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Table of Contents – Spis treści

PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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EDITORIAL

The Axiology of Sustainable Development: An Attempt at Typologization

Aksjologia zrównoważonego rozwoju: próba typologizacji

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Abstract

The axiology of sustainable development has been addressed in many works, taking a wide variety of approaches. Differences concern the interpretation of sustainable development, the set of values considered and methods of constructing such a set. The present paper aims to systematize discussion concerning the axiology of sustainable development, by developing a typology. Two types of axiology are distinguished: the holistic-altruistic type and the individualistic-egoistic type. The second of these is depicted in categories of the alienation of the idea of sustainable development in the process of its exteriorization.

Key words: sustainable development, philosophy of sustainable development, axiology of sustainable development, types of axiology of sustainable development

Streszczenie

Aksjologia rozwoju zrównoważonego to temat podejmowany w wielu pracach, przyjmujących jednak różne założenia. Różnice odnoszą się do interpretacji pojęcia rozwoju zrównoważonego, zbioru rozważanych wartości i metodyki konstruowania takiego zbioru. Celem niniejszego artykułu jest usystematyzowanie dyskusji dotyczącej aksjologii rozwoju zrównoważonego poprzez dokonanie jego typologizacji. Wyróżniono dwa typy aksjologii: holistyczno-altruistyczna i indywidualistyczno-egoistyczna. Drugą z nich przedstawiono w kategoriach alienacji idei zrównoważonego rozwoju w procesie jej eksterioryzacji.

Słowa kluczowe: rozwój zrównoważony, filozofia rozwoju zrównoważonego, aksjologia rozwoju zrównoważonego, typologia aksjologii rozwoju zrównoważonego

Introduction

Sustainable development has been the subject of many academic works, particularly in the fields of economics and law. It is a category that has entered the vocabularies of environmental protection, biology and geography. It is used with increasing frequency in the social sciences, and occupies an important place in the language of politics. At least for these reasons – which arise from the specific features of research in the given fields and disciplines of learning, and from the needs of politics – the term *sustainable development* may have many different meanings. In a book published in 2002, Barbara Piontek lists 28 definitions of sustaina-

Wstęp

Zrównoważony rozwój doczekał się wielu opracowań naukowych, zwłaszcza na gruncie nauk ekonomicznych i prawnych. Jest kategorią, która weszła do słownictwa ochrony środowiska, biologii i geografii. Posługują się nią coraz częściej przedstawiciele nauk społecznych. Zajmuje ważne miejsce w języku polityki. Już chociażby z tych względów – wynikających ze specyfiki badawczej wymienionych dziedzin i dyscyplin nauki oraz potrzeb polityki – pojęcie zrównoważonego rozwoju jest bardzo wieloznaczne. W książce opublikowanej w 2002 r. Barbara Piontek wymieniła 28 definicji zrównoważonego rozwoju występujących w pol-

ble development found in the Polish academic literature and in regulatory and political documents, including citations from United Nations and European Union documents (Piontek, 2002). In a publication of six years later, Artur Pawłowski lists as many as 50 such definitions (Pawłowski A., 2008). However, this dramatic rise in the number of meanings for the category *sustainable development* cannot be fully explained by the reasons indicated, since it is not accompanied by a similar rate of increase in the uses of the concept in new research areas or in new spheres of social life. The reasons lie deeper, in what is called (after Hegel) exteriorization. An objectivized idea functions in the public space in a manner independent of its creator. Every reception is an interpretation suited to the knowledge, beliefs and needs of those making it. Hence lying behind the rapid growth in the number of meanings of the term in question are probably differing expectations as to the effects of the realization of sustainable development, differences as to the scope of the changes being introduced by that idea, and controversies relating to the division of the benefits and costs of its implementation between global regions, groups of nations and social classes and strata – these being matters of immeasurable importance for the conduct of a policy of sustainable development. To put it differently: behind the phenomenon being considered lies the multiplicity and variety of values attributed to sustainable development in the political debate about the needs and permissible changes involved in the world's *sustainabilization*. It is these practical axiological differences, very closely connected with politics, that ensure that new meanings are continually assigned to this less than 40-year-old theoretical category.

skiej literaturze naukowej i zapisanych w aktach normatywnych oraz dokumentach politycznych, wliczając w to sformułowania przytaczane za dokumentami Organizacji Narodów Zjednoczonych i Unii Europejskiej (Piontek, 2002). W publikacji wydanej sześć lat później Artur Pawłowski wymienił już 50 takich definicji (Pawłowski A., 2008). Takiego lawinowego przyrostu liczby znaczeń kategorii *zrównoważony rozwój* nie można jednak do końca wyjaśnić na wskazanej drodze, ponieważ nie towarzyszy mu podobne tempo wzrostu zastosowań tego pojęcia na nowych obszarach badawczych lub w nowych sferach życia społecznego. Przyczyny leżą głębiej, w tym co za Georgiem W. F. Heglem nazywa się eksterioryzacją. Zobiektywizowana idea funkcjonuje w przestrzeni publicznej w sposób niezależny od swego twórcy. Każda recepcja jest interpretacją na miarę wiedzy, przekonań i potrzeb podejmujących ją podmiotów. Tak więc za szybkim wzrostem liczby znaczeń omawianego pojęcia kryją się raczej odmienne oczekiwania co do efektów realizacji zrównoważonego rozwoju, różnice w kwestii zakresu zmian wprowadzanych przez tę ideę, kontrowersje dotyczące podziału korzyści i kosztów jej wdrażania między obszary globu, grupy państw, klasy i warstwy społeczne, a więc sprawy niezmiernie istotne z perspektywy prowadzenia polityki zrównoważonego rozwoju. Można też powiedzieć inaczej: za opisywanym zjawiskiem stoi wielość i różnorodność wartości przypisywanych zrównoważonemu rozwojowi w politycznej debacie na temat potrzeb i dopuszczalnych zmian w *równoważeniu* świata. To właśnie te praktyczne, związane jak najściślej z polityką, różnice o charakterze aksjologicznym przesądzają sprawę nieustannego dopisywania nowych znaczeń do liczącej niespełna 40 lat kategorii teoretycznej.

Axiologies of sustainable development

Leszek Gawor gave the following description of the material and formal subject of the philosophy of sustainable development: *This project (setting aside the multiple different approaches taken by various authors) generally emphasizes that its subject is the whole of contemporary humanity, faced with an ecological crisis brought about by the development hitherto of civilization (technology), and also indicates possible (and at the same time necessary) means for the human species to extricate itself from that danger. This global project therefore has both a descriptive and postulative character* (Gawor, 2010). The postulative shape of the philosophy of sustainable development evidences its close connections with axiology. What kind of axiology (set and system of values) is this? The answer suggests itself: just like the philosophy of sustainable development, it comes in many variants. Gawor has good reason, in the text cited above, to set aside the multiple *approaches taken by various authors*.

Aksjologie zrównoważonego rozwoju

Leszek Gawor następująco przedstawił materialny i formalny przedmiot filozofii zrównoważonego rozwoju: *Projekt ten (przy pominięciu wielu zróżnicowanych autorskich ujęć) w ogólności podkreśla, że jego przedmiotem jest cała współczesna ludzkość, stojąca w obliczu ekologicznego kryzysu wywołanego dotychczasowym cywilizacyjnym (technologicznym) rozwojem oraz jednocześnie ukazuje możliwe (i zarazem konieczne) sposoby wywikłania się gatunku ludzkiego z tego zaistniałego zagrożenia. Ma więc ów o globalnym zasięgu projekt równocześnie charakter opisowy i postulatywny* (Gawor, 2010). Postulatywny kształt filozofii zrównoważonego rozwoju świadczy o jej ścisłych związkach z aksjologią. Jaka to aksjologia, czyli zbiór i system wartości? Odpowiedź nasuwa się sama: taka, jak filozofia zrównoważonego rozwoju – występuje w wielu wariantach. Gawor nie bez powodu abstrahuje w zacytowanej powyżej wypowiedzi od *autorskich ujęć*.

Differences in approaches to sustainable development, including to the axiology of that programme, are determined by many different causes. Among them we may list ignorance, particularistic interests, the vagueness and ambiguity of the categories used to define sustainable development, as well as *controlling ideas of humanity*, world views, value systems and methodological approaches that determine any picture of reality.

We will not concern ourselves with ignorance and interests. The difficulties with the meaning of the category *sustainable development* and with the determination of a system of values of sustainable development are multiplied by confusion relating to the concepts used to define it. Few of them have *real* definitions; most of the concepts relating to social life are defined nominally, in a manner which is rendered more specific in the process of social communication. The British philosopher Michael R. Redclift of King's College London, also citing Andrew Dobson, notes that the meaning of the term *sustainable development* is a function of the meaning ascribed to the categories fundamental to its understanding, such as nature, sustainability and justice (Redclift, 2009). He points out that the word *nature*, for example, has different symbolic meanings for different interest groups – nature protection activists, local environmental groups and politicians all define it in quite different ways. While for the first it means as much as a meadow, marsh, forest or reef, for the second it is rather a way of defining an identity based on a specific environment, the area of their place of residence; whereas for the third it is a way of attempting to express a professional judgement concerning type or value of resources (*common resources*, *ecologically endangered areas*, *natural drainage basins*). In turn, in the case of the words *sustainability* and *justice* what is significant is not only the fact that they are understood in different ways, but also the relations existing between them. That is to say, the way in which sustainability is understood affects the content of the second concept. Thus an interpretation of sustainability in categories of a stable number of people and households places emphasis on the distribution of resources and brings to the fore the issue of distributive justice. On the other hand, an understanding of sustainability in the context of environmental protection emphasizes the ecological functions of the environment and the issue of justice between species. It is in a similar spirit that Jan Kurowicki points out how the way in which nature is understood depends on the cultural context (Kurowicki, 2010).

From the perspective of the subject under consideration, it is determinants of a philosophical nature that are the most important. 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 cor-

Różnice występujące w podejściu do zrównoważonego rozwoju, w tym do aksjologii tego programu, są uwarunkowane przez wiele różnych przyczyn. Wśród nich można wymienić ignorancję, partykularne interesy, nieostrość i wieloznaczność kategorii używanych do definiowania pojęcia *zrównoważony rozwój*, a także *kierownicze idee ludzkości*, przekonania światopoglądowe, wartościowania oraz podejścia metodologiczne, które determinują obraz rzeczywistości.

Pomińmy ignorancję i interesy. Kłopoty z sensem kategorii *zrównoważony rozwój* i ustaleniem systemu wartości zrównoważonego rozwoju potęguje zamieszanie w sferze pojęć wykorzystywanych do jego definiowania. Niewiele z nich ma definicje realne, większość z pojęć odnoszących się do życia społecznego jest zdefiniowana nominalnie, w sposób, który się dookreśla w procesie komunikacji społecznej. Brytyjski filozof Michael R. Redclift z King's College London powołując się dodatkowo na Andrew Dobsona zauważa, że znaczenie pojęcia *zrównoważony rozwój* jest funkcją sensu nadanego takim fundamentalnym dla jego rozumienia kategoriom, jak: natura, zrównoważenie czy sprawiedliwość (Redclift, 2009). Wskazuje, że np. słowo *natura* ma odmienne symboliczne znaczenie dla różnych grup interesów – działacze na rzecz ochrony przyrody, lokalne ugrupowania ekologiczne, politycy definiują je całkowicie inaczej. Podczas gdy dla pierwszych znaczy ono tyle, co łąka, teren podmokły, las lub rafa, to dla drugich jest raczej sposobem na określenie tożsamości opartej na konkretnym środowisku, obszarze ich miejsca zamieszkania, natomiast dla trzecich – sposobem na podjęcie próby wyrażenia profesjonalnego osądu dotyczącego rodzaju lub wartości zasobów (*wspólne zasoby*, *obszary zagrożenia ekologicznego*, *naturalne zlewiska*). Z kolei w przypadku słów *zrównoważenie* i *sprawiedliwość* ważne jest nie tylko to, że są pojmowane na różne sposoby, ale także relacje zachodzące między nimi. Mianowicie, sposób pojmowania zrównoważenia wpływa na treść drugiego pojęcia. I tak interpretacja zrównoważenia w kategoriach stabilnej liczby ludzi i gospodarstw eksponuje wagę dystrybucji zasobów i wysuwa na pierwszy plan zagadnienie sprawiedliwości rozdzielczej. Natomiast ujęcie zrównoważenia w kontekście ochrony środowiska kładzie akcent na ekologiczne funkcje środowiska i przesuwa na czoło kwestię sprawiedliwości międzygatunkowej. W podobnym duchu wypowiada się Jan Kurowicki, podkreślając zależność sposobu pojmowania natury od kontekstu kulturowego (Kurowicki, 2010).

Z punktu widzenia podjętego tematu najważniejsze są determinanty o charakterze filozoficznym. Wszak to dzieła filozofów są źródłem tych wszystkich idei, światopoglądów, wartości i metodologii, od których zależy obraz świata i właściwy mu sposób widzenia oraz rozwiązywania problemów zrównoważonego rozwoju. Kierują się nimi uczest-

responding way of viewing and solving the problems of sustainable development. Those participating in the public debate on sustainable development are guided by these. They can also be found as the foundations of the practices through which sustainable development is defined by activists (practices can be regarded as the taking of an attitude to a theory, in spite of the fact that ideas and practice do not generally go in pairs). Hence for the purposes of the present analysis, following Zbigniew Hull, a broad understanding of the philosophical determinants of sustainable development is adopted. They include both imperfect, fragmentary social *emanations*, devoid of broader justificatory context, of explicitly articulated ideas, conceptions and philosophical positions, as well as those ideas, conceptions and positions themselves (Hull, 2008). This view is particularly justified considering that, in the public debate about sustainable development, the voice of philosophers is lost among the noise of opinions coming from fields of practice, divided between economic policy, sectoral social policy and environmental policy.

Perhaps because the birthplace of the concept of sustainable development was very distant from university schools of philosophy, a restriction of attention to the meanings attached to it in academic philosophy also reveals traces of a broadly conceived philosophical determinant. In any case, philosophical works testify to the differing ways of approaching sustainable development and deficiencies in presentation of the assumptions of an adopted position. This state of affairs is well illustrated by the conclusions drawn by Ignacy Fiut from an analysis of ways in which the category of *sustainable development* is defined in the pages of *Problemy Ekorozwoju/Problems of Sustainable Development* (Fiut, 2011). The analysis concerned papers published in that academic journal over a period of five years, starting from 2006. Although only 30% of articles addressed philosophical matters, they give a general picture of the situation existing in the philosophy of sustainable development. In almost a half of cases sustainable development was understood broadly, as a synonym of concepts based on an intuitive understanding of that category. In the remaining cases it was identified as: a synonym of eco-development; a feature of eco-development; a synonym of development of the natural environment; a synonym of unconventional development linking the quality of the environment with the development within it of a manner of existence appropriate to humankind; a lasting and self-sustaining process; a necessary condition for lasting development; a balancing process reflecting the dynamic nature of changes taking place in the natural environment; a concept for which a meaning needs to be found in the context of a synthesis of its different interpretations; and finally – in the case of

nicy publicznej debaty na temat zrównoważonego rozwoju. I odnajdziemy je u podstaw praktyk, za pośrednictwem których zrównoważony rozwój jest definiowany przez działaczy (praktyki można potraktować jako ustosunkowanie się do teorii, pomimo że idea i praktyka raczej nie chodzą w parze). Dlatego na użytek prowadzonych na tych stronach analiz za Zbigniewem Hullem przyjmuję szerokie rozumienie filozoficznych uwarunkowań zrównoważonego rozwoju. Składają się na nie zarówno niedoskonałe, fragmentaryczne, pozbawione szerokiego kontekstu uzasadnienia społeczne *emanacje* wyraźnie wyartykułowanych idei, koncepcji i stanowisk filozoficznych, jak też same te idee, koncepcje i stanowiska filozoficzne (Hull, 2008). Jest to pogląd uzasadniony tym bardziej, że w publicznej debacie na temat zrównoważonego rozwoju głos filozofów ginie w zgiełku stanowisk wynikających z praktyki, rozczłonkowanej między politykę gospodarczą, sektorowe polityki społeczne i politykę ochrony środowiska.

Być może dlatego, że koncepcja zrównoważonego rozwoju narodziła się bardzo daleko od uniwersyteckich katedr filozofii, ograniczenie uwagi do sensów łączonych z nią w filozofii akademickiej także ujawnia ślady szeroko rozumianej determinanty filozoficznej. W każdym razie filozoficzne prace przynoszą świadectwa odmiennych sposobów podejścia do zrównoważonego rozwoju i braków w wykładzie założeń zajętego stanowiska. Dobrą ilustracją tego stanu rzeczy są wnioski wyprowadzone przez Ignacego Fiuta na podstawie analizy sposobu definiowania kategorii *zrównoważony rozwój* na łamach czasopisma *Problemy Ekorozwoju/Problems of Sustainable Development* (Fiut, 2011). Badania objęły artykuły opublikowane w okresie pięciu lat wydawania tego naukowego periodyku, poczynając od 2006 roku. Chociaż tylko 30% artykułów poruszało treści filozoficzne, dają one ogólny ogląd sytuacji panującej w filozofii zrównoważonego rozwoju. W prawie połowy przypadków zrównoważony rozwój był pojmowany szeroko, jako synonim koncepcji opartych na intuicyjnym rozumieniu tej kategorii. W pozostałych był identyfikowany jako: synonim ekorozwoju; cecha ekorozwoju; synonim rozwoju środowiska przyrodniczego; synonim rozwoju niekonwencjonalnego wiążącego jakość środowiska z rozwijaniem w nim właściwego ludzkości sposobu egzystencji; proces trwały i samopodtrzymujący się; warunek konieczny rozwoju trwałego; proces balansujący, oddający dynamiczny charakter przemian zachodzących w środowisku przyrodniczym; pojęcie, dla którego należy znaleźć znaczenie w kontekście syntezy różnych jego ujęć; i w końcu – w przypadku stanowisk posuwających krytycyzm do negacji – *niedorozwój*.

Wspólny przedmiot oraz różnice w interpretacjach zrównoważonego rozwoju i pojęć używanych do

views which carry criticism to the point of negation – *underdevelopment*.

The common subject and differences in interpretations of sustainable development and of the concepts used to specify that category are visible in academic philosophy at the level of, among other things, the axiology of sustainable development. Below are given examples of fundamental sets of values of sustainable development as seen by such authors as Włodzimierz Tyburski, Józef Marceli Dołęga, Leszek Gawor, Armin Grunwald, and the present author. Also included is a description of the position of Eva M. Kras. All of these realize a fundamental premise of the concept of sustainable development, indicating the need to consider three orders, namely the ecological (environmental), economic and social. Differences come to light in the context of a different proposition for the concept, concerning the need to take an integral approach to them, and also in relation to the set of proposed values and their systematization.

