, 2005). Intuitively, it is understood that wind power favours this development, but has it always been perceived as such and to what extent is the development of wind technology environmentally friendly?

Harnessing energy and using it for one's own purposes is one of the expressions of development of human civilisation. The ability to produce additional energy and managing it to achieve a desired effect was the driving force behind the accelerated development of societies. By utilising the power of animals and constructing machines, driven by energy derived from external sources, man could multiply the effects of his work.

From time immemorial, windmills have played an important role. They have been used for various purposes, but mainly for powering pumps in irrigation systems, actuating equipment to grind grain or to overcome great distances with sailing ships.

All these applications have played an important role in the development of societies. Already, during the Sumerian and Egyptian civilisations, windmills watered farmland. In more recent times they were used to drain areas in depressions as in the Netherlands or Żuławy Wiślane in Poland. The mill structures were quite well known in Europe in the late Middle Ages and were described as post mills, whilst their subsequent solutions were paltrock mills and the Dutch smock mills.

We have long since become accustomed to these systems of harnessing the wind. They appear to be natural, and their use does not raise any concerns. However, it was not always the case. Fear of the unknown rotating devices was quite real. Its echoes have survived into modern times as delusions with the fictional Don Quixote fighting windmills. Undoubtedly, in ancient times, the rotating blades of a windmill, generating noise and driving huge millstones or pumps would have aroused fears and concerns.

Could these systems pose a threat to sustainable development in those far distant times?

The question, posed this way, may seem surprising and could be classed as meaningless. And yet, in an indirect way, man's harnessing of wind power and its utilisation gave significant impetus to man's further development. Its elements were the management of new areas for cereal cultivation and the accompanying irreversible action of destruction of existing vegetation.

However, we are not surprised with contemporary reflections on the harmful effects of wind turbines. Yet they draw energy from a natural, renewable energy source which is the wind's kinetic energy. Their functioning is much more natural than that of large power stations using fossil fuels. Modern society is accustomed to consuming large amounts of energy. Since the first industrial revolution, the source of this energy was mainly fossil fuels (Mokrzycki, 2009). Today, in contrast to the negative effects of this wasteful economy, the search is on for new, less environmentally damaging methods of obtaining energy. Wind power is certainly one such source. Despite the belief that this source brings incomparably less harmful effects than traditional fossil fuels, discussions, research and justification of the level of harmful effects must take place. This is especially important when the density of wind turbines increases significantly. Solutions should then be sought that will better serve the sustainable development of entire societies (Pawłowski, 2009).

This article attempts to formulate the main allegations articulated against wind turbines. A discussion was undertaken to determine to what extent these allegations are true and whether there are ways to reduce the adverse operational effects of wind turbines.

The discussion includes the technological development of wind power. There is also a brief discussion on whether the latest construction designs are conducive to reducing the negative impacts of wind turbines on the ecosystem. This discussion is supplemented by reflections on economic viability since fulfilling the investment conditions of profitability is essential for the further development of wind power.

However, public perception is the final approval. Regardless of any objective arguments, the so-called public opinion decides on whether to block any investments. Thus in the forthcoming discussion views have been formulated which describe what the expected public perception can be and what should be done to avoid unnecessary disputes.

Barriers to the development of wind power

The wind turbine discussion is multi-faceted. For the general public the most important appears to be that of the harmful impact on the environment.

The most well-known threat is noise generation and the inaudible infrasound. They arise as a result of the moving mechanical systems and aerodynamic effects. The low-frequency vibrations occur in the shadow of the tower which generates very low frequency sounds inaudible to the human ear. They are not indifferent to our skeletal system and internal organs since the resonant frequencies are very close to those of our organs. Their level but can be dangerous but only at a very close distance to the wind farms.

Infrasound effectively purges small rodents from its locality. This desired effect in our gardens, surprisingly, also has a negative effect. It contributes to a population increase in pest larvae which can attack plants and cause additional damage to crops.

The audible noise at the height of the nacelle can exceed 110 dB, but at a distance of 1-2 km falls to a level acceptable even by the strictest European standards (30-35 dB). The noise gradient may be greater due to obstacles or high air humidity. This problem is governed by regulations, including the Polish regulations (*Ministerstwo...*, 2012) which specify the isophonic contour lines.

Electromagnetic interference is another harmful effect. It can cause interference which disrupts electronic equipment such as TV, radio, mobile phones, radar and short wave radios (Figure 1). However, they are not a health risk.



Figure 1. Interference due to electromagnetic interference in the received signal.

This interference is significant only within a 200 meter radius from the source. It should be mentioned that switching to digital transmission and reception, virtually eliminates this type of interference.

Another hazard is the flickering between shadow and light reflections. They can be a serious problem, particularly, when the shadow of the rotating blade falls on the narrow windows of premises occupied by people. Such a phenomenon may increase the likelihood of epilepsy and the risk of increased nervous tension. Since the length of the shadow depends on latitude, season and time of day, it is still possible to specify a minimum impact distance for this shadow. If such a hazard should occur, then for the Central European latitudes the requirement is that the distance between the wind turbine and the residential buildings be at least 6-8 rotor diameters.

The rotating blades also pose a real danger to birds. The linear velocities of the blades at their tips can approach 300 km/h. No bird is able to escape such a danger, and therefore it is forbidden to locate wind turbines along avian air corridors, on their breeding sites and near bird sanctuaries. If these conditions are met, strikes occur very sporadically. It is estimated that in the USA there are far more avian collisions with buildings than with operational wind turbines.

Power engineers reported comments are of quite a different nature. Wind turbines cause quite a big problem for Transmission System Operators (TSO). They are obliged to buy green energy generated by wind power. Unfortunately, it is impossible to predict well in advance, the amount of generated energy, and most of all when it will happen. Because of the many factors affecting wind generation, its direction and intensity, it is largely accepted that the wind is stochastic. For the TSOs it is very difficult to manage such a source of energy. During a wind turbine outage or when it is not working at full capacity, the operators must ensure a supply from another source. This requires additional infrastructure funding, having reserve sources of power on standby, and above all a different operational control and management of the power grid.

Grid operators: local investment conditions and grid codes

Wind turbines in the vast majority of cases, work with the electricity network. The electricity generated by these wind turbines is therefore transferred to the network. For this purpose power connections are needed. Where such connections can be located depends on the network operator. The point of connection is identified by the network operator based on the existing network structure, energy transmission properties, reception facilities as well as the distance from the wind turbines, and the supply voltage.

Increasing the density of the installed renewable energy sources has forced the need to adopt grid codes, so that it is possible to increase the number and the contribution from wind turbines in the power grid. In addition, since these regulations place new requirements on wind turbines, they still generally serve positively in their development and in increasing the reliability of the overall power grid.

Grid codes are technical interconnection requirements for the power grid. Up to the 1980s there had been no requirement for wind turbines or wind farms during faults or voltage disturbances, because the impact of wind farms on the power grid was negligible. The protection of wind turbines was limited to ensuring their safe operation. In the event of a disturbance resulting in a significant deviation of voltage or frequency, wind turbines were disconnected. However, increasing wind power penetration to the power grid has led to the revision of TSO requirements and an elaboration of the new grid codes. These codes demand that wind farms should contribute to the power grid in a similar way as conventional power stations do. Compliance with these requirements allows an increase in wind farm penetration without compromising power system stability and reliability. In different countries, grid codes correspond to the power network characteristics in these countries and the penetration level for these networks by the wind turbines. Therefore, grid codes vary considerably among themselves, although the following requirements are common in most of TSO rules. Generally, they expect a similar reaction to disturbances from wind turbines as from conventional generation systems. Under normal operational conditions grid codes specify the following characteristics (Altin et al., 2010; Manual..., 2012; Network..., 2007; Tsili, Papathanassiou, 2009; Elkraft, 2013; Eltra, 2004).