Tyburski is among the leading Polish eco-ethicists. The commitment of this Toruń philosopher to eco-ethics is not without influence on his corresponding approach to the axiology of sustainable development. In his work he emphasizes the significant contribution of eco-ethics to shaping an awareness corresponding to needs for realization of the principles of sustainable development (Tyburski, 2011). He gives particular prominence to the role of the following values: life, health, responsibility, moderation (self-restraint), communality (solidarity), and justice. In a text written jointly with Piotr Domeracki he assigns some of these directly to the axiology of sustainable development: *An axiology of sustainable development proposes a set of universal values such as life, health and justice, which have the advantage that every human being is ready to accept them, and therefore it is possible to unite people around them on a global scale. (...) Education for sustainable development recognizes that a human being, within the framework of actions in the ecological, social and economic fields, accepts the obligation to protect those values and is ready to bear the consequences of his actions or inactions* (Domeracki, Tyburski, 2011).

A similar approach is taken by Dołęga. He adopts the assumption that *a developed and accepted environmental ethics* [i.e. eco-ethics – A. P.] may *become a basis for eco-development* (Dołęga, 2005), which is the name he uses in this part of the text for sustainable development. He regards life in the broad sense of the word, and the life and health of humans, as the highest values, although not absolute ones, while he sees the socio-natural environment as a fundamental value and a common good. The possibility of exact translation of the axiology of eco-philosophy into the language of the axiology of sustainable development is based on a specific and individual perspective of environment. In

uściślenia tej kategorii są widoczne w filozofii akademickiej m.in. na poziomie aksjologii zrównoważonego rozwoju. Poniżej zaprezentuję przykłady zasadniczych zestawów wartości zrównoważonego rozwoju w ujęciu takich autorów, jak: Włodzimierz Tyburski, Józef Marceli Dołęga, Leszek Gawor, Armin Grunwald, oraz w moim własnym. Dodatkowo dołączę opis stanowiska Evy M. Kras. Wszystkie realizują zasadniczą przesłankę koncepcji zrównoważonego rozwoju, wskazującą na konieczność uwzględnienia w refleksji trzech ładów, tj. ekologicznego (środowiskowego), gospodarczego i społecznego. Rozbieżności ujawniają się w kontekście innego postulatu omawianej koncepcji, traktującego o konieczności ich integralnego ujęcia, jak również w zakresie zbioru postulowanych wartości i ich porządku.

Tyburski należy do czołówki polskich ekoetyków. Zaangażowanie toruńskiego filozofa na rzecz ekoetyki nie pozostaje bez wpływu na właściwe mu podejście do aksjologii zrównoważonego rozwoju. W swojej twórczości podkreśla znaczący wkład ekoetyki w kształtowanie świadomości odpowiadającej potrzebom realizacji zasad zrównoważonego rozwoju (Tyburski, 2011). Szczególnie eksponuje rolę następujących wartości: życia, zdrowia, odpowiedzialności, umiarkowania (powściągliwości), wspólnotowości (solidarności), sprawiedliwości. W tekście napisanym wspólnie z Piotrem Domerackim część z nich wprost zalicza do aksjologii zrównoważonego rozwoju: *Aksjologia zrównoważonego rozwoju proponuje zestaw uniwersalnych wartości takich jak: życie, zdrowie, sprawiedliwość, które mają tę zaletę, że gotów je zaakceptować każdy człowiek, i dlatego można wokół nich zjednoczyć ludzi w skali globu. (...) Edukacja do zrównoważonego rozwoju uznaje, iż człowiek w ramach działań na polu ekologicznym, społecznym i gospodarczym przyjmuje zobowiązanie ochrony owych wartości i gotów jest ponosić konsekwencje swych działań lub ich zaniechań* (Domeracki, Tyburski, 2011).

Podobnie do sprawy podchodzi Dołęga. Przyjmuje założenie, że *wypracowana i akceptowana etyka środowiskowa* [tj. ekoetyka – A. P.] może *stać się podstawą dla ekorozwoju* (Dołęga, 2005), jak w tej części tekstu nazywa zrównoważony rozwój. Życie w szerokim znaczeniu tego słowa oraz życie i zdrowie człowieka uznaje za wartości najwyższe, mimo że nie absolutne. Natomiast środowisko społeczno-przyrodnicze – za wartość podstawową i dobro wspólne. Możliwość dokładnego przekładu aksjologii ekofilozoficznej na język aksjologii zrównoważonego rozwoju opiera na specyficznym dla siebie ujęciu środowiska. W pracach Dołęgi z zakresu ekoetyki nie występował rozdział na dwa odrębne środowiska: naturalne oraz społeczne. Chrześcijański filozof konsekwentnie łączył oba człony, podkreślając, że człowiek żyje w złożonym środowisku społeczno-przyrodniczym.

Dołęga's work on eco-ethics there is no division between a natural environment and a separate social environment. This Christian philosopher consistently unites the two aspects, emphasizing that a human being lives in a complex socio-natural environment.
Gawor's position alludes to Tyburski's proposed division of values into rudimentary (initial) values for the human social world, teleological values (intentional, and as might be added here, of autotelic character) for all forms of existence, and instrumental (auxiliary) values in the attainment of adopted goals. The list given of the principal values of sustainable development contains nine items. Gawor's rudimentary values include pacifism and freedom, his teleological values include dignity, egalitarianism, life and justice, while his instrumental values include communality (going beyond the human species, but within it also humanity-wide solidarity), responsibility and restraint (Gawor, 2010).
Taking as a starting point the division of the subject of sustainable development into so-called *orders*, Grunwald of Freiburg University – who formerly worked for the Parliamentary Council of Sustainable Development at the Bundestag – adapts to each of them the following main autotelic values (goals): retention of prospects for development and action (social order), assurance of existential security for people (ecological order), and maintenance of the social productive potential (economic order) (Grunwald, 2005).
The present author's proposed axiological system of sustainable development is, compared with those discussed, more elaborate structurally. It introduces a new level of values – ideal (constitutive) values – while it treats autotelic and instrumental values as two levels within the scope of practical values. The need to introduce a new higher level of values and to distinguish it from the other two results from my acceptance of the remarks of Dieter Birnbacher concerning ideal and practical norms. These imply that practical values without ideal values would be arbitrary, while ideal values without practical ones would remain alienated from reality (Birnbacher, 1999). I also apply the principle of the division of values according to the orders of sustainable development. Ideal values include the dignity of a person, progress and justice, human being as individual, and quality of life, where the dignity of a person has a distinct position among these, because it is common to the entire axiology of sustainable development. The others fit within the scope of particular orders, respectively social, environmental and economic, and of the task of integrating them. At the higher level of practical values, namely the autotelic values, are identified – following Grunwald – prospects of development and action, existential security, and social productive potential. At the lower level of practical values, namely the instrumental values, there are considered many very

Stanowisko Gawora nawiązuje do zaproponowanego przez Tyburskiego podziału wartości na rudymentarne (wyjściowe) dla ludzkiego świata społecznego, wartości teleologiczne (celowe – co warto tu dodać – o charakterze autotelicznym) dla wszelkich form istnienia oraz wartości instrumentalne (pomocne) w osiągnięciu przyjętych celów. Na liście głównych wartości zrównoważonego rozwoju znalazło się dziewięć pozycji. Do wartości rudymentarnych Gawor zalicza pacyfizm i wolność; teleologicznych – godność, egalitaryzm, życie i sprawiedliwość; instrumentalnych – wspólnotowość (wykraczającą poza gatunek ludzki, ale w jej obrębie także i ogólnoludzką solidarność), odpowiedzialność oraz umiar (Gawor, 2010).
Traktując za punkt wyjścia podział przedmiotu zrównoważonego rozwoju na tzw. *łady* Grunwald z Uniwersytetu we Freiburgu – były współpracownik Parlamentarnej Rady ds. Zrównoważonego Rozwoju przy Bundestagu – dostosowuje do każdego z nich następujące główne wartości autoteliczne (cele): zachowanie perspektyw rozwoju i działania (ład społeczny), zapewnienie ludziom bezpieczeństwa bytowego (ład ekologiczny), utrzymanie społecznego potencjału produkcyjnego (ład ekonomiczny) (Grunwald, 2005).
Przedstawiona przeze mnie propozycja systemu aksjologicznego zrównoważonego rozwoju jest w porównaniu z omówionymi bardziej rozbudowana pod względem strukturalnym. Wprowadza nowy poziom wartości – wartości idealne (konstytutywne), natomiast wartości autoteliczne i wartości instrumentalne traktuje jako dwa poziomy na obszarze wartości praktycznych. Potrzeba wprowadzenia nowego, wyższego poziomu wartości i jego odróżnienia od pozostałych dwóch poziomów jest skutkiem uwzględnienia przeze mnie uwag Dietera Birnbachera na temat norm idealnych i praktycznych. Wynika z nich, że wartości praktyczne bez wartości idealnych byłyby dowolne, podczas gdy wartości idealne bez praktycznych pozostałyby wyobcowane z rzeczywistości (Birnbacher, 1999). Zastosowałem również zasadę podziału wartości według ładów zrównoważonego rozwoju. Do wartości idealnych zostały zaliczone godność osoby ludzkiej, postęp i sprawiedliwość, człowiek jako jednostka oraz jakość życia, z tym że godność osoby ludzkiej ma wśród nich odrębną pozycję, ponieważ jest wspólna dla całej aksjologii zrównoważonego rozwoju. Pozostałe wpisują się w zakres poszczególnych ładów – odpowiednio: społecznego, środowiskowego, ekonomicznego – oraz zadanie ich integracji. Na wyższym poziomie wartości praktycznych, tj. autotelicznych, zostały wyróżnione za Grunwaldem: perspektywy rozwoju i działania, bezpieczeństwo bytowe, społeczny potencjał produkcyjny. Na niższym poziomie wartości praktycznych, tj. instrumentalnych, mowa o wielu bardzo różnych wartościach, historycznie i sytuacyjnie zmiennych. Rozpoczynają go takie wartości – po-

different values, variable in historical and situational terms. They begin with such values – enumerated here again within the above-mentioned system of orders – as sustainable consumption (a variant of restraint), veracity of prices, and an efficiency revolution (Weizsäcker, Lovins, Lovins, 1999), and retention of the service potential of nature (Papuziński, 2006/2; Papuziński, 2012).

Another proposed axiology of sustainable development differs considerably from all of those described above. Kras, of the International Society for Ecological Economics, bases her concept on what she considers to be the philosophical statements of *visionary scientists* in the style of Albert Einstein and Ernst F. Schumacher (Kras, 2011). She directs her main efforts towards determining and classifying universal values of sustainable development. The first group consists of values of one's relation with one's own ego. These are the deepest personal values, controlling a significant part of human behaviour and attitudes: love, sympathy, kindness, generosity, forgiveness, joy, self-respect and respect for others, honesty and trust, non-violence, humility. The second group of values relates to the family, work and society. The basic values of the family are love and cooperation; those of work are tolerance, trust and again cooperation, while those of society are participation and responsibility, solidarity, non-violence, dialogue and service for others, the common good, and ecology. The third group concerns nature and the cosmos. These are values directed towards the protection of nature and of the communities living in the natural environment. These values are water, air and earth. In this conception the values are not explicitly related to the world of non-human living beings, animals and plants.

We may imagine what still further sets of values of sustainable development might be reached if our analysis were to move a few more steps away from the works of professional philosophers and consider documents from various political conferences, the views of those active in business, local strategies of sustainable development created in many of the countries which signed the *Agenda 21* document in 1992, and practices aimed at bringing the idea into reality. Information on this subject is available and can be found in works by Tadeusz Borys and Adam Płachciak (Borys, Płachciak, 2011), Dariusz Kiełczewski (Kiełczewski, 2007) and the present author (Papuziński, 2010; 2011). Attempts to present the values written down in the documents of sustainable development policy from a philosophical perspective have been made by Artur Pawłowski (Pawłowski A., 2008) and Antoni Skowroński (Skowroński, 2003). The results obtained are very important from a theoretical and practical perspective, including educationally. Nonetheless I consider that it is appropriate to move the centre of gravity of philosophical inquiry to the

nownie wymieniane tu w określonym powyżej porządku ładów – jak: zrównoważona konsumpcja (odmiana umiarkowania), prawdomówność cen i rewolucja efektywności (Weizsäcker, Lovins, Lovins, 1999), zachowanie potencjału usługowego natury (Papuziński, 2006/2; Papuziński, 2012).

Kolejna propozycja aksjologii zrównoważonego rozwoju różni się zdecydowanie od wszystkich opisanych powyżej. Kras z International Society for Ecological Economics opracowała swoją koncepcję na podstawie tego, co uznała za filozoficzne wypowiedzi *naukowców-wizjonerów* w stylu Alberta Einsteina i Ernsta F. Schumachera (Kras, 2011). Główny wysiłek skierowała na ustalenie uniwersalnych wartości zrównoważonego rozwoju oraz ich klasyfikację. Pierwszą grupę stanowią wartości relacji z własnym Ja. To najgłębsze wartości osobiste, kontrolujące znaczną część ludzkiego zachowania i postaw: miłość, współczucie, dobroć, hojność, przebaczenie, radość, szacunek dla samego siebie i szacunek dla innych, uczciwość i zaufanie, powstrzymywanie się od przemocy, pokora. Druga grupa wartości odnosi się do rodziny, pracy i społeczności. Podstawowe wartości rodziny to miłość i współpraca; pracy – tolerancja, zaufanie i ponownie współpraca; społeczności – uczestnictwo i odpowiedzialność, solidarność, powstrzymywanie się od przemocy i dialog oraz służba na rzecz innych ludzi, wspólne dobro i ekologia. I trzecia grupa, dotycząca natury i kosmosu. Są to wartości ukierunkowane na ochronę natury i społeczności żyjących w środowisku naturalnym. Wartościami są tu woda, powietrze i ziemia. W omawianej koncepcji zabrakło wyraźnego odniesienia wartości do świata pozaludzkich istot żywych, zwierząt i roślin.

Wyobraźmy sobie, do jakich jeszcze innych zbiorów wartości zrównoważonego rozwoju moglibyśmy dojść, gdybyśmy w analizie oddalili się od prac profesjonalnych filozofów o kilka kolejnych kroków i skierowali wzrok na dokumenty z różnych konferencji politycznych, wypowiedzi działaczy gospodarczych, lokalne strategie zrównoważonego rozwoju powstające na terenie wielu państw, które w 1992 r. podpisały się pod dokumentem *Agenda 21*, i praktyki służące urzeczywistnieniu tej idei. Informacje na ten temat są dostępne. Można je znaleźć w opracowaniach przygotowanych przez Tadeusza Borysa i Adama Płachciaka (Borys, Plachciak, 2011), Dariusza Kiełczewskiego (Kiełczewski, 2007) oraz przeze mnie (Papuziński, 2010; 2011). Próby zaprezentowania wartości zapisanych w dokumentach polityki zrównoważonego rozwoju z perspektywy opracowań filozoficznych podjęli Artur Pawłowski (Pawłowski A., 2008) i Antoni Skowroński (Skowroński, 2003). Uzyskane wyniki są bardzo ważne pod względem poznawczym i praktycznym, w tym edukacyjnym. Niemniej sądzę, że warto przenieść punkt ciężkości dociekań filozoficznych na postulowany przez Birnbachera poziom wartości i norm idealnych (konstytutywnych), naj-

level proposed by Birnbacher, of ideal (constitutive) values and norms, this being the most suitable for evaluating the justifiability of existing catalogues of values and norms of sustainable development.

A typology of axiologies of sustainable development

The creation of *ideal types* aims to reduce the differences in studied phenomena and concepts to the most important features. In order for classification to meet the methodological requirement of accuracy, it must truly relate to these features, and not to others that are of little significance or even accidental. Thus the development of such a model classification of axiologies of sustainable development requires that several conditions be fulfilled. The first of them concerns reference to the common assumptions of philosophies of sustainable development: the classification should include those conceptions, and only those, which have a common theoretical foundation in the form of an adopted set of premises. The second condition results from the need to raise the analysis of conceptions of the philosophy of sustainable development above the level of the differences which divide them: it requires the creation of a research perspective superior to them, suited to the reconstruction of conceptual oppositions from one point of view. The third condition concerns the possibility of simplifying the analyses leading to the classification of axiologies of sustainable development by reducing the number of potential differences through the use of one of the existing typologies of philosophy of sustainable development in the broad sense discussed above: such typology may only be used if one can be confident that it is accurate, namely that the types distinguished by it do not stand in contradiction to the assumptions of the philosophy of sustainable development.

As regards the assumptions of the philosophy of sustainable development, reference can again be made to Gawor's position (Gawor, 2010). Although the set of premises described by him is of an *a priori* nature, in that it does not result from analysis of specific conceptions of the philosophy of sustainable development, it nonetheless deserves acceptance on the ground of the method adopted by Gawor. The assumptions have been reconstructed on the basis of the conviction, shared by the present author also, that the philosophy of sustainable development has a post-Enlightenment character. Below will be presented only some of the premises enumerated by Gawor, depending on their usefulness in the subsequent analysis.

At the foundations of the philosophy of sustainable development there lie, among others, assumptions of a metaphysical and anthropological nature. Metaphysical assumptions include realism and naturalwłaściwszy do oceny zasadności istniejących katalogów wartości i norm zrównoważonego rozwoju.

Typologia aksjologii zrównoważonego rozwoju

Tworzenie *typów idealnych* ma na celu ograniczanie różnic w badanych zjawiskach i koncepcjach do najważniejszych cech. Aby klasyfikacja sprostała metodologicznemu wymogowi trafności, musi rzeczywiście dotyczyć takich właśnie cech, a nie innych, mało istotnych lub wręcz akcydentalnych. Wobec tego wypracowanie takiej modelowej klasyfikacji aksjologii zrównoważonego rozwoju wymaga spełnienia kilku warunków. Pierwszy z nich dotyczy odwołania się do wspólnych założeń filozofii zrównoważonego rozwoju: w klasyfikacji powinny się znaleźć te i tylko te koncepcje, które mają wspólną podstawę teoretyczną w postaci przyjętego zbioru przesłanek. Drugi warunek wynika z potrzeby wzniesienia się w analizie koncepcji filozofii zrównoważonego rozwoju ponad dzielące je różnice: obliguje do wypracowania nadrzędnej wobec nich perspektywy badawczej, nadającej się do rekonstrukcji opozycji ideowych z jednego punktu widzenia. Trzeci warunek jest związany z możliwością uproszczenia analiz prowadzących do klasyfikacji aksjologii zrównoważonego rozwoju przez zredukowanie liczby potencjalnych różnic za sprawą wykorzystania którejś z istniejących typologii filozofii zrównoważonego rozwoju w opisanym powyżej szerokim sensie: można się posłużyć tylko taką, co do której będzie się miało pewność, że jest trafna, czyli że wyodrębnione w niej typy są niesprzeczne z założeniami filozofii zrównoważonego rozwoju.

W sprawie założeń filozofii zrównoważonego rozwoju ponownie się odwołam do stanowiska Gawora (Gawor, 2010). Chociaż opisany przez niego zbiór przesłanek ma charakter aprioryczny, jako że nie wynika z analizy konkretnych koncepcji filozofii zrównoważonego rozwoju, to jednak zasługuje na akceptację z powodu przyjętej przez Gawora metody. Założenia zostały zrekonstruowane na podstawie podzielanej również przeze mnie tezy o postoświeceniowym charakterze filozofii zrównoważonego rozwoju. Poniżej ograniczę się do przedstawienia części przesłanek wymienionych przez Gawora, kierując się ich przydatnością w dalszych analizach.