- Frequency and voltage ranges for continuous operation,
- Active power control and
- Reactive power or voltage control.

Additionally, in case of grid short circuits resulting in voltage dips, grid codes usually create:

- Fault Ride Through (FRT) and sometimes
- Reactive current or reactive power injection.

Figure 2 shows the differences between the standards for some European Transmission System Operators (REA, 2008; Elkraft, 2013; Eltra, 2004).

A comparison of certain national requirements for the continuous operation of wind turbines at frequencies, which differ from the rated conditions, shows significant variation. This is due to different levels of technological development for the grid, and capabilities to work as flexible generation systems. A high level of reserve energy sources leads operators to more liberal requirements, thereby making the obligation to work in a wide range of frequencies. On the basis of the sample data, Polish TSO requirements are relatively quite restrictive, because they require continuous operation in the narrowest frequency range from 49.5 to 50.5 Hz (*Manual of operation...*, 2012; Jarzyna, Lipnicki 2013).



Figure 2. Operational requirements for a wind turbine at variable grid frequencies. The time in the rectangles depicts the minimum time the frequency relays are activated. Source: Authors' own work.

Technological development of wind energy

The investment boom in wind turbines followed the first oil crisis in the second half of the 1970s. At the time, within a short period of time, large areas of California became covered with wind turbines with capacities of up to 30 kW. Unfortunately, these investments were not thought through, were not preceded by environmental impact studies and in technological terms were very simple constructions. Consequently negative opinions were spread about them, which to this day investors installing present day solutions have to contend with.

The development of wind power in Europe was a lot more stable. Its progress since the 1980s is significant. For over twenty years the total capacity of installed power in wind turbines has increased almost quadratically. This increase has been accompanied by technological developments. Comparing the old solutions from the early 1990s to the current ones, the difference is enormous. Due to technological developments there has been a greater than 150-fold increase in power of the nominal manufactured systems (Figure 3).

Modern wind turbines have significantly better parameter values than those of the 1980s. They operate variably within a wide range of rotational speed. They achieve a higher efficiency, generate less noise and are more reliable.

The wind turbines obtain these properties through the use of vector controlled power electronic converter solutions. The operational variables and parameters are regulated and controlled internally by complex microprocessor systems.



Figure 3. Development of wind turbines, their maximum power and rotor diameter. Source: Authors' own work.

Wind turbines operating at variable rotational speeds are usually coupled to the grid through AC/DC-DC/AC converters. Figures 4a, 4b and 4c show the basic wind turbine topologies (Altin et al., 2010; Tsili, Papathanassiou, 2009).



Figure 4. Modern variable speed generator configurations: a) Double Fed Induction generator, b) Direct drive with Permanent Magnet Synchronous generator and back to back converter full scale converter, c) Squirrel cage Induction Generator with back to back full scale converter. Source: Authors' own work.

The most common solution is the double fed induction generator (Figure 4a). Its construction is based on the slip ring induction machine, whose stator is directly connected to the grid, whilst the rotor is connected back to back to the full scale converter which allows bidirectional energy flow through the rotor circuits. As a result, the system can generate energy even below the synchronous speed, whilst for speeds above the synchronous speed, maximum power can be almost twice the power rating of the slip ring induction machine.

The solution in Figure 4b has the greatest efficiency and the lowest noise. Furthermore, it is the most resistant to voltage dips. Due to its own electromagnetic field in the rotor, these generators with electronic power converters are able to quickly restore voltages. For these reasons, in recent years, these solutions are becoming increasingly popular.

As can be seen in Figure 3 the unit capacity of wind turbines is constantly increasing. However, their growth is limited due to the weight of the turbine and the nacelle located at the top of the tower. For example, the total weight of the 4.5 MW Enercon E112 wind turbine with a PMSG generator is 440 tonnes, while the Enercon E-126 model is nearly 580 tonnes.

Such a large weight limits further growth in wind power capacity, especially above 10 MW. This limit can be overcome by using PMSG systems with a High Temperature Superconducting rotor and a non-magnetic pole body. Such solutions are expected to appear in 2016.