U podstaw filozofii zrównoważonego rozwoju leżą m.in. założenia metafizyczne i antropologiczne. Do założeń metafizycznych należy realizm i monizm naturalistyczny. Realizm prowadzi do rozumienia rzeczywistości przyrodniczej i społecznej jako samodzielnej i niezależnej w swym istnieniu od jakichkolwiek czynników, jak np. świadomość człowieka. Zgodnie z monizmem naturalistycznym rzeczywistość jest jednością bytową, co znaczy, że świat społeczny (socjosfera) jest integralną częścią natury (biosfery), a człowiek nie może być pojmo-

istic monism. Realism leads to an understanding of natural and social reality as autonomous and independent in its existence from any factors such as human consciousness. According to naturalistic monism, reality is the unity of being, which means that the social world (sociosphere) is an integral part of nature (the biosphere), and a human being cannot be understood as an entity ontologically different from nature. Anthropological assumptions include the rationality of human nature, which is reflected in the harmony between the gaining of increased knowledge about the world, successes in achieving mastery over nature, and human moral progress. This has three important consequences for the philosophy of sustainable development. The first is that morality is a sufficient shield against the negative effects of the technical applications of scientific achievements. The second is that a human is a self-critical being, and thanks to the ability to evaluate the effects of his own actions is able to adjust his set goals and the methods for attaining them. The third is that a human being's traits include the ability to overcome his own biological limitations in the process of creating a culture. In short:

1. life in the autonomous space of the characteristically human existence created by human rationality – the sociosphere – does not break the ontological bonds between a human being and objective reality (realism);
2. the expansion of the sociosphere is linked with a deepening of knowledge about objective reality, the development of technical means of influencing nature, and moral progress (the rationality of human nature);
3. the development of morality ensures the use of reason (rationality and knowledge) in the evaluation of the effects of one's own behaviour with reference to goals and the adjustment of those goals if they threaten the survival or significant features of the sociosphere (the rationality of human nature);
4. the causal dependence of the sociosphere on the biosphere is a sufficient premise for human responsibility for and care for the entirety of existence (naturalistic monism and the rationality of human nature).

As regards the typology of philosophy of sustainable development, I shall apply the classification developed by Hull, containing model encapsulations of the main types of such philosophy (Hull, 2005; 2009; 2011). I shall use this classification in the slightly modified version previously presented by myself in another paper (Papuziński, 2006/2). According to this version, the existing conceptions can be divided between three types of philosophy of sustainable development: pragmatic, systemic and conservational. Because the issue has been discussed thoroughly in several papers, the description given here will be restricted to a necessary minimum. Realism leads to an understanding of natural and social reality as autonomous and independent in its existence from any factors such as human consciousness. According to naturalistic monism, reality is the unity of being, which means that the social world (sociosphere) is an integral part of nature (the biosphere), and a human being cannot be understood as an entity ontologically different from nature. Anthropological assumptions include the rationality of human nature, which is reflected in the harmony between the gaining of increased knowledge about the world, successes in achieving mastery over nature, and human moral progress. This has three important consequences for the philosophy of sustainable development. The first is that morality is a sufficient shield against the negative effects of the technical applications of scientific achievements. The second is that a human is a self-critical being, and thanks to the ability to evaluate the effects of his own actions is able to adjust his set goals and the methods for attaining them. The third is that a human being's traits include the ability to overcome his own biological limitations in the process of creating a culture. In short:

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wany jako byt ontologicznie odmienny wobec przyrody. Do założeń antropologicznych należy teza mówiąca o racjonalności ludzkiej natury, która przejawia się w harmonii między pogłębianiem wiedzy o świecie, sukcesami w opanowywaniu natury i postępem moralnym człowieka. Wynikają stąd trzy istotne konsekwencje dla filozofii zrównoważonego rozwoju. Pierwsza mówi o tym, że moralność jest wystarczającą osłoną przed negatywnymi skutkami technicznych zastosowań osiągnięć naukowych. Druga – że człowiek jest istotą samokrytyczną, dzięki umiejętności zwrotnej oceny skutków własnego postępowania uzdolnioną do korekty stawianych sobie celów i metod ich osiągania. Trzecia – że do właściwości człowieka należy zdolność przezwyciężania własnych ograniczeń biologicznych w procesie tworzenia kultury. Krótko mówiąc:

1. życie w wykreowanej przez rozumność człowieka autonomicznej przestrzeni swoiście ludzkiej egzystencji – socjosferze – nie zrywa ontologicznych więzi człowieka z obiektywną rzeczywistością (realizm);
2. poszerzanie socjosfery jest związane z pogłębianiem wiedzy o obiektywnej rzeczywistości, rozwojem technicznych środków oddziaływania na przyrodę i postępem moralnym (racjonalność natury ludzkiej);
3. rozwój moralności zapewnia wykorzystanie rozumu (racjonalności i wiedzy) w zakresie oceny skutków własnego postępowania w odniesieniu do celów i korekty tych celów, jeśli zagrożą trwaniu lub istotnym właściwościom socjosfery (racjonalność natury ludzkiej);
4. kauzalna zależność socjosfery od biosfery jest wystarczającą przesłanką ludzkiej odpowiedzialności za i troski o całość bytu (monizm naturalistyczny + racjonalność natury ludzkiej).

Jeżeli chodzi o typologię filozofii zrównoważonego rozwoju, zastosuję klasyfikację opracowaną przez Hulla, zawierającą modelowe ujęcia głównych typów tej filozofii (Hull, 2005; 2009; 2011). Posłużę się nią w wersji nieznacznie przeze mnie zmodyfikowanej w innym artykule (Papuziński, 2006/2). Zgodnie z nią istniejące koncepcje dają się rozdzielić między trzy rodzaje filozofii zrównoważonego rozwoju: pragmatyczną, systemową i konserwatorską. Ponieważ sprawa została dokładnie omówiona w kilku opracowaniach, tutaj ograniczę charakterystykę do niezbędnego minimum. Wymienię ogólne cechy każdego rodzaju koncepcji i wskażę po dwa założenia: antropologiczne i aksjologiczne. Dodatkowo do każdej z nich dołączę krótką uwagę na temat specyfiki relacji występujących w danej typologii między założeniami filozofii zrównoważonego rozwoju. Dochodzę bowiem do wniosku, że istnienie trzech różnych typów filozofii zrównoważonego rozwoju w szerokim, ustalonym powyżej, znaczeniu tej nazwy jest konsekwencją konkretnych zależności w systemie tych założeń. Mianowicie

mum. The general features of each type of conception will be given, and two assumptions (anthropological and axiological) will be indicated in each case. In addition, a brief remark will be appended to each of them concerning the specific nature of the relations existing in the given typology between the assumptions of the philosophy of sustainable development. I'm convinced that the existence of three different types of philosophy of sustainable development (in the aforementioned broad meaning of the term) is a consequence of specific dependences in the system of those assumptions: it results from the reading of the meaning of the fourth premise from perspectives in which sometimes the first, sometimes the second and sometimes the third assumption dominates.

In the pragmatic version of the philosophy of sustainable development the main role is played by a premise assuming convergence between the development of morality and humans' inclination to use reason to evaluate the effects of their own actions with reference to goals and to adjust those goals if they pose a danger to people. The dominance of this assumption takes interpretation of the obligation to be responsible for and care for the entirety of existence to positions which are moderately anthropocentric and – within the framework of this variant of anthropocentrism – solidaristic. In this version, generally speaking, sustainable development is development based on a balance between economic growth and the state of ecosystems for the purpose of providing society with a high quality of life, understood in not only economic but also social and humanistic categories. In order to achieve that goal, it is proposed that an adjustment be made to the axiological system dominant in today's society, in favour of greater respect for the values of quality of life (measured using such parameters as life in a clean environment, health, freedom, equality, justice, work, solidarity between people, and universal access to basic goods, including to nature) as against values of comfort of life (measured by the amount of material consumption), and that mechanisms, primarily market mechanisms, be introduced to promote savings in raw materials and energy and reduction in quantities of unused waste. In other words, there is a movement here towards the joining together of objective and subjective measures of quality of life, through its definition in the categories *have*, *be* and *love*. A pragmatic philosophy of sustainable development is based on the following assumptions, which will be important for our further considerations:

1. the anthropological assumption that a human is a social being that can become self-fulfilled only in a specific historical community, through the relations established with other people within a given cultural system;
2. the axiological assumption that the most important value is solidarity with other people,

wynika z odczytania znaczenia czwartej przesłanki z perspektyw, w których raz dominuje pierwsze, raz drugie, a raz trzecie założenie.

W pragmatycznej wersji filozofii zrównoważonego rozwoju główną rolę odgrywa przesłanka zakładająca zbieżność pomiędzy rozwojem moralności a ludzką skłonnością do wykorzystania rozumu do oceny skutków własnego postępowania w odniesieniu do celów i korekty tych celów, jeśli zagrożą człowiekowi. Dominacja tego założenia prowadzi interpretację obowiązku odpowiedzialności za (i troski o) całość bytu na pozycje umiarkowanie antropocentryczne i – w ramach tego wariantu antropocentryzmu – solidarystyczne. W tej wersji, generalnie rzecz biorąc, rozwój zrównoważony to rozwój zakładający równowagę między wzrostem gospodarczym a stanem ekosystemów w celu zapewnienia społeczeństwu wysokiej jakości życia, rozumianej nie tylko w kategoriach ekonomicznych, ale i społecznych, humanistycznych. Aby osiągnąć ten cel proponuje się korektę dominującego we współczesnym społeczeństwie systemu aksjologicznego w stronę większego respektowania wartości jakości życia (mierzonej za pomocą takich parametrów, jak życie w czystym środowisku, zdrowie, wolność, równość, sprawiedliwość, praca, solidarność międzyludzka, powszechny dostęp do podstawowych dóbr, w tym przyrody) kosztem wartości komfortu życia (mierzonej wielkością materialnej konsumpcji) i wprowadzenie mechanizmów, przede wszystkim rynkowych, promujących oszczędność surowców i energii oraz zmniejszenie ilości niewykorzystywanych odpadów. Inaczej mówiąc, zmierza się tu w stronę połączenia obiektywnych i subiektywnych miar jakości życia, przez jej określenie w kategoriach *mieć*, *być* i *kochać*.

Pragmatyczna filozofia zrównoważonego rozwoju opiera się na następujących założeniach, ważnych ze względu na dalsze wywody:

1. antropologicznym – człowiek jest istotą społeczną, mogącą siebie spełnić wyłącznie w konkretnej historycznej wspólnocie, za sprawą relacji nawiązywanych z innymi ludźmi w ramach danego systemu kulturowego;
2. aksjologicznym – najważniejszą wartością jest solidarność z innymi ludźmi, jak np. rodzina, przyjaciele, współpracownicy, sąsiedzi itd., i poczucie więzi z obecnymi oraz przyszłymi pokoleniami.

W systemowej filozofii zrównoważonego rozwoju podstawowa funkcja przypada przesłance podkreślającej ontologiczne zakorzenienie człowieka w obiektywnej rzeczywistości. Ona kieruje refleksję na temat obowiązku odpowiedzialności człowieka za i troski o całość bytu na tory biocentryzmu. Omawiana wersja jest projektem radykalnych zmian cywilizacyjnych, które można by po nietzscheańsku określić przewartościowaniem wszystkich wartości pod kątem przewagi znaczenia stanu ekosystemów nad wzrostem gospodarczym i jako-

such as family, friends, colleagues, neighbours and so on, and the feeling of bonds with present and future generations.

In a systemic philosophy of sustainable development, the fundamental role is played by a premise that emphasizes a human being's ontological rootedness in objective reality. This causes reflection on the human obligation to be responsible for and care for the entirety of existence to be directed onto the path of biocentrism. The version discussed here is a project of radical changes in civilization, which could be defined, in Nietzschean fashion, as a revaluation of all values with respect to the superior importance of the state of ecosystems over economic growth and quality of life understood in any categories of material comfort. This means that in the case of conflict between economic, social and ecological goals, the decisive criterion is that of the state of the ecosystems. The greatest emphasis is placed on the proposition that we should *be* more. At the foundations of the systemic philosophy of sustainable development can be found the following philosophical assumptions:

1. the anthropological assumption that a human is simultaneously a social and natural being, able to become self-fulfilled only in a living community, through relations established with other living beings, human and non-human;
2. the axiological assumption that the most important value is life in every form, and consequently reverence (honouring, respect) for all life and the solidarity of the human world and the world of nature.

The conservational philosophy of sustainable development results from the adoption of an assumption which places emphasis on the expansion of the sociosphere through a continuous process of broadening of knowledge about objective reality, the development of technical means of influencing nature, and moral progress. An extreme anthropocentric approach to the human obligation to be responsible for and care for the entirety of existence results from the precedence given to the task of expanding the sociosphere. In this version economic growth takes priority over quality of life and the state of ecosystems. The issues of quality of life and state of ecosystems may not be overlooked completely, but in the first case precedence is taken by the ideal of comfort in life, consumption measured by quantities of material goods produced and consumed, while in the second case everything is limited to the conditions and restrictions imposed by nature on the economic growth that ensures the attainment of existing goals. This vision of the philosophy of sustainable development leads to an adjustment in the understanding of economic development as economic growth, but does not go beyond the proposition of coordinating existing forms of management with environmental conditions, and continues to see in economic growth a ścią życia pojmowaną w jakichkolwiek kategoriach materialnego komfortu. To oznacza, że w przypadku konfliktu między celami ekonomicznymi, społecznymi i ekologicznymi rozstrzyga kryterium stanu ekosystemów. Najmocniejszy akcent zostaje postawiony nad postulatem, by *bardziej być*. U podstaw systemowej filozofii zrównoważonego rozwoju można odnaleźć następujące założenia filozoficzne:

1. antropologiczne – człowiek jest jednocześnie istotą społeczną i przyrodniczą, mogącą siebie spełnić wyłącznie we wspólnocie życia, za sprawą relacji nawiązywanych z innymi, ludzkimi i pozaludzkimi, istotami żywymi;
2. aksjologiczne – najważniejszą wartością jest życie w każdej postaci – a co za tym idzie – rewerencja (cześć, szacunek) dla wszelkiego życia i solidarność świata ludzkiego i świata przyrody.

Konserwatorska filozofia zrównoważonego rozwoju jest wynikiem przyjęcia założenia kładącego nacisk na rozrost socjosfery za sprawą ciągłego procesu poszerzania wiedzy o obiektywnej rzeczywistości, rozwoju technicznych środków oddziaływania na przyrodę i postępu moralnego. Skrajnie antropocentryczne podejście do obowiązku odpowiedzialności człowieka za i troski o całość bytu jest rezultatem przyznania pierwszeństwa zadaniu rozbudowy socjosfery. W tej wersji zakłada się priorytet wzrostu gospodarczego przed jakością życia i stanem ekosystemów. Co prawda i tutaj kwestia jakości życia oraz stanu ekosystemów nie są całkowicie pomijane, ale w pierwszym przypadku góruje nad nią ideał komfortu życia, konsumpcji liczonej miarą wytwarzanych i zużywanych dóbr materialnych, natomiast w drugim – wszystko ogranicza się do przyrodniczych uwarunkowań i ograniczeń wzrostu gospodarczego, zapewniającego realizację dotychczasowych celów. Omawiane teraz ujęcie filozofii zrównoważonego rozwoju prowadzi do korekty rozumienia rozwoju gospodarczego jako wzrostu ekonomicznego, jednak nie wykracza poza postulat koordynacji dotychczasowych form gospodarowania z warunkami środowiskowymi i nadal upatruje we wzroście gospodarczym gwarancji powodzenia działań podejmowanych we wszystkich innych sferach ludzkiej aktywności. Wiernie obstaje przy tradycyjnym postulacie epoki rozpoczętej w dobie rewolucji przemysłowej: *więcej mieć*. Konserwatorska filozofia zrównoważonego rozwoju wspiera się na następujących przesłankach filozoficznych:

1. antropologicznej – człowiek jest rozumnym egoistą, ludzkim atomem sumującym się arytmetycznie w zbiorowość autonomicznych (równych) indywiduów;
2. aksjologicznej – najważniejszą wartością jest dobro (wolność) jednostki.

Rekonstrukcja typów filozofii zrównoważonego rozwoju ukazała zachodzenie ścisłych związków tej

guarantee of the success of actions taken in all other spheres of human activity. It remains faithful to the traditional proposition of the epoch which began at the time of the Industrial Revolution: *have* more. The conservational philosophy of sustainable development is based on the following philosophical premises:

1. the anthropological assumption that a human being is a rational egoist, a human atom which can be summed arithmetically into a community of autonomous (equal) individuals;
2. the axiological assumption that the most important value is the good (freedom) of the individual.

This reconstruction of the types of philosophy of sustainable development shows the overlapping of the strict relations of that classification with assumptions of an anthropological and axiological nature. This is an important indicator for the building of a classification of axiologies of sustainable development, but does not remove the difficulties relating to the conceptualization of very different doctrines. In such cases, Leszek Nowak suggests the application of *ordinary standards of theoretical work*. These standards involve thinking outside controversies through the use of one's own language, suitable for the reconstruction of oppositions of ideas. In our case the disputes relate to matters of axiology. A language in which it would be possible to describe the controversies over the values of sustainable development is thus – according to Nowak – the language of human nature, of anthropology. This operation makes it possible to treat different axiological versions as reactions to a belief concerning man and who he *really* is, that is, ignoring all accidental features and additional circumstances. A similar approach is taken by Charles Taylor, to systematize the debate between communitarians and liberals, which is full of misunderstandings caused by confusion of concepts (Taylor, 2004). Taylor proposes making use of the ontology of social conditions as a set of issues relating to matters considered to be factors explaining social life. This approach requires the definition of categories which may be considered final in the order of explanation. In spite of the differences between the proposals of Nowak and Taylor, the effect of their proposed procedures is the same. In each case it reduces to an understanding of the human being. The two authors' concretizations of the manner of understanding the human being only appear to entail differences in the procedure for developing the desired tool. For Nowak such categories are altruism and egoism, while for Taylor they are atomism and holism, but if we interpret the categories used by Taylor in the way that their author does, the discrepancies cease to be so marked. In both cases the matter reduces to the same thing, to the differences in the manner of understanding a social good: differences between its understanding

klasyfikacji z założeniami o charakterze antropologicznym i aksjologicznym. Jest to ważna wskazówka w sprawie budowy klasyfikacji aksjologii zrównoważonego rozwoju, ale nie usuwa trudności związanych z konceptualizacją bardzo różnych doktryn. W takich przypadkach Leszek Nowak podpowiada zastosowanie *zwykłych standardów roboty teoretycznej*. Standardy te polegają na myślowym wyjściu poza kontrowersje przez zastosowanie własnego języka, nadającego się do rekonstrukcji opozycji ideowych. W naszym przypadku spory dotyczą spraw aksjologicznych. Takim językiem, w którym dałoby się opisać kontrowersje w sprawie wartości zrównoważonego rozwoju jest zatem język – jak pisze Nowak – natury ludzkiej, antropologii. Przedstawiony zabieg pozwala potraktować odrębne wersje aksjologiczne jako reakcje na przekonanie dotyczące człowieka, tego kim on *naprawdę* jest, czyli z pominięciem wszelkich przypadkowych cech i dodatkowych okoliczności. Podobnie postępuje Charles Taylor w celu uporządkowania debaty między komunitarianami i liberałami pełnej nieporozumień z powodu pomieszania pojęć (Taylor, 2004). Taylor proponuje sięgnięcie do ontologii bytu społecznego jako zbioru kwestii dotyczących spraw uważanych za czynniki wyjaśniające życie społeczne. Takie podejście wymaga określenia kategorii, które mogą być uznane za ostateczne w porządku wyjaśniania. Pomimo różnic między propozycjami Nowaka i Taylora, efekt proponowanych przez nich procedur jest zbieżny. Za każdym razem sprowadza się do rozumienia człowieka. Zastosowane przez obu autorów konkretyzacje sposobu pojmowania człowieka tylko pozornie różnicują procedurę wypracowywania poszukiwanego narzędzia. Chociaż dla Nowaka takimi kategoriami są altruizm i egoizm, zaś dla Taylora – atomizm i holizm, to po przyjęciu odautorskich interpretacji kategorii stosowanych przez Taylora rozbieżności przestają być takie wyraźne. W obu przypadkach sprawa sprowadza się do jednego, do różnic w sposobie rozumienia społecznego dobra: różnic między pojmowaniem go jako dobra wspólnego zbiorowości nieredukowalnej do swoich ludzkich składników lub jako dobra będącego sumą dóbr poszczególnych jednostek.

Zarysowana perspektywa badawcza wskazuje na zbieżności w zakresie założeń antropologicznych pragmatycznej i systemowej filozofii zrównoważonego rozwoju. W obu przypadkach człowiek jest pojmowany holistycznie, tzn. jako istota społeczna, która nie może siebie spełnić poza wspólnotą, niezależnie od sposobu rozumienia wspólnoty i zakresu istot, jakie do niej należą. Konserwatorska filozofia zrównoważonego rozwoju pozostaje w jaskrawej opozycji w stosunku do pozostałych dwu koncepcji. Zajmuje stanowisko indywidualistyczne. Traktując człowieka w kategoriach ludzkiego atomu, staje po drugiej stronie barykady ujęć wspólnotowych.

as a good of a joint community irreducible to its human components, or as a good being the sum of the goods of particular individuals.

The research perspective outlined here indicates a convergence, as regards anthropological assumptions, of the pragmatic and systemic philosophies of sustainable development. In both cases the human being is conceived holistically, namely as a social being that cannot achieve self-fulfilment outside a community, irrespective of the manner of understanding a community and the range of beings considered to belong to it. The conservational philosophy of sustainable development stands in clear opposition to the other two, in that it takes an individualistic position. By treating a human being in the categories of human atom, it stands on the other side of the barricade as regards views of communality.

Hand in hand with the division of positions into holistic and individualistic goes the division of attitudes into altruistic and egoistic. Altruism involves placing another's good above one's own, and egoism the opposite. The pragmatic and systemic philosophies of sustainable development give preference to altruism. Both of them propose a limitation of consumption (moderation, restraint, asceticism) wherever this can be afforded, as well as solidarity with others, particularly through provision of general access to limited environmental goods. They also share with altruism a focus on *spiritual* aspects of quality of life, such as the boosting of the value of life through satisfaction obtained from close contacts with others and self-fulfilment in opening up to or devoting oneself to others. Here again it is necessary to neglect the different content which might be assigned to the category of *another* or *others*, since from the point of view of altruism these are of secondary importance. It is thus not significant here whether these terms include only people or also non-human beings. Of significance, on the other hand, is the proposal to continue efforts concentrated on the material good of one's own *ego*, associated with the conservational philosophy of sustainable development. The ideal of the rational egoist corresponding to that philosophy conflicts with the inclination to share one's own good with others.

The aforementioned features of the considered versions of the philosophy of sustainable development can be extended into other oppositions of importance for their axiology. These include the opposition between good and right, which has led to differences of opinion as regards the primacy of one of those alternatives over the other. Holism's approach to good is fundamentalistic, while its approach to right is teleological (finalistic). Individualism takes opposite positions in these questions. Holism assumes the priority of that which is important for the community: its constitutive common good. In holism, good and right have a dual

Z podziałem stanowisk na holistyczne i indywidualistyczne idzie w parze rozdział postaw między altruistyczne i egoistyczne. Altruizm polega na przedkładaniu cudzego dobra nad własne; egoizm – przeciwnie. Pragmatyczna i systemowa filozofia zrównoważonego rozwoju preferują altruizm. W obu przypadkach postuluje się ograniczenie konsumpcji (umiar, wstrzemięźliwość, ascezę) wszędzie tam, gdzie można sobie na to pozwolić, oraz solidarność z innymi, zwłaszcza w postaci upowszechnienia dostępu do ograniczonych dóbr środowiskowych. Z altruizmem łączy je także ukierunkowanie na *duchowe* aspekty jakości życia, jak np. dowartościowanie życia przez satysfakcję czerpaną z bliskich kontaktów z innymi i samospełnienia w otwarciu się na lub poświęceniu dla drugiego. Ponownie należy tutaj abstrahować od treści, jakie można podłożyć pod kategorię *inny* lub *drugi*, gdyż z punktu widzenia altruizmu mają drugoplanowe znaczenie. Jest więc tu obojętne, czy będą to tylko ludzie, czy także istoty pozaludzkie. Natomiast nieobojętny jest postulat kontynuacji wysiłku skoncentrowanego na materialnym dobru własnego *ja*, należący do konserwatorskiej filozofii zrównoważonego rozwoju. Odpowiadający jej ideał rozumnego egoisty kłóci się ze skłonnością do dzielenia własnym dobrem z innymi.

Przedstawione cechy omawianych wersji filozofii zrównoważonego rozwoju znajdują przedłużenie w innych, istotnych dla ich aksjologii, opozycjach. Należy do nich opozycja między dobrem a prawem, którą zrodziły różnice zdań w sprawie prymatu jednej ze stron tej alternatywy. Podejście holizmu do dobra jest fundamentalistyczne, natomiast w stosunku do prawa – teleologiczne (finalistyczne). Indywidualizm zajmuje w tych kwestiach przeciwstawne pozycje. Holizm wychodzi z założenia o pierwszeństwo tego, co ważne dla wspólnoty: konstytutywnego dla niej wspólnego dobra. Dobro i prawo łączy w holizmie podwójna relacja: dobro jest źródłem prawa, zaś prawo – strażnikiem dobra. Indywidualizm wychodzi z założenia o budowie społeczeństwa z równych sobie presocjalnych jednostek, które podjęły decyzję o wspólnym życiu. Taka wizja społeczeństwa uzasadnia szczególny nacisk, jaki indywidualizm przykłada do zagwarantowania jednostce ochrony uprawnień przed zagrożeniami ze strony innych. Dlatego w indywidualizmie uprawnienia, prawa są pierwotne względem dobra wspólnego, co znaczy, że nie ma dobra wspólnego bez wypracowania immanentnych mechanizmów ich ochrony.

Kolejna sprawa dotyczy opozycji między jednostką a osobą. Jeżeli przez osobę rozumieć istotę mającą swoją indywidualną tożsamość, obdarzoną specyficzną osobowością, żyjącą w określonym społeczeństwie i pozostającą w konkretnych relacjach z innymi, a do tego zdolną – oczywiście dopiero po uwzględnieniu jego prawomocności i słuszności jego roszczeń – do znalezienia sobie miejsca w

relationship: good is the source of right, while right is the protector of good. Individualism assumes that society is built up from presocial individuals who are equal to each other and who have taken a decision to live together. This vision of society justifies the particular emphasis placed by individualism on the protection of the entitlements of the individual against threats from others. Thus in individualism it is entitlements and rights that take primacy over the common good, which means that there is no common good without the development of immanent mechanisms for their protection.

Another issue concerns the opposition between individual and person. If the person is understood as a being having its own individual identity, imbued with a specific personality, living in a specified society and having concrete relations with others, and also capable – naturally only following consideration of its legal validity and the legitimacy of its claims – of finding a place within the boundaries of the existing moral order (Selznik, 2004), then such an entity is, from the perspective of theory, a product of holism, altruism and the primacy of good over right. The pragmatic and systemic philosophies of sustainable development use the concept of a human being as a person. However if the individual is taken to be a party to a wide variety of contracts, abstracted out of the social context, namely a being whose essence is defined by the ability to be such or other party, such as a party in work, in consumption or in the educational services provided by institutions of higher education, then such an entity is, from the perspective of theory, a product of individualism, egoism and the primacy of rights over good. The theoretical picture of human being as individual belongs to the axiology of the conservational philosophy of sustainable development.

The conclusion? To the three-element typology of philosophies of sustainable development there correspond two types of axiological conception. For the purposes of our further analysis, we will call these respectively the holistic-altruistic and individualistic-egoistic axiologies of sustainable development.

The holistic-altruistic axiology of sustainable development is a part of the pragmatic and systemic versions of the philosophy of sustainable development. It is characterized by such features as holism (communality), altruism, acknowledgement of the primacy of good over right, and the vision of human being as person.

The individualistic-egoistic axiology of sustainable development is a part of the conservational philosophy of sustainable development. Its features include individualism, egoism, acknowledgement of the primacy of rights over good, and the vision of human being as individual.

granicach panującego porządku moralnego (Selznik, 2004), to ktoś taki jest z punktu widzenia teorii wytworem holizmu, altruizmu i prymatu dobra przed prawem. Pragmatyczna i systemowa filozofia zrównoważonego rozwoju operują pojęciem człowieka jako osoby. Jeżeli natomiast za jednostkę wziąć wyabstrahowany z kontekstu społecznego podmiot najprzeróżniejszych kontraktów, tzn. osobnika, którego istotę określa zdolność do bycia takim czy innym podmiotem, jak np. podmiot pracy, podmiot konsumpcji lub podmiot usług edukacyjnych świadczonych przez szkolnictwo wyższe, to ktoś taki jest z perspektywy teorii produktem indywidualizmu, egoizmu oraz prymatu uprawnień przed dobrem. Teoretyczny obraz człowieka jako jednostki należy do aksjologii konserwatorskiej filozofii zrównoważonego rozwoju.

Wniosek? Trzyelementowej typologii filozofii zrównoważonego rozwoju odpowiadają dwa rodzaje koncepcji aksjologicznych. Na użytek dalszych analiz jedną nazwę holistyczno-altruistyczną, zaś drugą – indywidualistyczno-egoistyczną aksjologią zrównoważonego rozwoju.

Holistyczno-altruistyczna aksjologia zrównoważonego rozwoju jest częścią pragmatycznej i systemowej wersji filozofii zrównoważonego rozwoju. Charakteryzują ją takie cechy, jak: holizm (wspólnotowość), altruizm, uznanie prymatu dobra przed prawem i wizja człowieka jako osoby.

Indywidualistyczno-egoistyczna aksjologia zrównoważonego rozwoju jest częścią konserwatorskiej filozofii zrównoważonego rozwoju. Właściwe jej są następujące cechy: indywidualizm, egoizm, uznanie prymatu uprawnień przed dobrem i wizja człowieka jako jednostki.

Aksjologia zrównoważonego rozwoju w świetle krytyki

Zadaniem etyki było i nadal jest poprowadzenie człowieka do dobrego życia i dbałości o to, co na dobre życie się składa. Niemniej etyka się zmienia. Jak pisała Maria Ossowska, współczesna myśl etyczna dawno odeszła od traktowania moralności jako drogi prowadzącej do szczęścia czy jako sztuki zdobywania doskonałości na rzecz pojmowania moralności jako umiejętności współżycia społecznego (Ossowska, 1963). Dzisiejsze doktryny aksjologiczne oddziałują na rzeczywistość poprzez mobilizację ludzi, czyli skłonienie ich do zajęcia określonej postawy. Na ogół zawierają trzy części składowe: dalekosiężny cel autoteliczny, cel instrumentalny i środki do realizacji tego celu. Ich siła zależy w pierwszym rzędzie od atrakcyjności celów i wiarygodności zalecanych środków. *Żaden argument etyczny nie ma mocy, jeśli nie jest powiązany z powodami skłaniającymi ludzi do działania* – słusznie twierdzi John Gray (Gray, 2001). Dalekosiężny

The axiology of sustainable development in the light of criticism

The task of ethics has been, and continues to be, to lead people to a good life and lead them to care for the things that constitute a good life. Nonetheless, ethics is changing. As Maria Ossowska writes, contemporary ethical thought has long moved away from treating morality as a path leading to happiness or as an art of achieving perfection, towards an understanding of morality as the ability to co-exist in society (Ossowska, 1963). Today's axiological doctrines influence reality through the mobilization of people, that is, by inclining them to adopt a particular attitude. They generally contain three component parts: a far-reaching autotelic goal, an instrumental goal and means for the attainment of that goal. Their power depends primarily on the attractiveness of the goals and the credibility of the proposed means. No ethical argument has power if it is not accompanied by reasons persuading people to act, as John Gray rightly points out (Gray, 2001). The far-reaching goal of the axiology of sustainable development is sufficiently resounding that for almost four decades it has mobilized the chief actors of the international political scene, as well as world public opinion. Sustainable development was the subject of the three largest political conferences of recent years, the so-called *Earth Summits* (1992, 2002, 2012), in which almost all the countries of the world participated. Ultimately, as I have said, the stake is success in the game of overcoming the global dangers brought by our civilization. However in the case of the instrumental goals and the means dedicated to them, things become complicated. As can be seen, the two axiologies of sustainable development are not only different, but mutually exclusive. Thus each of them defines differently – though under the same name of sustainable development – its instrumental goal, understood as the desired state of social relations defined by the dominant attitudes of people towards each other and towards nature. In addition, each of them proposes different means for the achievement of its instrumental goal.

Identification of the existence of two separate axiological projects within the concept of sustainable development creates opportunities to bring order to the ongoing discussion on that subject. It is important to differentiate the currents of that discussion and to identify a type of axiology which is criticized with particular force. Anticipating our further considerations, it can be stated that critical attention has been centred on one of these versions – the individualistic-egoistic axiology of sustainable development. This criticism is based on justified doubts in relation to the described features of that conception.

cel aksjologii zrównoważonego rozwoju jest na tyle nośny, by od bez mała czterech dekad mobilizować głównych aktorów międzynarodowej sceny politycznej oraz światową opinię publiczną. Trzy największe konferencje polityczne ostatnich lat, tzw. *Szczyty Ziemi* (1992, 2002, 2012), w których uczestniczyły prawie wszystkie kraje globu, były wszak poświęcone zrównoważonemu rozwojowi. W końcu – jak o tym pisałem – stawką jest sukces w grze o przezwyciężenie globalnych zagrożeń niesionych przez naszą cywilizację. Jednak w przypadku celów instrumentalnych i poświęconych im środków sprawa się komplikuje. Jak można się było przekonać, obie aksjologie zrównoważonego rozwoju są nie tylko różne, ale wręcz nawzajem się wykluczają. Wobec tego każda z nich inaczej – choć pod tą samą nazwą zrównoważonego rozwoju – definiuje swój cel instrumentalny, rozumiany jako pożądany stan stosunków społecznych określony przez dominujące w nim postawy ludzi wobec siebie nawzajem i wobec przyrody. I jednocześnie każda z nich podaje inne środki do realizacji swego instrumentalnego celu.

Wskazanie na istnienie dwóch odrębnych projektów aksjologicznych w łonie koncepcji zrównoważonego rozwoju stwarza szanse na uporządkowanie dyskusji prowadzonych na jego temat. Ważne jest rozróżnienie nurtów tej dyskusji i ustalenie rodzaju aksjologii krytykowanej ze szczególną mocą. Uprzedzając dalsze wywody powiem, że w centrum krytycznej uwagi znalazła się jedna z tych wersji – indywidualistyczno-egoistyczna aksjologia zrównoważonego rozwoju. Składają się na nią uzasadnione wątpliwości w stosunku do opisanych cech tej koncepcji.

Indywidualizm

Perspektywa poznawcza, w której działania społeczne, struktury i warunki tłumaczy się własnościami podejmujących te działania i tworzących owe struktury i warunki jednostki ma wielu krytyków. Zdaniem Henryka Skolimowskiego indywidualistyczna perspektywa poznawcza wywodzi się z doświadczenia bezgranicznego udziału ludzkiej woli w czynie i chorobliwie hołduje przejawom wszelkiej wolności. Jednostka, której cechy odgrywają tak znaczną rolę w procesie wyjaśniania i rozumienia, jest istotą samowolną, niezdolną do kierowania się jakimikolwiek zasadami ogólnymi (Fiut, 2009). W kontekście aksjologii zrównoważonego rozwoju duże wątpliwości budzi możliwość realizacji zasady sprawiedliwości pokoleniowej i międzypokoleniowej w oparciu o wizję własności człowieka jako abstrakcyjnej jednostki ludzkiej. Czy doktryna, która w drugim człowieku nie widzi bliźniego, kogoś z kim jesteśmy połączeni poczuciem wspólnoty i węzłami moralnych więzi oraz trwałymi zobowiązaniami może dopomóc w do-

Individualism
The cognitive perspective in which social actions, structures and conditions are explained by properties of the entities taking those actions and creating those structures and conditions has many critics. In the view of Henryk Skolimowski, the individualistic cognitive perspective originates from experience of the unlimited part played by human will in actions, and pays a pathological homage to all symptoms of any type of freedom. The entity whose features play such an important role in the process of explaining and understanding is a wilful being, incapable of being guided by any general principles (Fiut, 2009). In the context of the axiology of sustainable development, serious doubts arise in connection with the possibility of realizing the principle of generational and intergenerational fairness based on a vision of the properties of a human being as an abstract human individual. If a doctrine does not see in another person a neighbour, someone with whom we are connected by a feeling of community, moral bonds and lasting obligations, can that doctrine help in perceiving humanity in another person? Does the ability of an individual to enter into contracts for the realization of the current project of his good life provide sufficient stimulation to action beyond his *here* and *now*? Can the sum of such individual goods, variable over time, be sensibly acknowledged as a common good of humanity in its broadest sense? If not, we will have a society oriented towards the attainment of short-term benefits at the cost of groups that do not have the chance to play a part in the contract: those too poor to be able to contribute anything to it, and those too unreal as they are not yet born. The first will be more and more marginalized, and the second are denied their rights. Hans Jonas was inspired to make a philosophical interpretation of the principle of responsibility for exactly the reason that in the case of unexisting future generations there can be no possibility of contractual responsibility (Jonas, 1996).

Egoism
Belief in the positive potential of rational egoism takes strength from the successes of the past, primarily from the importance of the idea of egoism in the origins of parliamentary democracy and the free market, which set in motion the mechanisms of the political freedoms of modern society. Can it therefore be hoped that the accumulated potentials of individual egoists, known metaphorically as the *invisible hand of the market*, will stop the trend towards *snowballing growth in inequality* (Pawłowski L., 2012) and bring to a halt the process of unsustainable development in modern civilization? In the light of what we know about the growth of poverty, reinforcement of ecologically irrational and wasteful models of production and consumption, and the development of new civilization-

strzeżeniu ludzkości w drugim człowieku? Czy zdolność jednostki do zawierania kontraktów dla realizacji bieżącego projektu jej dobrego życia wystarczająco stymuluje do działań poza jej *tu* i *teraz*? Czy sumę takich indywidualnych, zmiennych w czasie dóbr możemy sensownie uznać za wspólne dobro jak najszerzej pojętej ludzkości? Jeśli nie, będziemy mieli do czynienia ze społeczeństwem ukierunkowanym na osiąganie doraźnych korzyści kosztem zbiorowości będących bez szans na udział w kontrakcie: zbyt biednych, by mogły do niego coś wnieść i nazbyt nierzeczywistych przed swoimi narodzinami. Pierwsze będą coraz bardziej marginalizowane, drugim odmówi się ich praw. Hans Jonas został zainspirowany do filozoficznego wypracowania zasady odpowiedzialności właśnie z tego względu, że w przypadku nieistniejących przyszłych pokoleń odpowiedzialność kontraktowa nie wchodzi w grę (Jonas, 1996).