Technological progress by implementing sustainability

The described new constructions, especially the ability to work over a wide range of variable angular speeds significantly reduces infrasound generation. However, they cannot be completely eliminated in horizontal-axis turbines. The reason is the periodic movement of the blade near the tower. The resultant air pressure changes in the vicinity of the tower's tubular structure produces low-frequency noise. Wind turbines with towers comprising of lattice structures or with a vertical axis of rotation practically do not have this disadvantage.

The source of audible noise is the air flow around the blades and gearbox. In a gearless construction (Figure 4b) with a slow speed generator, the noise is reduced due to lack of a gearbox.

The noise generated by the airflow around the blades can be reduced for winds below the rated wind speed. Then specially selected construction material and the profile of the blades allow for laminar airflow. This results in an increase in torque and quieter operation.

When the turbine operates above the rated wind speed, up to the cut-off speed, the turbulence level increases which also increases the noise. It is only limited by changing the angle of attack of the blades, which reduces the torque without letting the wind become turbulent.

In conclusion, the lowest noise level from large wind turbines is from those that are gearless, variable speed, and with an adjustable blade pitch. The infrasound level can be limited by significantly fast torque regulators of vector controlled electronic power converters applied in all constructions listed in Figure 4.

The wind turbine manufacturer is required to disclose the level of interference and noise generated in the data sheets which can be used in simulations to assess the risk level. Such a risk assessment can be made on the basis of standards e.g. in Polish legislation there are noise regulations (*Ministerstwo...*, 2012). They can be used to construct isophonic contours, lines connecting points with the same noise level from the source. Doing this type of calculation should answer the question whether noise pollution is real.

The one factor that forced the described technological changes in wind turbines were the TSO rules. Further detailed discussion of them is not within the scope of this article. However, an interesting question is what the changes in grid codes have brought society? The answer is an increase in the reliability of the entire power system. Wind turbines have begun to be treated just like any other source of energy. It therefore requires a wide range of control and an active participation in rebuilding the voltage during short-circuits and switching between power lines.

Wind turbines also make a significant contribution to the creation of modern power systems known as smart grids. Contemporary wind turbine designs meet the requirements of such a system and can help to improve voltage quality and to reduce the risk of loss of voltage over large areas known as blackouts. As such incidents in Canada, USA and India have shown, activating the power grid after such failures can take up to a week.

The solutions to date demonstrate that in general the development of wind energy using modern solutions is a positive phenomenon. However, to realise it, financial resources are required and an expected return on this type investment. This is considered later in the article.

Evaluation of the Cost Effectiveness of Investments

From market profitability analysis the following can be differentiated:

- ✓ Investment profitability analysis of the project:
 - Simple (static) methods.
 - Dynamic (discount) methods.
- ✓ Financial profitability of the project:
 - Financial results analysis,
 - Cash flow analysis.

An economic analysis of the rentability of the investment enables one to estimate the basic static indicators like the Return on Investment Time (RoIT), return on capital, break-even point and dynamic indicators: discountable costs, Net Present Value (NPV), Internal Rate of Return (IRR), efficiency of investment and the time needed to receive the return on the investment. A more accurate outcome will be received when using dynamic methods including the whole investment period (Jarzyna et al., 2012).

Cash flow analysis is one of the most used methods for all financial analysis, especially when controlling the economic activity of the company. It is irreplaceable when synchronising investment incomes, activating production and developing the company's assets. The investor should be equipped with abundant financial means to cover costs of production, financial indebtedness, handling debt costs or taxes. Cash flow comparisons are usually made monthly or annually. The project is rated positively when there is favourable cash flow balance in all the periods considered (*Network...*, 2005).

These costs must be funded at the investment financing stage (in the form of equity, grants and loans) and at the wind farm operational stage (in the form of revenues from electricity sales and certificates of origin).

Profitability results should take into account different financial sources, cash flow indicators and wind capacity and wind turbine data. During current computations certain input data was assumed, which was related to a base value defined as the total investment value.