Egoizm
Wiara w dodatni potencjał racjonalnego egoizmu czerpie siłę z sukcesów przeszłości. Przede wszystkim ze znaczenia idei egoizmu w genezie demokracji parlamentarnej i wolnego rynku, które uruchomiły mechanizmy wolności politycznych współczesnego społeczeństwa. Czy wobec tego można mieć nadzieję, że skumulowane potencjały pojedynczych egoistów znane pod nazwą przysłowiowej *niewidzialnej ręki rynku* powstrzymają trend do *lawinowego narastania nierówności* (Pawłowski L., 2012) i zahamują proces niezrównoważonego rozwoju współczesnej cywilizacji? Czy w świetle naszej wiedzy o wzroście ubóstwa, utrwalaniu ekologicznie nieracjonalnych, rozrzutnych wzorców produkcji i konsumpcji, narastaniu nowych konfliktów cywilizacyjnych, społecznych i politycznych można nadal sądzić, że egoizm jest kluczem do minimalizacji wspólnych strat i maksymalizacji społecznych korzyści, sposobem na generowanie zysków, które obejmą wszystkich, także najsłabszych i następne pokolenia? Pozytywna odpowiedź na te pytania kłóci się z ukierunkowaniem egoizmu na cel maksymalizacji własnego dobra w przypadku kolizji z dobrem partnera interakcji. Zdaniem Zdzisławy Piątek taka odpowiedź wynika z błędnego utożsamienia racjonalności politycznej i racjonalności gospodarczej z racjonalnością ekologiczną (Piątek, 2011). Do tego dodam racjonalność społeczną.

Pierwszeństwo uprawnień przed dobrem
Komunitarianie pytają o sens doktryny, która stawia siebie ponad całym spektrum dóbr i wartości podlegających wyborowi, przez lansowanie absolutnego prawa wyboru i decydowania o sobie. I rozważają, czy pod *płaszczem swobodnego wyboru* nie przemyca się jakiegoś partykularnego dobra, którego treścią jest nie napotykające przeszkód zaspokajanie ludzkich zachcianek. W takim ujęciu mielibyśmy do czynienia – jak pisze Piotr Przybysz

related, social and political conflicts, can egoism continue to be considered the key to the minimization of common losses and maximization of social benefits, a way of generating profits that will accrue to all, including the weakest groups and future generations? An affirmative answer to these questions stands in contradiction to the orientation of egoism towards the goal of maximizing one's own good in case of conflict with the good of one's partner in interaction. According to Zdzisława Piątek, such an answer results from an erroneous identification of political and economic rationality with ecological rationality (Piątek, 2011). To this, the present author would add social rationality.

Primacy of rights over good

Communitarians question the sense of a doctrine that sets itself above the whole spectrum of goods and values subject to choice, by postulating an absolute right to choose and to decide about oneself. They consider whether under the *mantle of free choice* there is being smuggled some particularistic kind of good consisting in the uninhibited satisfaction of human cravings. On such an approach we would have, in the words of Piotr Przybysz, *a particularistic ethical system which places a certain personality type, a certain type of behaviour, above others. It would make the satisfaction of desires into a moral problem, and would justify immoderation in that matter on the ground of human rights* (Przybysz, 1994). This is undoubtedly one of the reasons for the increase in scepticism towards the natural-law doctrine in recent political philosophy, but not the only one. From the perspective of discourse on the philosophy of sustainable development, in the contemporary debate on human rights it is also important to consider the views of those (such as Amitai Etzioni) who point out the abuses connected with the extension of human rights to the natural world, using arguments that call into question the differences between laws of nature and natural human entitlements. The discourse conducted in the language of goods is free of such defects, since it permits the development of arguments referring to views being subject to the evaluation of common sense and based on knowledge, capable of being the subject of discussion and negotiation. Such discourse, according to Alasdair MacIntyre and Michael Oakeshott, leads into the sphere of considerations of virtue, and hence of that which is not given to us, but requires our self-discipline, courage and sacrifice. Ultimately it directs the attention towards institutions capable of standing guard over such goods, initiating and enabling virtuous behaviour (Śpiewak, 1998).

Vision of the human being as individual

The perception of a human as an individual, capable of being a party to contracts, alienates the human being from the culture of symbolic communi-

z – *partykularnym systemem etycznym, wywyższającym pewien konkretny typ osobowościowy, pewien typ zachowania, ponad inne. Z zaspokajania pragnień czyniłaby ona problem moralny, a nieumiarkowanie w tym względzie usprawiedliwiała prawami człowieka* (Przybysz, 1994). Jest to zapewne jeden z powodów wzrostu sceptycyzmu wobec doktryny prawnonaturalnej w najnowszej filozofii polityki, ale nie jedyny. Z punktu widzenia dyskursu filozofii zrównoważonego rozwoju w debacie prowadzonej współcześnie na temat praw człowieka ważne są te głosy (np. Amitai Etzioni), które wskazują na nadużycia związane z rozszerzaniem praw człowieka na świat przyrodniczy przez zastosowanie argumentacji kwestionującej różnice między prawami natury i naturalnymi uprawnieniami ludzkimi. Dyskurs prowadzony w języku dóbr jest pozbawiony takich mankamentów, gdyż pozwala na rozwinięcie argumentacji odwołującej się do racji poddawanych ocenie rozsądku i bazujących na wiedzy, mogących być przedmiotem dyskusji i negocjacji. Taki dyskurs – jak twierdzą Alasdair MacIntyre i Michael Oakeshott – wprowadza w sferę rozważań o cnocie, a więc tego co nie jest dane, ale wymaga od nas samodyscypliny, odwagi i poświęceń. W końcu kieruje uwagę na instytucje zdolne na stania na straży takich dóbr, inicjując i umożliwiając cnotliwe postępowanie (Śpiewak, 1998).

Wizja człowieka jako jednostki

Kontraktowa podmiotowość człowieka jako jednostki alienuje człowieka z kultury symbolicznej zbiorowości. Jednostka pozbawiona kontaktu z wartościami i dobrami scalającymi wspólnoty, odseparowana od dóbr i wartości pozwalających jej na identyfikację ze wspólnotą odnajduje się na polu potrzeb materialnych. Zatratę starej tożsamości symbolicznej nadrabia w trakcie budowy nowej tożsamości materialnej *człowieka jednowymiarowego*, jak to określił Herbert Marcuse. Kumulacja nietrwałych dóbr materialnych jest próbą rekompensaty utraty dostępu do trwałych wartości symbolicznych. Odwołując się do książki Daniela Bella *Kulturowe sprzeczności kapitalizmu* Ralph Dahrendorf zauważa, że oparta na takich stabilnych wartościach protestancka etyka oszczędzania, ciężkiej pracy i odkładania zapłaty uległa wobec siły oddziaływania współczesnej kultury *bezzwłocznego zużycia*. Produkcja ustąpiła miejsca dystrybucji, wytwarzanie – sprzedaży. Podczas gdy w gospodarce nadal panuje racjonalność wydajności, w kulturze zapanowało dążenie do *folgowania sobie*, stała się hedonistyczna, skoncentrowana na zabawie i uciechach. *Kiedyś ideałem było zapracowywanie sobie dniem dzisiejszym na radość przyszłej zapłaty, obecny styl życia polega na radowaniu się teraz, a odpracowywaniu (ewentualnym) tego w przyszłości. Jest w tym coś więcej niż styl, a na pewno więcej niż moda. Bez coraz bardziej złożonych syste-*

ty. An individual deprived of contact with the values and goods that integrate communities, separated from the goods and values which enable him to identify with the community, rediscovers himself in the field of material needs. He makes up for the loss of the old symbolic identity while building a new material identity of a *one-dimensional man*, as Herbert Marcuse put it. The accumulation of impermanent material goods is an attempt to make up for the loss of access to durable symbolic values. Referring to Daniel Bell's book *The Cultural Contradictions of Capitalism*, Ralph Dahrendorf notes that the Protestant ethics of thrift, hard work and the postponement of reward, which is based on such stable values, has surrendered to the influential power of the contemporary culture of *immediate consumption*. Production has given way to distribution, and manufacturing to selling. While in economics the rationality of productivity remains dominant, in culture the striving to *indulge oneself* has come to the fore; it has become hedonistic, focused on play and amusements. The well-known sociologist writes: *At one time it was an ideal to work today for the joy of future reward, while the present-day lifestyle is based around experiencing enjoyment now and (possibly) working it off in the future. In this there is something more than style, and certainly more than fashion. Without ever more complex systems of credit, neither individuals nor whole economies would any longer be capable of functioning* (Dahrendorf, 1993). Dahrendorf draws attention to the changes which occur, under the influence of the reduction of the human being to a *one-dimensional* individual, even in the economic system, accelerating the consumption of raw materials and the process of degradation of the biosphere. They support the opinion concerning the nature of contemporary hedonism – that it is insatiable. The fruitless effort of filling the gap left by the values of a symbolic culture of community condemns the individual to the Sisyphean effort of rebuilding an identity in the field of consumption. Having regard to the individualistic-egoistic version of the axiology under consideration, one is compelled to agree with Wiesław Sztumski, who states that *the idea of sustainable development is continuously subordinated to the ideology of consumptionism. In fact sustainable development supports and maintains that ideology, since it does not resist excessive growth in consumption, but merely attempts to impose certain restrictions. These, however, have not been precisely defined. The ideology of sustainable development is just a particular variant of the ideology of consumptionism* (Sztumski, 2009).

As can easily be deduced, the individualistic-egoistic version of the axiology of sustainable development is a legacy of the liberal tradition. Hence it may be considered to be the subject of criticisms which demand that the concept of sustainable de-

mów kredytowych nie byłyby już zdolne do funkcjonowania ani jednostki, ani całe gospodarki (Dahrendorf, 1993), napisał znany socjolog. Wypowiedź Dahrendorfa zwraca uwagę na zmiany, jakie pod wpływem redukcji człowieka do *jednowymiarowej* jednostki zachodzą także w systemie gospodarczym, przyspieszając zużycie surowców i proces degradacji biosfery. Potwierdzają one opinię o charakterze współczesnego hedonizmu – jest nienasycony. Bezowocny trud wypełnienia luki po wartościach symbolicznej kultury wspólnoty skazuje jednostkę na syzyfowy wysiłek odbudowy tożsamości na polu konsumpcji. Mając na uwadze indywidualistyczno-egoistyczną wersję omawianej aksjologii trzeba się zgodzić z Wiesławem Sztumskim, który twierdzi, że *idea rozwoju zrównoważonego ciągle jest jeszcze podporządkowana ideologii konsumpcjonizmu. Właściwie rozwój zrównoważony wspiera i podtrzymuje tę ideologię, gdyż nie przeciwstawia się nadmiernemu wzrostowi spożycia, a tylko próbuje nałożyć pewne ograniczenia. Nie zostały one jednak precyzyjnie określone. Ideologia rozwoju zrównoważonego jest tylko pewnym wariantem ideologii konsumpcjonizmu* (Sztumski, 2009).

Jak nietrudno wywnioskować, indywidualistyczno-egoistyczna wersja aksjologii zrównoważonego rozwoju jest spadkiem po tradycji liberalnej. Dlatego można do niej odnieść krytyki, które domagają się oczyszczenia koncepcji zrównoważonego rozwoju od wpływów neoliberalizmu (Hull, 2007; Hull, 2008; Pawłowski L., 2012; Piątek, 2011). Chodzi w nich o to, że – jak ujął to Redclift – *idea zrównoważonego rozwoju, osiągnąwszy wiek dorosły, jest obecnie pozbawiana pełni praw dorosłego obywatela. W miejsce nowych, radykalnych interpretacji, które zmuszałyby nas do zmiany pojmowania znaczenia zrównoważonego rozwoju, termin jest zwykle jedynie bezkrytycznie dołączany do istniejących praktyk i polityk* (Redclift, 2009).

Zakończenie

Ukierunkowanie filozofii zrównoważonego rozwoju na poszukiwanie wyjścia z pułapki globalnych zagrożeń nadaje jej aksjologii dodatkowy wymiar – wymiar historiozoficzny. W dobie wzrastającego sceptycyzmu wobec filozoficznych wizji historii wydaje się to przedsięwzięciem co najmniej ryzykownym. W jednym z artykułów Piątek podejmuje wątek historiozoficznych aspektów filozofii zrównoważonego rozwoju. Zdecydowanie odcina się od interpretacji zrównoważonego rozwoju w kategoriach obiektywnych praw postępu historycznego, wykazując, że bieg ludzkich dziejów oraz sens zdarzeń historycznych zależą od ludzkiego działania. Odwołując się do koncepcji historii otwartych możliwości Rajmunda Poppera, Piątek twierdzi, że w omawianą koncepcję zostały wpisane takie tendencje rozwojowe, które wyznaczają nowy zakres

velopment be purified of the effects of neoliberalism (Hull, 2007; Hull, 2008; Pawłowski L., 2012; Piątek, 2011). The point of this criticism is that, as Redclift put it, the idea of sustainable development, having reached the age of maturity, is now being deprived of the full rights of an adult citizen. Instead of new radical interpretations which would compel us to change our understanding of the meaning of sustainable development, the term is usually merely appended uncritically to existing practices and policies (Redclift, 2009).

Conclusion

The orientation of the philosophy of sustainable development towards seeking a way out of the trap of global dangers gives its axiology an additional dimension – the historiosophical dimension. In an era of increasing scepticism towards philosophical visions of history, this seems to be at the very least a risky undertaking. In one of her papers, Piątek takes up the thread of the historiosophical aspects of the philosophy of sustainable development. She makes a determined break from the interpretation of sustainable development in categories of objective laws of historical progress, showing that the course of human history and the meaning of historical events depend on human action. Referring to Popper's concept of the history of open possibilities, Piątek states that the conception under consideration has incorporated such developmental tendencies as delineate a new range of possibilities of progress both in the evolution of life and in the history of humankind (Piątek, 2007).

Can this view be applied to both axiological versions of sustainable development? In the light of the analysis carried out, the individualistic-egoistic axiology does not provide stimulation to take account of new possibilities. At most it leads to an adjustment in existing environmental, economic and social policy. In this version of the exteriorization of the concept of sustainable development, the original idea has undergone alienation. The fundamental defects of the individualistic-egoistic axiology result from an attempt to solve contemporary existential problems by making use of the same values that condition them, which – as Einstein wrote with regard to the serious problems faced by humanity – is not in any way possible (Dufas, Hoffman, 1979). Ironically, Einstein's view fits very well into the logic of liberalism. The historical meaning of liberalism is based on a striving to build such a society which is able to call itself into question, in so far as social practices and institutions cease to be, in the opinion of citizens, an embodiment of norms worthy of voluntary acceptance on their part. The experience obtained from unsuccessful attempts to reach the end of history, in the meaning given to those words in the doctrines of Hegel and Marx, leads to the conclusion that every civilization has only a transient status.

możliwości postępu zarówno w ewolucji życia, jak i w dziejach ludzkości (Piątek, 2007).

Czy przytoczoną opinię można odnieść do obu aksjologicznych wersji zrównoważonego rozwoju? W świetle przeprowadzonej analizy, indywidualistyczno-egoistyczna aksjologia nie stymuluje do uwzględniania nowych możliwości. Co najwyżej prowadzi do korekty dotychczasowej polityki ochrony środowiska, gospodarczej i społecznej. W przypadku tej wersji eksterioryzacji koncepcji zrównoważonego rozwoju doszło do alienacji pierwotnej idei. Podstawowe braki aksjologii indywidualistyczno-egoistycznej wynikają z próby rozwiązania współczesnych kwestii egzystencjalnych za pomocą tych samych wartości, które je warunkują, co – jak o tym pisał Einstein mając na uwadze poważne problemy, przed którymi stanęła ludzkość – nie jest w ogóle możliwe (Dufas, Hoffman, 1979). Jak na ironię, opinia Einsteina bardzo dobrze wpisuje się w logikę liberalizmu. Historyczne znaczenie liberalizmu polega przecież na dążeniu do zbudowania takiego społeczeństwa, które jest w stanie samo siebie zakwestionować, o ile tylko społeczne praktyki i instytucje przestaną być w opinii obywateli ucieleśnieniem norm z ich strony godnych dobrowolnej akceptacji. Doświadczenie zdobyte na podstawie nieudanych prób dotarcia do kresu historii, w znaczeniu nadanym tym słowom w doktrynach Hegla i Karola Marksa, prowadzi do wniosku o przemijającym statusie każdej cywilizacji.

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PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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Exergy, Life and Sustainable Development

Egzergia, życie i rozwój zrównoważony

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Abstract
Humankind faces the most serious challenge ever – sustainable development. A new paradigm based on respect of nature and awareness of natural mechanisms is needed. The concept of exergy and exergy based methods offers a unique potential to support this. Applications to real problems and possible solutions are presented and applied to living systems and the process of sustainable development. In particular, implications on the educational systems are addressed.

Key words: exergy, sustainable development

Streszczenie
Ludzkość staje przed największym jak dotąd wzywaniem, którym jest konieczność wprowadzenia rozwoju zrównoważonego. Potrzebny jest tu nowy paradygmat oparty na szacunku wobec przyrody i znajomości mechanizmów rządzących naturą. Koncepcja egzergii i jej metody stanowią ogromny potencjał, który należy tu wykorzystać. W pracy powiązano teorię egzergii z problemami występującymi w realnym świecie, dyskutując możliwe rozwiązania, odnosząc je zarazem do żywych systemów i procesów związanych ze zrównoważonym rozwojem. W szczególności, podkreślono implikacje odnoszące się do systemów edukacyjnych.

Słowa kluczowe: egzergia, rozwój zrównoważony

Introduction

The evolution of knowledge is essential to human cultures. Every human culture carries a unique cultural paradigm – the soil for knowledge to grow and flourish. The diversity of cultures in our world is essential to the evolution of human knowledge – our creative diversity. This diversity is the well-spring of our progress and creativity.
Present focus must be on relationships; between humans and with nature. Today these relationships are too often characterized by greed and violence fostered by the present cultural paradigm, or arrogance and ignorance instead of friendship and compassion. This must change into a culture of peace. Peace within us, peace among us and peace with nature are essential for happiness, harmony and knowledge to flourish.
We, the people of the world, are also children of Earth with a common goal to care for life itself. We were given intelligence, emotions and possibilities, but also responsibilities. With these gifts we have created a world of prosperity, but also of poverty. The world has brought us together, but also apart and away from nature. We face a future of threats and limitations, but also possibilities. These challenges demand careful and responsible actions from everyone, based on a better understanding together with moral obligations.
The ongoing depletion of nature's capital must come to an end before it is too late. Values are lost and substances are spread in the environment when nature's capital is exploited and consumed by our economies. The physical conditions in nature change and create instability. New life forms that are better fitted to these new conditions will appear, i.e. *survival of the fittest*. Some of these new organisms will not support present higher forms of life, e.g. *homo sapiens*. We see this as new diseases. The *bird flu* virus (H5N1) and the recent *E. coli* bacteria (EHEC) outbreak in Europe are just but examples of an ongoing creation of new organisms that will go on as long as suitable conditions are offered. Thus, present industrial society is fertilizing its own

extinction. The only solution to sustainable development for humankind is to restore and preserve nature's capital. This enforces a new paradigm based on increasing the capital of nature instead of exploiting it. Present technology and social management are founded, to a large extent, on the knowledge offered by science. Yet it is precisely these structures and their impact, which we know to be unsustainable. This implies tremendous efforts by the academia, which gradually adopts the new situation. In some areas of science this even relates to a complete change of paradigm. Science is partly the problem as well as a part of the solution for a sustainable development.

2. Nature

Nature is the only creator and holder of life, as far as we know. From our understanding there are some fundamental conditions that maintain this unique capacity of nature.

2.1. Contrast, Motion, Exergy, and Time

In order for things to happen, i.e. motion to occur, there must be a driving force: something that can create action. A force is created by a difference in space of some kind, i.e. a contrast. This is a physical quantity such as temperature, pressure or tension. When this force, due to a contrast, is acting, it is also partly lost as irreversibility. This depletion is the creator of time. Thus, by allowing a contrast enclosed by the three-dimensional space to act, a new fourth dimension is created, i.e. time.

Exergy is the physical concept of contrast, which quantifies its power of action. A system in complete equilibrium with itself and the environment does not have any exergy, i.e. no power of action. Exergy is defined as work, i.e. ordered motion, or ability to perform work. Time is experienced when exergy is destroyed, i.e. a irreversible process, which creates a motion in a specific direction, i.e. in the direction of time.

The limited speed of light is also of essential importance for the life support systems. If light could move at infinite speed, the sun could, in principal, release all its stored exergy immediately, thus, there would be no time for life to appear. The light from other stars in the universe brings also with it the history, due to the limited speed of light. When we look into space, we look into the history of the universe. The border of the universe gives us its time of birth, or the so-called *big bang*, perhaps the birth of time.

2.2. Energy, Matter, Exergy, and Entropy

Energy and matter cannot be created, destroyed, produced or consumed. Energy and matter can only be converted into different forms. This occurs by the consumption of contrast. Locally, the contrast may increase, but this can only occur at the expense of an even greater deterioration of the contrast elsewhere. On the whole it is a question of continuous deterioration of contrast, thus, pointing out the existence and direction of time, see Figure 1.

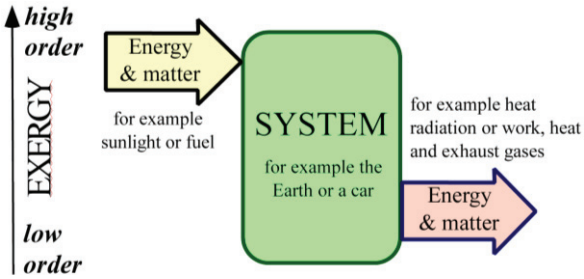

Figure 1. The flow of energy and matter through a system. Source: Author's own work.

Energy and/or matter flow through a system. The motive force of the flow of energy and/or matter through the system is the contrast or the level of order. Energy and/or matter are falling from high order, i.e. low entropy, in the inflow into low order, i.e. high entropy, in the outflow. This is also expressed as a destruction of exergy, see below (Wall, 1977 & 1986).

Energy and matter only serve as carriers of contrast, which is partly consumed when it flows through a system. When energy and matter flow through a system, a very small part of this may sometimes be stored in or removed from the system. If there is a balance between inlets and outlets of energy and matter, the system will remain unchanged, a kind of steady state, that is described in Figure 1. Such steady state systems are the moon and a car. The moon offers us moonlight and a car is a mean of transport, however, the systems remain in principal unchanged. Table 1 summarizes some thermodynamic differences between energy and exergy.

Table 1. Energy versus Exergy. Source: Author's own work.

Energy	**Exergy**
The first law of thermodynamics	The second law of thermodynamics
Energy is motion or ability to produce motion.	Exergy is work, i.e. ordered motion, or ability to produce work.
Energy and matter is *the same thing*.	Exergy and information* is *the same thing*.
Energy is always conserved, i.e. in balance; it can neither be produced nor consumed.	Exergy is always conserved in a reversible process, but reduced in an irreversible process, i.e. real processes. Thus, exergy is never in balance for real processes.
Energy is a measure of quantity.	Exergy is a measure of quantity and quality.

*as defined in information theory (Tribus, 1961; Wall 1977 & 1986).

If exergy is stored in the system we may have a viable state, i.e. life may flourish. Logic would suggest therefore that the existence of life and the

evolution of life imply that exergy from the sun must be stored on Earth.

2.3. Earth, the Sun and Space

The source of exergy on Earth is secured from the contrast between the sun and space, see Figure 2. The exergy on Earth exists through the conversion of energy from sunlight into heat radiation, which flows from Earth back into space. Due to this, all flows of energy and matter are carried forward through systems on Earth's surface, and life can be created and maintained.

Figure 2. The Sun-Earth-Space system. Source: Author's own work.

2.4. Life

Life in nature relates to three fundamental processes: production, consumption, and decomposition. These maintain the circulation of energy and matter in the biosphere by using the incoming sunlight in a sustainable and evolutionary way, see Figure 3.

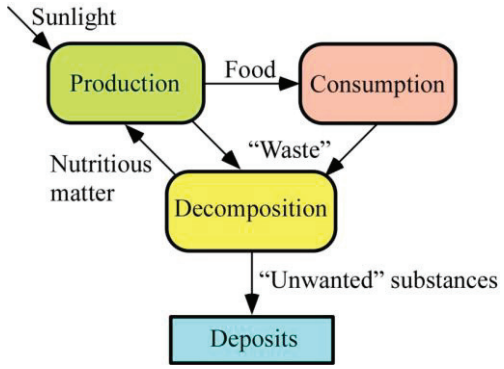

Figure 3. The circulation of energy and matter in the biosphere powered by sunlight. Source: Author's own work.

Green plants, which represent the production process, convert exergy from sunlight into the exergy-rich matter of biomass, via photosynthesis. The exergy as biomass then passes through different food chains in the ecosystems. At every trophic level exergy is consumed and decomposition organisms dominate the last level in this food chain. There is no waste, however a removal of *unwanted* substances. Nature operates a unique machinery of development on Earth by capturing and sealing certain substances into deposits of minerals into Earth's crust. A fraction of the exergy from the sun-space contrast is stored as an increase of the exergy capital on Earth. This appears as a net-flow of *unwanted* substances from the biosphere into the lithosphere as well as a redistribution of other substances in the environment, e.g. oxygen to the atmosphere. Thus, the exergy capital on Earth is increasing, which is a key factor in nature's process of evolution.

3. Society

Present industrial society, is built on an unsustainable resource use, see Figure 4. Fossil fuels and metals that originate from deposits of minerals in the lithosphere are unsealed and spread in the environment, which is exactly the opposite of what is done by nature (Figure 3). This is obviously not sustainable, at least not for a very long time. Resource depletion and environmental destruction are two consequences of the use of deposits. In a closed system *nothing disappears and everything disperses* which state that these substances will unavoidably end up in the environment.

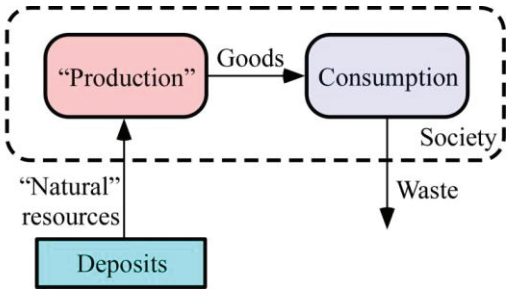

Figure 4. Society depletes nature's capital and returns waste. Source: Author's own work.

In Figure 5, we see how the resource use in the society is maintained. The greater part of the exergy requirements are utilized from the terrestrial exergy stocks, i.e. funds and deposits. Only a very small part of the natural exergy flow from the sun is used directly. Through society we see an almost continuous exergy loss. Some exergy flows, such as flows of metals, initially increase their exergy when passing through society. However, other flows decrease their exergy all the more. A tank, which contains the funds and the deposits, indicates the limited amount of exergy stocks or capital on Earth. As long as the levels are kept stable, i.e. the output of resources does not exceed the input from the sun and the biological processes, then we have a sustainable situation. However, if the level is dropping, i.e. the exergy capital is depleting then we have an unsustainable situation and unwanted substances will contaminate the environment. As long as these substances are under control this may not be a serious problem. Large amount of substances are accumulated in the society as constructions, e.g. buildings and machines, and, as long as these remain, their substances may not influence the environment. However, when they are allowed to de-

compose some of them may pose a serious threat, e.g. old nuclear, chemical, and biological arms that are not safely stored or destroyed. This also relates to harmful substances that are accumulated by a purification system, e.g. used filters and sediments from sewage treatment works, cyclone separators and scrubbers. However, human constructions and buildings will not last forever. Sooner or later they will deteriorate and their substances will end up in the environment. Thus, environmental pollution is an inevitable consequence of the use of deposits. The depletion of the resource may not be the most serious problem, but rather the emission of pollutant and unwanted substances into the environment. The use of fossil fuels inevitably leads to a buildup of carbon dioxide in the atmosphere with severe impact on the climate. The concern for an eventual lack of non-renewable resources must be combined by a similar concern for the environmental impact and its consequences from the emission of these substances. Presently, only nature offers the machinery to put these substances back into the lithosphere (Figure 3). However, the present damage may take nature millions of years to repair, and in the meantime there will be a serious impact on the living conditions for all forms of life.

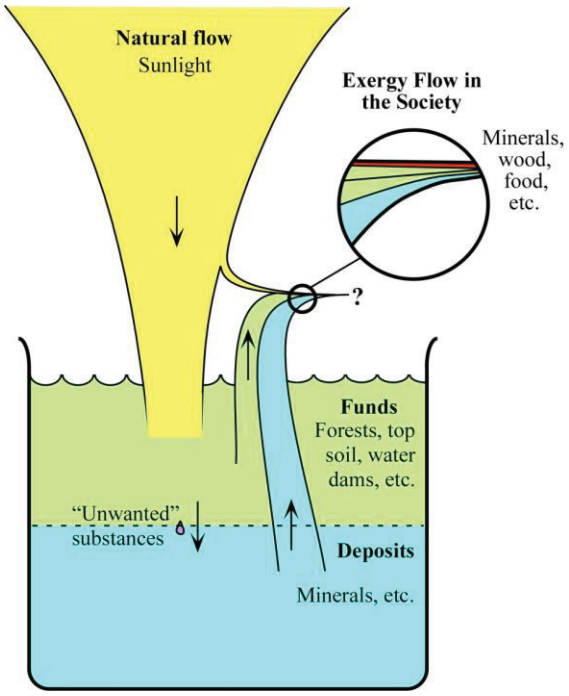

Figure 5. Exergy flows to the society. Source: Author's own work.

Figure 6 shows the exergy flow in the society in more detail, in this case the main conversions of energy and materials in Sweden in 1994 (Gong & Wall, 2001). The situation is more or less the same today. The flows go from the resource base to the consumption sector. Thus, the diagram basically represents the resource supply sector where resources such as crops and minerals are turned into consumer goods such as food, transport and thermal comfort. The inflows are ordered according to their origins. Sunlight is thus a renewable natural flow. Besides a minor use of wind power, far less than 5 PJ, this is the only direct use of a renewable natural flow. Harvested forests, agricultural crops, and hydropower are renewable exergy flows derived from funds. Iron ore, nuclear fuels, and fossil fuels are flows from deposits, which are exhaustible and also carry with them toxic substances. The unfilled boxes represent exergy conversions, which in most cases represent a huge number of internal conversions and processes. The total inflow of resources during 1994 amounts to about 2720 PJ or 310 GJ *per capita* and the net output becomes 380 PJ or 40 GJ *per capita*. Thus, the overall efficiency of the supply sector can be estimated at less than 15%. As we can see, some sectors are extremely inefficient. Some resource conversion systems have a ridiculously poor efficiency. For nuclear fuel to space heating through short circuit heaters the utilization becomes less than 0.025% (Gong & Wall, 2001).

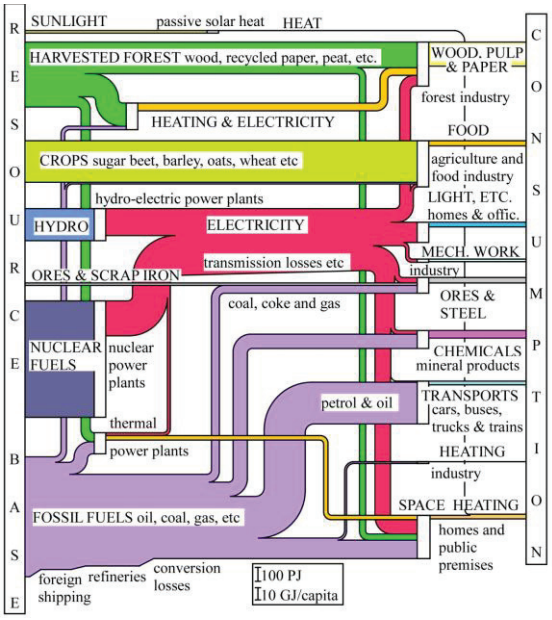

Figure 6. Exergy use in the Swedish society in 1994. Source: Author's own work.

The emission of unwanted substances from the industrial society is likely to produce diverse and unpredictable consequences in the biosphere. New microorganisms adapted to new environments will appear, see Figure 7. Existing microorganisms, i.e. bacteria, fungi and viruses, provide the conditions on which present forms of life are founded. All forms of life are built on the existence of a specified mixture of certain microorganisms.

The incredible power of these tiny organisms must not be ignored. One single bacterium could in theory fill out the entire solar system within a few weeks if it were allowed to multiply without limitations. This describes the power of the living foundation of nature's life support system and the dan-

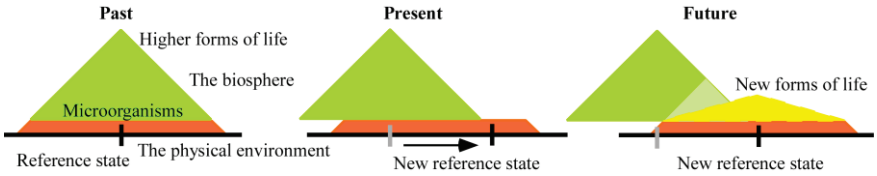

Figure 7. *Survival of the Fittest* is a driving force in the evolution. Source: Author's own work.

ger of interfering with this. By changing the physical environment it becomes unfavorable for existing microorganisms as well as for present higher forms of life. This may be recorded as a reduction in the number of species. However, the new physical environment that is offered will also encourage new forms of life to appear, initially by new microorganisms that are better fitted to the new conditions, e.g. bacteria that develop immunity to antibiotics. Later new insects or insects with new characteristics will appear, such as malaria mosquitoes that are resistant to DDT. This is what Darwin expresses as *the survival of the fittest*. Toxicity is a condition that can be reversed when transferred to different biological systems. A toxic substance is of course harmful for some organisms but at the same time it offers a new ecological niche that soon will be occupied by new organisms. This is a dangerous consequence of environmental pollution and an important perspective on the *bird flu* virus.

Thus, industrial society may nourish its own extinction by degrading the biological foundations of human existence. It would be very naive to believe that new microorganisms will only live in harmony with the present higher forms of life. The immediate signs of this are the appearance of new diseases as the *bird flu* virus and *E. coli* bacteria, less resistance against existing diseases due to a weakened immune system and the increasing rate of chronic allergy. It must be remembered that nature lives, i.e. is a living highly intelligent system. This will be further discussed below.

4. Exergy

The exergy concept originates from works of Carnot (1824), Gibbs (1873) Rant (1956) and Tribus (1961). Exergy of a system is (Wall, 1977 & 1986)

$$E = U + P_0 V - T_0 S - \sum_i \mu_{i0} n_i \quad (1)$$

where U, V, S, and n_i denote extensive parameters of the system (energy, volume, entropy, and the number of moles of different chemical materials i) and P_0, T_0, and μ_{i0} are intensive parameters of the environment (pressure, temperature, and chemical potential). Analogously, the exergy of a flow can be written as:

$$E = H - T_0 S - \sum \mu_{i0} n_i \quad (2)$$

where H is the enthalpy.

All processes involve the conversion and spending of exergy, thus high efficiency is of most importance. This implies that the exergy use is well managed and that effective tools are applied.

4.1. Exergy Losses

Energy is always in balance, however, for real processes exergy is never in balance due to irreversibilities, i.e. exergy destruction that is related to the entropy production by

$$E_{\text{in}}^{\text{tot}} - E_{\text{out}}^{\text{tot}} = T_0 \Delta S^{\text{tot}} = \sum_i (E_{\text{in}} - E_{\text{out}})_i > 0 \quad (3)$$

where ΔS^{tot} is the total entropy increase,

$E_{\text{in}}^{\text{tot}}$ is the total exergy input,

$E_{\text{out}}^{\text{tot}}$ is the total exergy output,

and $(E_{\text{in}} - E_{\text{out}})_i$ is the exergy destruction in process i.

The exergy loss, i.e. destruction and waste, indicates possible process improvements. In general *tackle the biggest loss first* approach is not always appropriate since every part of the system depends on each other, so that an improvement in one part may cause increased losses in other parts. As such, the total losses in the modified process may in fact be equal or even larger, than in the original process configuration. Also, the use of renewable and non-renewable resources must be considered. Therefore, the problem needs a more careful approach.

4.2. Exergy Efficiencies

A simple definition of efficiency expresses all exergy input as used exergy, and all exergy output as utilized exergy. So the exergy efficiency $\eta_{\text{ex},1}$ becomes

$$\eta_{\text{ex},1} = \frac{E_{\text{out}}}{E_{\text{in}}} = 1 - \frac{E_{\text{in}} - E_{\text{out}}}{E_{\text{in}}} \quad (4)$$

However, this efficiency does not always provide an adequate characterization of the thermodynamic efficiency of processes, such as heat transfer, separation, expansion etc. Often, there exists a part of the output exergy that is unused, i.e. an exergy waste E_{waste} to the environment. Thus, the utilized exergy is given by $E_{\text{out}} - E_{\text{waste}}$, which we call the exergy product E_{pr}. The output consists of two parts

$$E_{\text{out}} = E_{\text{pr}} + E_{\text{waste}} \quad (5)$$

The exergy efficiency $\eta_{\text{ex},2}$ now instead becomes

$$\eta_{ex,2} = \frac{E_{out} - E_{waste}}{E_{in}} = \frac{E_{pr}}{E_{in}} = \eta_{ex,1} - \frac{E_{waste}}{E_{in}} \quad (6)$$

Sometimes a part of the exergy going through the system is unaffected. This part of the exergy has been named the transit exergy E_{tr}, see Figure 8. Example of transit exergy is the exergy which goes unaffected through a production process, e.g. the exergy of crude oil being refined into petroleum products.