- Investors own funds 48.8 %,
- Bank credit 39.4 %,
- Government grants 11.9 %,
- Annual development costs 1.5 %,

•	Period of credit	
	reimbursement	5 years,
•	Grace period of the credit	2 years,
•	Discount rate	8%,
•	Rate of depreciation	5%,
•	Working life	20 years,
•	Rated wind speed	12 m/s.

Based on a wind audit, an average annual wind velocity of 7 m/s was assumed. The capacity factor was determined as 27.6 %, which describes the total annual generated energy divided by the energy generated when the wind turbine is working continuously at the rated power (nameplate capacity) over one year.

For the forecasting Financial and Economic Balance, a two-year grace period was assumed before repayment of the bank loan in installments was required. Three variants of electrical energy price rises were considered. The Return on Investment Time of 6.8 years is required for a stable 1% annual price rise (Series 1). For comparison, a 4% increase in energy prices (Series 2) results in a 6 year RoIT payback period. However, variable energy price increases starting at 8% and dropping over 10 years to 1% (Series 3) result in a payback period of 5.4 years. Figure 5 shows a histogram for these three variants of the Financial Balance.



Figure 5. The Financial Balance (FB) computed for 3 variants of price rises and determined in relative values, where the highest annual FBx is the Base Value of Series $x=1\div3$. Source: Authors' own work.

Nevertheless, the Financial and Economic Balances depend mainly on the annual average wind speed. Figure 6 shows the effect of the average annual wind speed on the predicted RoIT for the project, where the rated wind speed is equal to 12 m/s.



Figure 6. The dependence of the Return on Investment Time on the average annual wind speed for three price increase variants (as previously described). Source: Author's own work.

Assuming an Annual Wind Speed (AWS) of 7 m/s as the base value, a reduction of 20% to 5.6 m/s results in a near doubling of the RoIT. However, a 20% increase to 8.4 m/s, shortens the RoIT by up to 60%. For this reason, the key issue during the investment is the choice of location for the wind turbine. How to select a site and where to begin is described in the next section of this article which is related to a wind energy audit. Using innovative solutions analysis of wind strength definitely accelerates this stage and reduces the risk of making an erroneous decision.

The optimal choice of location is also an environmentally friendly target

The construction of a wind farm is limited by many factors. The basis is a business plan which forecasts revenue from the planned investment. Factors that are crucial to the profitability of the investment are the wind energy resources. They can be initially evaluated using meteorological parameters. These include:

- the average wind speed,
- the probability distribution of wind speed as a function of the frequency of its occurrence,
- the wind velocity gradient as a function of height.
- the level of turbulence and a wind rose.

The average annual wind speed has a major impact on the predicted generated power. From satellite observations, preliminary data on wind conditions can be obtained from the *Global Wind Speed Atlas*. A free version is available from webpage (*sanderpartner.com*, 2013). This data allows for a preliminary assessment of wind conditions for the selected area. The location is approximate and the data does not take into account long-term variations (Figure 7). To obtain more accurate data requires placing an order with a commercial company.

Detailed wind conditions are described on the basis of measurements carried out over at least a two-year period by specialist companies.

The wind speed which is included in these calculations is measured at the height of the installed nacelle. In this



Figure 7. An example of a map copied from Sander + Partner with a selected measuring location with specific coordinates, and the average annual wind speed at a height of 60 and 120 m. Source: *sanderpartner.com* (2013).

way, wind speed changes can be averaged in the height function. The empirical formula for this speed is:

$$V_{w}(h) = V_{hub} \left(\frac{h}{h_{hub}}\right)^{a} \tag{1}$$

where:

h_{hub}	-	height of the installed nacelle,
h	-	the height at which the wind
		speed is measured,
V_{hub}	_	wind speed at height h_{hub} ,
$V_w(h)$	_	wind speed at height h,
α	_	exponent, the value of which
		depends on the terrain classified
		by its roughness.

A terrain has the smallest impact when it is an open, calm sea (Terrain Roughness Class 0). Under such conditions, already at a height of about 30 m the surface friction is negligible, and the wind speed approaches the true wind speed, whose main components are the geostrophic and pressure-gradient winds (Lipnicki, 2012).

In areas with a higher Terrain Roughness Class, wind speed and direction is not determined until

altitudes of $500 \div 1500$ m. The estimated effect of roughness on wind speed in the height function is presented in the Normal Wind Profile Model – NWPM (2) (Kacejko, Wydra, 2011).

$$P_{\rm t} = k \cdot S \cdot V_{\rm w}^{3} \cdot c_{\rm p}(\lambda, V_{\rm w}) \tag{2}$$



Figure 8. Wind speed characteristics using the NWPM model with the coefficient $\alpha = \{0.01, 0.1, 0.3\}$ at an actual wind speed of 10 m/s in a fixed zone. On the left hand side, three wind speed characteristics using the NWPM model with coefficient $\alpha = \{0.01, 0.1, 0.3\}$ corresponding to a Terrain Roughness Class of 0, 1 and 3. It is assumed that the set geostrophic wind speed occurs at a height of 500m and is 10 m/s. On the right hand side, for these three curves the wind turbine generates significantly different powers of 4.5 MW, 2.8 MW and 1.2 MW respectively (Jarzyna, 2011).

The average annual energy is determined using the relationship between the power generated by the air stream, which flows through the surface area described by the tips of the turbine blades. The resulting value is admittedly the most important, but not the only indicator in the assessment of wind energy. To determine the expected usable power of the turbine the wind speed range (cut-in \div cut-off) for which the wind turbine operates should be taken into account.

Most commonly turbine blades begin to rotate at a cut-in speed greater than 3.5 m/s. This lower speed limit is justified by the fact that the generated power is related to the wind speed cubed. Assuming that the wind turbine achieves its rated power at a wind speed of 13 m/s then the power output at a wind speed of 3.5 m/s is less than 2% of the rated power. This power in most solutions only slightly exceeds the resistance to motion, so it isn't worth to operate the wind turbine below this value.

In contrast, wind speeds over 25 m/s are usually the upper limit at which the turbine blades are brought to rest (cut-off). Above this speed, wind turbine

operation can be dangerous due to excessive mechanical stresses and possible blade vibrations caused by the turbulent air flow.

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However, knowing the probability of occurrence of the different wind speeds the expected power yield can be determined. The calculation method is determined by the Wind Turbine International Standards (ENTSO-E, 2013). The algorithm described uses a two-parametric Weibull distribution. Examples of such distributions for two average annual wind speeds ($V_r = 5$ m/s and 8 m/s) which describe the distribution of wind speeds over a year is illustrated in Figure 9.



Figure 9. Wind speed probability function, used to describe the distribution of wind speeds over an extended period of time. Source: Authors' own work.

In addition, these distributions can be used to determine the distribution of power and can be useful when selecting the rated wind speed of the wind turbine.

Wind conditions and the choice of a wind turbine

The most important wind turbine parameters are:

- power,
- blade span,
- rated wind speed,
- cut-in wind speed,
- cut-off wind speed,
- the height of the siting of the nacelle,
- turbulence level.

Turbine capacity is directly related to the square of the span of the blades and the cube of the wind speed (2). Therefore, it indirectly depends on the height of the tower on which the nacelle is mounted (1). Examples of the power curve for a turbine as a function of wind speed is shown in Figure 10.

Therefore, it may happen that a turbine with a smaller blade span will have a higher power rating. However, this power will occur at higher wind speeds. Therefore, if an investor from the outset specifies the rated power, a multi-variant analysis should be performed, which consists of a cycle of calculations as proposed in Figure 11.



Figure 10. The power curve for two wind turbines with an identical blade span but different wind speed ratings. Source: Authors' own work.



Figure 11. Algorithm for optimal wind turbine selection. Source: Authors' own work.