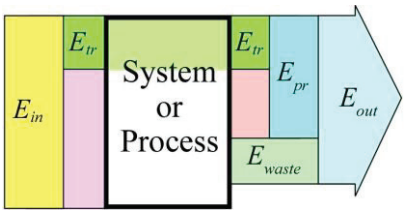

Figure 8. Process flows. Source: Author's own work.

If the transit exergy E_{tr} is deducted from both the input and the output exergy (or rather from exergy product), the exergy efficiency $\eta_{ex,3}$ becomes

$$\eta_{ex,3} = \frac{E_{out} - E_{waste} - E_{tr}}{E_{in} - E_{tr}} = \frac{E_{pr} - E_{tr}}{E_{in} - E_{tr}} \quad (7)$$

These latter definitions are compared by applying them to a system with two different processes A and B (Figure 9) The exergy efficiencies are for process A: $\eta_{ex,2}$=91% and $\eta_{ex,3}$=10%, and for process B: $\eta_{ex,2}$= $\eta_{ex,3}$=50%. Thus, determining which is the most efficient process is a matter of defining efficiency. In addition, the exergy destruction of process A is larger than that of process B, 9 versus 5.

A better insight is offered by using exergy flow diagrams since it shows: (1) the exergy efficiencies of the various parts of a system, (2) the different exergy inputs and outputs, (3) where the various exergy flows come from and go to, (4) the amount of transit exergy, (5) how much exergy is destroyed in each processes.

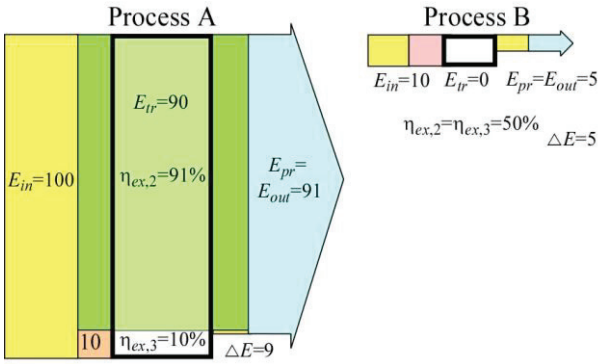

Figure 9. Comparing exergy efficiencies. Source: Author's own work.

4.3. *Exergy flow diagrams*

From the above it is clear that ambiguity reduces if an exergy flow diagram is used to demonstrate an exergy transfer instead of a ratio. In engineering, these diagrams are often used to describe the energy or exergy flows through a process.

Figure 10 shows a typical heat power plant, its main components and roughly the main energy and exergy flows of the plant. This diagram shows where the main energy and exergy losses occur in the process, and also whether exergy is destroyed from irreversibilities or whether it is emitted as waste to the environment. In the energy flow diagram energy is always conserved, the waste heat carries the largest amount of energy into the environment, far more than is carried by the exhaust gases. However, in the exergy flow diagram the temperature of the waste heat is close to ambient so the exergy becomes much less. The exergy of the exhaust gas and the waste heat are comparable.

Figure 11 illustrates the energy and exergy flows of an oil furnace, an electric heater, an electric heat pump and a combined power and heat plant, i.e. a co-generation plant. The produced heat is used for space heating. In the oil furnace the energy efficiency is assumed to be typically about 85%, losses being due mainly to the hot exhaust gases. The exergy efficiency is very low, about 4%, because the temperature difference is not utilized when the temperature is decreased, to a low of about 20°C, as a comfortable indoor climate.

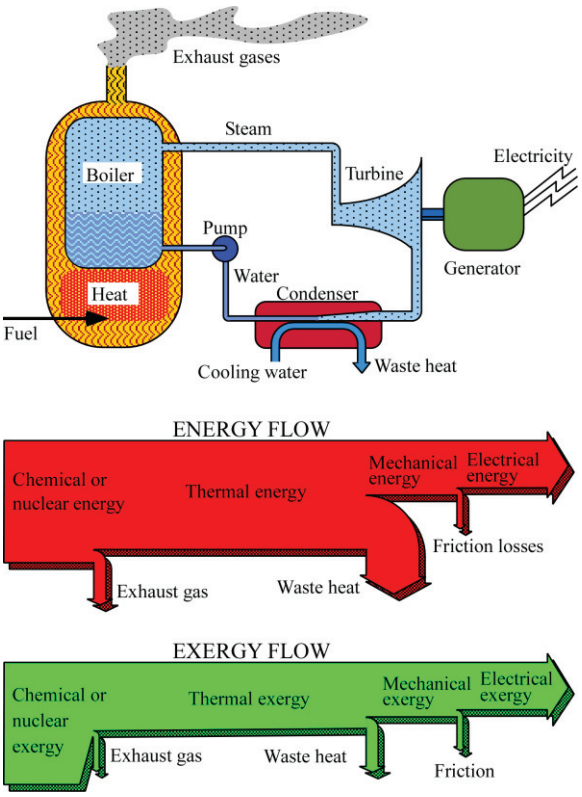

Figure 10. Energy and exergy flow diagrams of a heat power plant. Source: Author's own work.

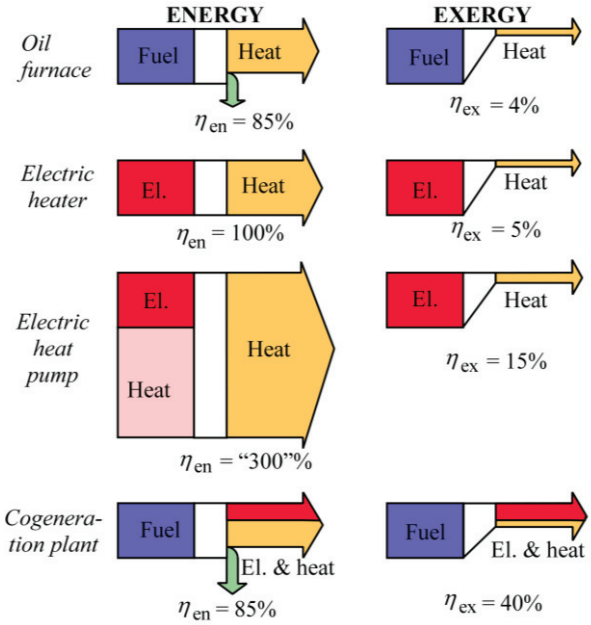

Figure 11. Energy and exergy flows through some typical energy systems. Source: Author's own work.

Electric heating by short-circuiting in electric resistors has an energy efficiency of 100%, by definition of energy conservation. The energy efficiency of an electric heat pump is not limited to 100%. If the heat originating from the environment is ignored in the calculation of the efficiency, the conversion of electrical energy into indoor heat can be well over 100%, e.g. 300% as in Figure 11. The exergy flow diagram of the heat pump looks quite different. The exergy efficiency for an electric heater is about 5% and for the heat pump, 15%.

In Figure 10 the energy and exergy efficiencies are the same because the inflow of fuels and the outflow of electricity both have an exergy factor of about or exactly 1 respectively. The exergy factor is by definition the relation between exergy and energy for a given form of energy. Both energy and exergy of chemical substances are related to agreed reference states, i.e. standard reference states for each substance. The reference state for energy and exergy respectively does not necessarily match. For energy the reference state is usually pure elements, whereas for exergy the reference state is carefully selected to meet the most environmental state for the substance. Thus, a substance may have different reference states for energy and exergy which implies that the exergy may exceed the energy value. This deserves further attention from the research community. In particular this is the case for some hydrocarbons (Szargut, 2005). For a combined power and heat plant, i.e. a cogeneration plant (Figure 11) the exergy efficiency is about the same as for a thermal power plant (Figure 10). The difference may vary and relates among other things to the heat and power ratio. This can be better understood from the exergy diagrams. The main exergy loss occurs in the conversion of fuel into heat in the boiler. Since this conversion is practically the same in both the condensing and the combined power plants, the total exergy efficiency will be the same, i.e. about 40%. However, it may be noted that the power that is instead converted into heat corresponds to a heat pump with a coefficient of performance (COP) of about 10. Thus, if there is a heating need a cogeneration plant is far superior to a condensing power plant. The maximum energy efficiency of an ideal conversion process may be over 100%, depending on the definition of efficiency. The exergy efficiency, however, can never exceed 100%. Due to definitions of the reference state the exergy factor, i.e. exergy.

4.4. Exergy Analysis

To estimate the total exergy input that is used in a production process it is necessary to take all the different inflows of exergy to the process into account. This type of budgeting is often termed Exergy Analysis (Wall, 1977 & 1986). There are basically three different methods used to perform an Exergy Analysis: a process analysis, a statistical analysis or an input-output analysis. The latter is based on an input-output table as a matrix representation of an economy. Every industrial sector is represented by a row and column in the matrix. The main advantage of this method is that it can quickly provide a comprehensive analysis of an entire economy. The main disadvantages results from the use of financial statistics and from the degree of aggregation in the table. In order to obtain a more detailed disaggregation than used in input-output tables it may be sufficient to make use of the more detailed statistics from which input-output tables are usually compiled. The method is called statistical analysis, which is basically a longhand version of input-output analysis. This method has two advantages over the input-output method: firstly, it can achieve a more detailed analysis, and secondly, it can usually be executed directly in physical units, thus avoiding errors due to preferential pricing, price fluctuations, etc. However, its disadvantage compared to the input-output method is that the computations usually have to be done manually. Process analysis, see Figure 12, focuses on a particular process or sequence of processes for making a specific final commodity. It evaluates the total exergy use by summing the contributions from all the individual inputs, in a more or less detailed description of the production chain. This is also often referred to as calculation of the cumulative energy or exergy use of specific product or service.

Net Exergy Analysis has also to be applied, see Figure 13. All exergy being used, directly or indirectly, in the production of the product will be deducted from the exergy of the product, in order to define the net exergy product. This method is of particular importance in the analyses of extracting fuels from tar sand and biomaterial.

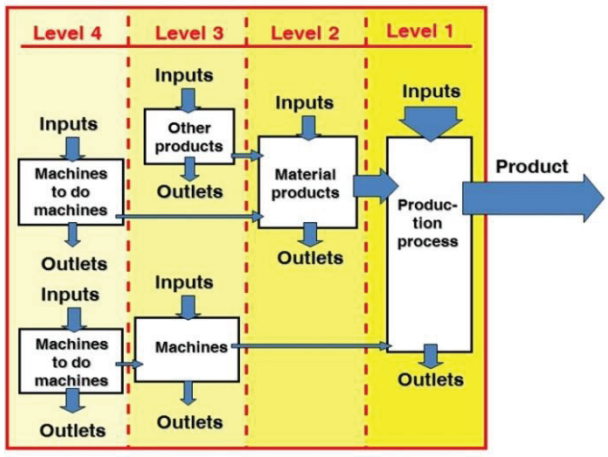

Figure 12. Levels of an exergy process analysis. Source: Author's own work.

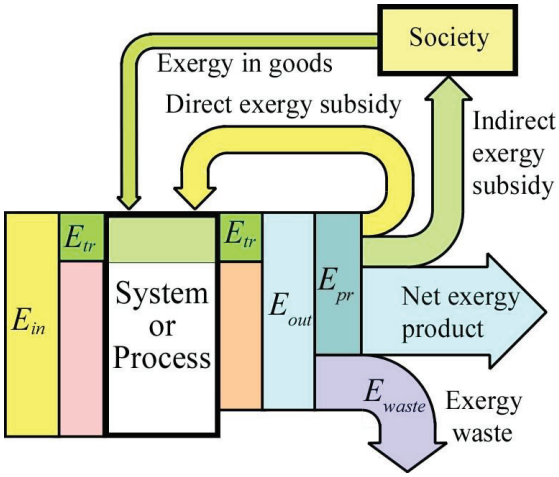

Figure 13. Net exergy analysis. Source: Author's own work.

4.4.1. Life Cycle Analysis or Assessment

Environmentally oriented Life Cycle Analysis or Assessment (LCA) has become very popular in the last decade to analyze environmental problems associated with the production, use and disposal or recycling of products or product systems, see Figure 14. Every product is assumed to be divided into these three *life processes*, or as it is sometimes named *from cradle to grave* or *from cradle to cradle*.

Figure 14. The life cycle *from cradle to grave*. Source: Author's own work.

For every *life process* the total inflow and outflow of energy and material is computed, thus, LCA is similar to Exergy Analysis. In general Exergy Analysis and LCA have been developed separately even though they are strongly linked. This inventory of energy and material balances is then put into a framework of four stages: (1) Aims and limits or Goals and scope, (2) Inventory, (3) Environmental impact, and (4) Measures, see Figure 15. These four main parts of an LCA are indicated by boxes, and the procedure is shown by arrows. Solid arrows show the basic steps and dashed arrows indicate suitable next steps, in order to further improve the analysis.

In LCA the environmental burdens are associated with a product, process, or activity by identifying and quantifying energy and materials used, and wastes released to the environment. Secondly one must assess the impact on the environment, of those energy and material uses and releases. Thus it is divided into several steps (Figure 15).

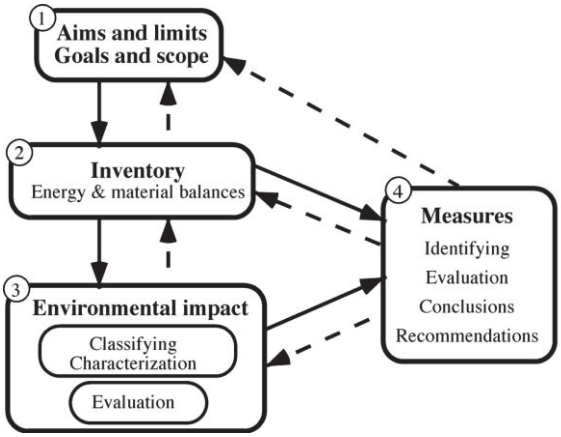

Figure 15. Main steps of an LCA. Source: Author's own work.

4.4.2. Life Cycle Exergy Analysis

The multidimensional approach of LCA causes large problems when it comes to comparing different substances, and general agreements are crucial. This problem is avoided if exergy is used as a common quantity, which is done in Life Cycle Exergy Analysis (LCEA) (Wall, 1977; Gong & Wall, 2001) and in Exergetic Life Cycle Analysis (ELCA) presented by Cornelissen in 1997 (Cornelissen 1997). However, ELCA does not distinguish between renewable and non-renewable resources.

In the LCEA method we distinguish between renewable and non-renewable resources. The total exergy use over time is also considered. These kinds of analyses are of importance in order to develop sustainable supply systems of exergy in society. The exergy flow through a supply system, such as a power plant, usually consists of three separate stages over time (Figure 16). At first, we have the construction stage where exergy is used to build a plant and put it into operation. During this time, $0 \le t \le t_{start}$, exergy is spent of which some is accumulated or stored in materials, e.g. in metals etc. Secondly we have the maintenance of the system during time of operation, and finally the clean up stage. These time periods are analogous to the three steps of the life cycle of a product in an LCA.

The exergy input used for construction, maintenance and clean up we call indirect exergy E_{indirect} and we assume this originates from non-renewable resources. When a power plant is put into operation, it starts to deliver a product, e.g. electricity with exergy power E_{pr}, by converting the direct exergy power input E_{in} into demanded energy forms, e.g. electricity. In Figure 16 the direct exergy is a non-renewable resource, e.g. fossil fuel and in Figure 17 the direct exergy is a renewable resource, e.g. wind.

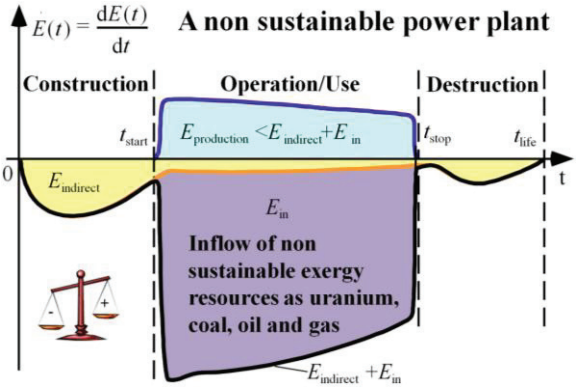

Figure 16. LCEA of a fossil fueled power plant. Source: Author's own work.

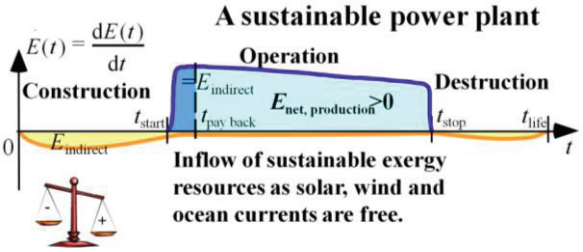

Figure 17. LCEA of a wind power plant. Source: Author's own work.

In the first case, the system is not sustainable, since we use exergy originating from a non-sustainable resource. We will never reach a situation where the total exergy input will be paid back, simply because the situation is powered by a depletion of resources, we have $E_{\text{pr}} < E_{\text{in}} + E_{\text{indirect}}$. In the second case, instead, at time $t = t_{\text{payback}}$ the produced exergy that originates from a natural flow has compensated for the indirect exergy input, see Figure 17, i.e.

$$\int_{t_{start}}^{t_{payback}} \dot{E}_{\text{pr}}(t)dt = \int_{0}^{t_{life}} \dot{E}_{\text{indirect}}(t)dt = E_{\text{indirect}} \quad (8)$$

Since the exergy input originates from a renewable resource we may not account for it. By regarding renewable resources as free then after $t = t_{\text{payback}}$ there will be a net exergy output from the plant, which will continue until it is closed down, at $t = t_{\text{close}}$. Then, exergy has to be used to clean up and restore the environment, which accounts for the last part of the indirect exergy input, i.e., E_{indirect}, which is already accounted for (Eq. 8). By considering the total life cycle of the plant the net produced exergy becomes $E_{\text{net,pr}} = E_{\text{pr}} - E_{\text{indirect}}$. These areas representing exergies are indicated in Figure 17. Assume that, at time t=0, the production of a wind power plant starts and at time $t = t_{\text{start}}$ it is completed and put into operation. At that time, a large amount of exergy has been used in the construction of the plant, which is indicated by the area of E_{indirect} between t=0 and $t = t_{\text{start}}$.

Then the plant starts to produce electricity, which is indicated in Figure 17 by the upper curve $E_{\text{pr}} = E_{\text{indirect}} + E_{\text{net,pr}}$. At $t = t_{\text{payback}}$ the exergy used for construction, maintenance and clean up has been paid back. For modern wind power plants this time is only some months. Then the system has a net output of exergy until it is closed down, which for a wind power station may last for decades. Thus, these diagrams could be used to show if a power supply system is sustainable.

LCEA is very important in the design of sustainable systems, especially in the design of renewable energy systems. Take a solar panel, made of mainly aluminum and glass that is used for the production of hot water for household use, i.e. about 60°C. Then, it is not obvious that the exergy being spent in the production of this unit ever will be paid back during its use, i.e., it might be a misuse of resources rather than a sustainable resource use. The production of aluminum and glass require a lot of exergy as electricity and high temperature heat or several hundred degrees Celsius, whereas the solar panel delivers small amounts of exergy as low temperature heat. LCEA must therefore be carried out as a natural part of the design of sustainable systems in order to avoid this kind of misuse. Another case to investigate is the production of biofuels in order to replace fossil fuels in the transport sector. This may not necessarily be sustainable since the production process uses a large amount of fossil fuels. Thus, it may well turn out to be better to use the fossil fuels in the transport sector directly instead.