Knowing the wind speed distribution f(V) and the wind turbine's power curve $P_k(V)$, the average power \overline{P}_k can be determined for a wind turbine which it is able to generate from the wind in a given period of time. This power can be calculated from formula (3).

$$\overline{P} = \int_0^\infty P(V) f(V) dV \tag{3}$$

It should be noted that the average on-shore power \overline{P}_k only fluctuates within $(20 \div 25)\%$ of the rated power.

 $P_k(V)$ largely depends on parameters such as the cut-in wind speed V_{cut-in} and the wind speed at which the rated power output V_n is achieved.

The amount of electricity generated annually E_a can be calculated from the relationship:

$$E_a = PP_nT \tag{4}$$

where:

 E_a – electricity generated in kWh,

 P_n – rated power output of the wind turbine,

T – number of hours in a year (8760 h).

The calculated amount of energy is the basis for estimating the expected annual energy profits.

Factors shaping public opinion

Sustainable development perspective must include not only environmental and economic, but also social issues.

Social opinions and attitudes have also a very large impact on the expansion of wind energy. Insufficient information and disseminating incorrect facts is a major concern when planning a wind farm. Of course, there are reasons for fear and anxiety on the part of residents. As mentioned previously, wind turbines bring disruption to the surrounding ecosystem, which may lead to adverse effects on health and quality of life.

During the decision-making process to build a wind farm, three social groups are formally involved:

- local population,
- local authorities and,
- investors.

This division does not include groups of people interested in promoting their own particular interests. These latter groups mainly exist as unidentified groups, using various social engineering tools, to achieve their own success. Experts appointed by them, or rather pseudo-experts assess the problem unilaterally without a proper objective assessment of the situation. The discussions, sometimes aggressive and demagogic, prevent factual analysis and objective assessment of the planned energy investment.

Local authorities often cannot cope with such a situation. Burdened with a political desire for reelection, they do not want to risk losing votes of the dominant group of voters and sometimes approve blatantly false solutions. It should be emphasised that such a stance from the authorities may affect both those in favour and those against the construction. A common feature of such conduct is the marginalisation of the experts' objective opinion, whose arguments are lost in the adversaries' vociferous slogans and social engineering methods.

The use of methods which shape social attitudes aimed at achieving a particular, biased objective, leads to a so-called groupthink. In the extreme, it is characterised by a complete loss of the sense of reality and an overestimation of one's own strength and ability to act. Such behaviour has been documented by J. Irving (1972) as symptoms of groupthink. As a result of the imposed self-censorship, members of the group subjected to this phenomenon, voluntarily impoverish their intellectual abilities, and become a tool in the hands of groups, whose arguments may be erroneous, but who are completely in pursuit of their own goals. This happens when wind turbines are built too close to residential buildings, or when e.g. due to infrasound or electromagnetic interference, wind turbines planned in compliance with all standards cannot gain the acceptance of the local community.

The greatest number of concerns relate to the effect of wind turbines on human health. Studies conducted in the UK (GWEC, 2006) have shown that factors such as noise, infrasound and shadow flicker do not have any harmful effects on human health if, during construction, wind turbine building regulations have been complied with. Paradoxically, greater adverse health conditions can be caused by man as a result of anxiety caused by fear of the negative impact of wind power on the human body. It should be remembered that most of the negative consequences can be avoided by a reasonable distribution of wind turbines. Thus, the wind turbine should be so incorporated into the existing landscape so as not to change the perceptions and feelings of people who exist there every day.

Arranging the wind turbine site and land-use area, we must remember, that wind turbines occupy only 1% of the area leased by investors. The remaining 99% can be reasonably managed or exploited in a rational manner. These areas are currently used mainly for agriculture, but landscape architects can have room to maneuver here, or even make it a tourist attraction.

Sometimes, little public knowledge on energy efficiency and the expected benefits derived from producing this energy happens to be a big problem. The fact that the purchase and operation of wind turbines as well as other renewable energy sources results in the development of the local market and provides new places of work to a much greater extent than conventional power is not publicised. Furthermore, the consequences of environmental pollution in this case are virtually eliminated.

A hint on how to solve this type of problem is the Dutch experience (IEA, 2013). It consists in the introduction of the institutionalised form of discussion to encourage the exchange of ideas and to help reach compromised solutions. A special group of external independent experts (outside experts) raise public awareness through information campaigns. In the Netherlands this resulted in an increase in project transparency and an increase in confidence towards investors.

A long-term educational policy can also be carried out in schools. Such an example exists in some U.S. states (*Wind for...*, 2013), where education regarding renewable energy sources allows for a wider public discussion on the potential benefits which have an impact on the local market for goods and services.

An important aspect when constructing wind farms are the potential financial benefits charged to the local community. Many projects are blocked by protests linked to the unfair distribution of profits such as long-term lease agreements for farmers. A good solution to this issue could be an opportunity for the residents to invest themselves. For example, in Denmark the residents' share of the distributed income reaches almost 20% (REA, 2008). Such a solution provides a choice for each potential beneficiary of whether he wants to achieve financial benefits associated with the development of wind energy in his place of residence.

Citing Section 4.1 of Recommendations for Developers (IEA, 2013):

To balance financial interests and thus create an increased potential for new and positive relationships between the wind energy project and the local residents/community, developers should consider the following:

- Boost the local economy by:
 - contracting with local companies for basic construction activities such as pouring foundations, building roads, establishing grid interconnection, and transporting equipment;
 - purchasing local products (e.g., gifts for VIPs, snacks for guided tours); and
 - hiring local residents for operations and maintenance labour, tour guides, etc.
- Allow residents/communities to participate as shareholders (potentially by offering them shares at a special price if otherwise not practicable).
- Create a positive link with the wind power production; for example, by setting up a company for the wind power project that is based in the municipality so that the taxes generated by the project flow to the host municipality.
- Consider allowing the residents/communities to purchase the locally generated electricity on preferential terms.
- Offer an *indirect* land rent or the ability of owners of neighbouring parcels to participate as shareholders.

There are also new opportunities. Renewable energy plants may be perceived as tourist attraction, as is the case of Morbach in Hunsrück in Germany. Old US army base is now a place, where different renewable energy technologies (including wind power) are presented, with thousands of visitors every year. There are even special tourist guides for those, who are interested in renewables, like German Baedeker Deutschland – Erneuerbare Energien Entdecken (Germany – Explore Renewable Energy).

Various examples show that there is no standard answer to all concerns. In each case, an optimal solution should be sought in the local social context. Social acceptance and proper representation of specific projects in the media can be defined as a public consensus in the planning, construction and operation of wind farms.

Conclusions

Electricity generation using wind turbines does not produce greenhouse gases, and yet its development raises a number of concerns especially when they significantly aesthetically change the environment or when their work is a burden for the local community. The negative effects of operating wind turbines are felt to a greater extent. While the sound of old windmills could reassure and soothe us, it is the compounded operational noises of large wind turbines which cause exasperation. Sometimes we are more afraid of what our senses do not perceive, for example, infrasound and electromagnetic waves. The validity of some of these fears may be justified. That is why a reliable knowledge and an honest dissemination of information to the local communities is required.

The need for reliable expert information is extremely important, as the development of technologies for the production, design and commissioning of wind turbines is very dynamic. The development described in this article uncovers further the unknown properties of wind turbines. The authors suggest that the new wind turbine solutions are better suited for the needs of society. These solutions also contribute to reducing the negative impacts on the ecosystem.

Unfortunately, due to the aggressive policies of certain groups, facts are distorted and whole communities are misled. Such actions cause a lot of harm and introduce distrust.

For this reason, a comprehensive assessment of the impact on the environment is required, and thus a check on whether the conditions for sustainable development are satisfied. Only such a policy can bring long-term positive effects and significantly reduce installation errors and minimise adverse impacts on people and the environment, which is so important from the perspective of sustainable development.

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