Sustainable engineering could be defined as systems which make use of renewable resources in such a way that the input of non-renewable resources will be paid back during its life time, i.e. $E_{\text{pr}} > E_{\text{in}} + E_{\text{indirect}}$. In order to be truly sustainable the used deposits must also be completely restored or, even better, not used at all. Thus, by using LCEA and distinguishing between renewable and non-renewable resources we have an operational (9) method to define sustainable engineering.

4.5. Exergy and economics

Exergy measures the physical value of a natural resource. Thus, it is also related to the economic value, which reflects the usefulness or utility of a resource.

In order to encourage the use of sustainable resources and to improve resource use, an exergy tax could be introduced. The use of non-renewable resources and its waste should be taxed by the amount of exergy it accounts for, since this is relat-

ed to the environmental impact. In addition to this, toxicity and other indirect environmental effects must also be considered. In the case of irreversible environmental damage, a tax is not suitable, instead restrictions must be considered.

A system could be regarded as a part of two different environments, the physical and the economic environment. The physical environment is described by pressure P_0, temperature T_0, and a set of chemical potentials μ_{i0} of the appropriate substances i, and the economic environment by a set of reference prices of goods and interest rates. These two environments are connected by cost relations, i.e. cost as a function of physical quantities (Figure 18).

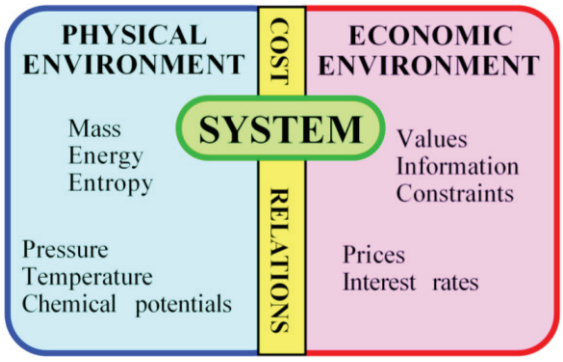

Figure 18. The system surrounded by the physical and the economical environments, which are linked through cost relations. Source: Author's own work.

With the system embedded in the physical environment, for each component there are mass and energy balances needed to define the performance of the system. In addition, these balances describe the physical behavior of the system.

If the cost relations are known, then the physical and economic environments could be linked. The cost equations can sometimes be simplified to a scale effect, times a penalty of intensity. Then the system of lowest cost, which is physically feasible, can be found. Usually the maintenance and capital costs of the equipment are not linear functions, so in many cases these costs have more complex forms. If, by some reason, it is not possible to optimize the system, then at least cost could be linked to exergy by assuming a price of exergy. This method is called Exergy Economy Accounting (EEA).

4.5.1. Exergy Economy Accounting

Since exergy measures the physical value, and costs should only be assigned to commodities of value, exergy is thus a rational basis for assigning costs, both to the interactions that a physical system experiences with its surroundings and to the sources of inefficiency within it. The exergy input is shared between the product, and the losses, i.e. destruction and waste.

EEA simply means determining the exergy flows and assigning economic value to them. When there are various inflows and outflows, the prices may vary. If the price per exergy unit does not vary too much, an *average price* can be defined. This method allows comparison of the economic cost of the exergy losses of a system. Monetary balances are formulated for the total system, and for each component of the system, being investigated. EEA gives a good picture of the monetary flows inside the total system and is an easy way to analyze and evaluate very complex installations.

EEA does not, however, include consideration of internal system effects. It does not describe how the capital investments in one part on the system affect exergy losses in other parts of the system. In the EEA method the exergy losses are numbers and not functions. However, this simple type of analysis sometimes gives ideas for, otherwise, not obvious improvements, and a good start of an optimization procedure, in which the exergy losses would be functions.

4.5.2 Exergy Economy Optimization

When constructing a system, the goal is often to attain the highest possible technical efficiency at the lowest cost, within the existing technical, economical and legal constrains. The analysis also includes different operating points (temperatures, pressures, etc.), configurations (components, flow charts, etc.), purpose (dual purpose, use of waste streams, etc.), and environments (global or local environment, new prices, etc.). Usually, the design and operation of systems have many solutions, sometimes an infinite number. By optimizing the total system, the best system under the given conditions is found. Some of the general engineering optimization methods could be applied, in order to optimize specific design and operation aspects of a system. However, selecting the best solution among the entire set requires engineering judgment, intuition and critical analysis. Exergy Economy Optimization (EEO) is a method that considers how the capital investments in one part of the system affect other parts of the system, thus optimizing the objective function. The marginal cost of exergy for all parts of the system may also be calculated to find where exergy improvements are best paid off.

Optimization, in a general sense, involves the determination of a highest or lowest value over some range. In engineering we usually consider economic optimization, which in general means minimizing the cost of a given process or product, i.e. we need a well-defined objective function. It is also important not to be misled by a local optimum, which may occur for strongly non-linear relations. It is only the global optimum that truly optimizes the objective function.

5. Sustainable Development

5.1. Political semantics

There are numerous definitions of sustainable development of which the most widely-used was coined in 1987 by the World Commission on Environment and Development (WCED) in their report, *Our Common Future* or the so-called Brundtland report: *to meet the needs of the present without compromising the ability of future generations to meet their own needs*. This may sound very attractive since everyone *will* get what they *need*, now and forever. However, this does not free the rich from dealing very concretely with the problems associated with redistribution of current wealth to those who are in greater need. Still, need must be treated with global justice to remain its meaning. *United Nations Development Programme Human Development Report* has stated that the annual income of the poorest 47 percent of the people of the world is less than the combined assets of the richest 225 people in the world. Given this obscenely unequal distribution of wealth and income, the top fifth of the world's people consume 86 percent of all the goods and services while the bottom one-fifth must subsist on a mere 1.3 percent. Sustainable development must not become a mantra used as an excuse and justification to sustain economic growth at the expense of continued human suffering and environmental destruction. Thus, it must incorporate an explicit and well-founded notion of the globe's carrying capacity and an awareness of the consequences of exceeding this. However, since the Brundtland report was presented, resource depletion and environment destruction have only proceeded and worsen. The poor are still ignored and left out with a catastrophe. Thus, the time of lip service must be replaced with action and true change. This implies the fulfillment of moral obligations concealed for generations.

5.2. Physical conditions

The World Commission on Environment and Development brought sustainable development to the world's attention and focused on three pillars of human well-being and sustainable development: (1) economic conditions – such as wealth, employment, and technology; (2) socio-political conditions – such as security and democracy; and (3) environmental and resource conditions – such as the quality of our air and water and the availability of capital in the form of natural resources. The abiotic part of the environmental and resource conditions is better specified as a foundation for all these pillars, i.e. certain physical conditions or a life support system for present forms of life. Then life is related to three living systems that are founded on specific physical conditions, and if these change this will have an impact on all these living systems. Particularly, for the natural evolution, as presented above. This could be depicted as a foundation for these pillars and for sustainable development to be reached, see Figure 19. Without suitable physical conditions the idea of sustainable development will lack meaning no matter number or size of pillars.

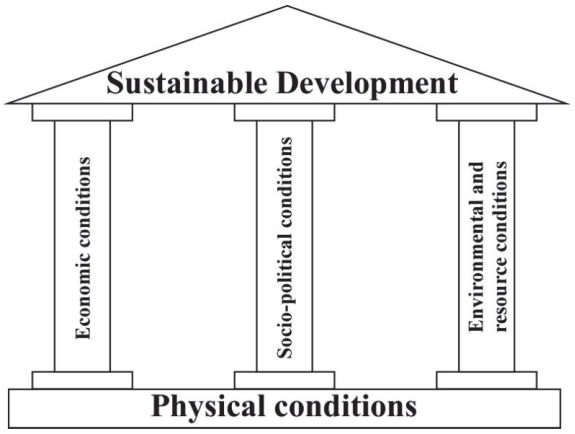

Figure 19. Sustainable development based on suitable physical conditions. Source: Author's own work.

Before the industrial revolution the physical conditions were only managed by nature. However, by the industrialization this has now changed into an unsustainable development. In addition, a strongly unpredictable and unstable situation increasingly out of control for human institutions. It should be noticed that nature through the biosphere is in charge of the physical conditions on Earth that are subject to constant change often referred to as a sustainable development or the natural evolution.

5.3. Sustainable development in nature

Sustainability in nature is not a static state, but rather a state of constant change or evolution since nature lives. As we saw above, unwanted substances are constantly removed, and this is very important. Matter and energy is being recycled in an almost closed-loop. A small part, often not considered, is being removed and sealed in deposits, as a kind of cleaning process; thus creating a constant change in the environment; a redistribution of matter. This is indicated by the flow of *unwanted* substances to the deposit of fossils and minerals in Figure 3 above. This is how most of the deposits are created, which are mainly chemical compositions of carbon, i.e. fossils. If we assume that the oxygen in the atmosphere originates from carbon dioxide the total amount of exergy used would amount to about 1.7×10^{25}J which is equivalent to about 4 years of solar inflow to Earth. Estimated conventional fossil fuels in Earth's crust are estimated to about 5.3×10^{23}J (Valero, 2010). The content of oxygen has increased in the atmosphere at the expense of carbon dioxide. Thus, exergy is being stored in deposits as increasing contrast, or a growing amount of so-called natural resources in the lithosphere. When these resources are dispersed into the environment, e.g. by combustion of

fossil fuels, this contrast is partly lost. Well-ordered structures and concentrated substances are demolished and spread as pollutions in the environment. Thus, the process of creating order through natural cycles is being reversed by the industrial society. Nature redistributes material substances and reshapes its physical conditions so that highly sophisticated structures can develop in order to make the evolution of life possible. Initially, material substances were organized into systems, which were able to reproduce themselves. This is the essence of life, see Figure 20. The indicated processes of change, i.e. life and mind, in Figure 20 should not be taken to appear exactly in time, but to indicate main steps. Also, the exact meaning of life and mind are not possible to precisely define.

About 170 PW solar radiation exergy power reach Earth, about 30 percent of this are immediately reflected and radiated back into space. Once the radiation enters the atmosphere, a complex series of reflections and absorptions take place impelling the climatic system. Exergy is converted to thermal exergy in the atmosphere, land and ocean. Large parts evaporate water as part of the circulation of water on Earth, essential to most life forms. Approximately 40GW biological matter is buried under sediment on an average ongoing basis (Berner, 2003) or about 0.24 ppm of the incoming solar exergy power.

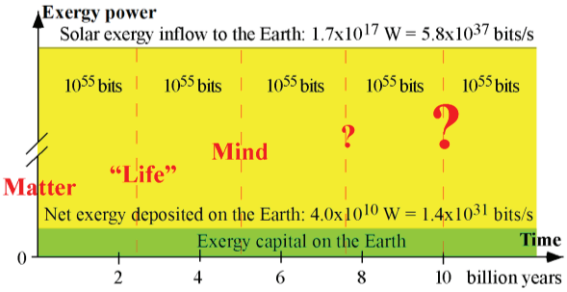

Figure 20. A tiny part of the exergy flow from the Sun to Earth is stored in deposits on Earth, while matter is organized into life and further into the mind, and further into…? Source: Author's own work.

Apparently nature has the machinery to create highly sophisticated and ordered structures operating in space and time. Obviously, there is a strategy acting behind the scenes. A strategy, however, far too intelligent for humans to completely grasp. Exergy stored as deposits on Earth is essential to the evolutionary process that characterizes the living nature. During billions of years nature has gone through an enormous process of change, which is so powerful that it has completely changed the life support systems on Earth. This story can be told in terms of exergy. An estimation of the exergy from among other things the separation of carbon dioxide into carbon deposits, and oxygen into the atmosphere, is indicated by the green area in Figure 9, where the size of this area is exaggerated in order to be visible. The relation between the yellow and the green areas are hard to size, however, at least several millions to 1. This build-up of stored exergy in the form of so-called natural resources of mainly fossil fuels is of vital importance for life and for evolution on Earth. From a purely physical perspective this amount of exergy can be measured as deposits, or dead stocks. However, these deposits exist in order to create and maintain the conditions for life support systems. Usually, it is only these deposits that take the form of minerals, e.g. fossil fuels, which are considered. However, the fact that the atmosphere consists of about 21 percent oxygen is also a consequence of this. The total amount of oxygen in the atmosphere is about one millionth of the total amount of oxygen on Earth, mostly as minerals in the crust.

Obviously, nature operates in a very intelligent way. By capturing huge amounts of exergy as deposits on Earth it creates an enormous contrast, which is able to generate life forms with very little effort. Look at a simple seed: the difference between whether it is dead or alive is not physically measurable. However, planted in soil the difference is undeniable. The interactions within this system, which give rise to evolution of life on Earth are inordinately complex. Let us compare the situation with the creation of a piece of music on a violin. This needs a well-tuned violin, which resembles the deposits on Earth, i.e. an essential part of the life support system. A musician could then, with a small effort *bring life* to this wooden box. No one would ever imagine using the violin as firewood, especially not a Stradivarius. However, this is exactly what we are now doing in the name of economic progress, when we extract mineral deposits at the current, unsustainable rate. Keeping the genetic codes or the music sheets is meaningless if we also destroy the environment or the instrument.

Thus, if all deposits, i.e. stored exergy on Earth, were used up, then life, as we know it today on this planet would completely disappear. Earth would be taken back to a state similar to that seen at the creation of our solar system, i.e. some five to six billion years ago. From an ecological perspective the quality of the stored exergy on Earth should be regarded as an indicator of the value of present living systems. When resource deposits are exploited and used this literally means that we deplete the life support systems, since the preservation of these deposits are essential for the support of life. Global exergy accounting of natural resources provides a good understanding of the present ecological crisis, pinpointing problem areas and maybe providing solutions. Also, this knowledge is an essential part of a new paradigm to guide science towards a sustainable development.

Life may be regarded as the organization of matter in space and time into living organisms, as mentioned above. Matter as specific molecules are es-

sentially the *building blocks* of life. On Figure 20 it is positioned at the first level on the evolutionary scale. Going up the scale life, or living organisms, advance and evolve towards the level of the mind, i.e. the state of being aware. This higher level of organization is *carried* in particular by intelligent life forms, i.e. species with large brain capacity. At this level living organisms are acting as the *building blocks* of awareness. Logically the next level must in some way involve awareness as *building blocks*. Love may be the result of the organization of awareness. Love is a mysterious phenomenon, obviously carried by the mind, even though we tend to relate it to the heart. True love has no monetary value and only increases by sharing. It is not traded on the stock market. However, it is just as impossible for a human being to predict future levels of organization as it is for an atom to describe the complexity of a bacteria or for a bacteria to explain the beauty of a piece of poetry. It is simply out of range of our imagination. Unfortunately, in this regard, the human brain is far too *stupid* to grasp this enormous intelligence we call nature. We can only show respect and humility for the power and beauty of nature. Nature is so intelligent and immense that science will continue to discover new patterns eternally. Thus, the unknown will always be there. This knowledge is also an important part of a new paradigm. Science must always treat the unknown with highest respect, if not hubris may be its fate.

The present unsustainable situation is due to altered physical conditions on Earth that is threatening the very existence of higher forms of life including human beings. Eventually, we must look beyond present religious, economic and political structures to find the conditions for a sustainable development. This implies a revision of the present cultural structures ruling the world. In addition, from a scientific point of view it is well known that we can't solve problems by using the same kind of thinking we used when we created them. A statement related to Albert Einstein. To conclude we may say that the problem of sustainable development is not lack of resources, the problem is that we use too much and the solution is to live with less. In this regard Cuba after the collapse of the Soviet Union and lack of foreign support offers interesting social results worth of study for the rest of the world in order to meet the global peak oil collapse (Morgan, 2006).

Exergy is a suitable scientific concept in the work towards sustainable development. Exergy accounting of the use of energy and material resources provides important knowledge on how effective and balanced a society is in conserving nature's capital. This knowledge can identify areas in which technical and other improvements should be undertaken, and indicate the priorities, which should be assigned to conservation measures. Thus, exergy concept and tools are essential to the creation of a new paradigm towards sustainable development.

5.4. Building of Empires

Finding the true underlying causes is the only way of changing the present situation of resource depletion and environmental destruction. This means that many unpleasant questions must be addressed. Why has our civilization ended up in this situation? When did it go wrong? What can we do to avoid a catastrophe? Is it just a matter of better measuring, collecting more data and keeping better records? When looking for answers to these questions we must not be misled by our own myth of sovereignty. We must look beyond present cultural, scientific, religious and political structures and believes. Human's history is full of ruined previously great civilizations, so we will not be the first. The reason for our failure is probably related to our culture of deep-rooted behavior of building empires.

The natural behavior that was originally practiced by humans was based on a sustainable coexistence with nature. This did not allow overexploitation or building of empires. Nature was subject to respect and not ownership. The agricultural revolution turned most people into farmers, which also became useful bricks in the building of empires. The production of a surplus created a new situation. Power could be established in centralized institutions by taxing farmers, which became a foundation for an aristocracy and of empires to grow and with them inequity. The building and maintaining of walls and boarders is a typical sign of this, still being practiced in the world. Some were born to be fed, e.g. priests, soldiers, administrators and politicians, whereas others were born to feed them. By time the empires grow stronger and formalized into nations at the cost of incredible sufferings. Nations often force people to fight each other as well as nature. The industrial revolution brought mankind even further away from nature and natural behavior. The inequity became global and also moved to future generations by resource depletion and environmental destruction. Obedience is essential to empire structures, which is maintained by systematic training, based on rewards and punishments. The educational system mainly separates people into; (1) those to be fed and (2) those to feed them. The successful student with a strong self-confidence will mostly go into *empire management*, whereas those who fail in school, often with a weak self-confidence, will mainly create the *empire workforce*. As salary slaves they will constitute the foundation of the empire pyramid. Sacrosanct symbols, rituals and myths sustain the system. To question these may by treason. The secret formula to climb this hierarchical system is to please your superiors and to make use of your subordinates. However, this training only works in systems where people are dependent of it. Also, fear is an essential

component in the management of empires (Lennon, 1970): *When you can't really function you're so full of fear*. This is why indigenous people mostly have to be forced into the industrial civilization by means of weapons, religions and/or drugs. These forces were also the foundation of colonial policy, which contributed to the wealth of the rich world.

Indigenous people often live peacefully in tribes with plenty of time for love and care. Children are raised together with parents and relatives. Violence or selfishness is not encouraged. They have a very high material and social welfare, in harmony with the life support system. They also carry sacrosanct signs and beliefs, however, different from those of empire cultures. From history it is learned that these people are mostly useless as empire builders, but can be used as slaves. They are regarded uncivilized and called primitive, which is inappropriate. These cultures carry a unique knowledge and wisdom of life in general and sustainable development in particular. One reason for this is most probable the lack of forcing people to read and write. The brain maintains its full natural intellectual capacity that would otherwise be reduced by forcing it to make space for the skill of reading and writing. Everyone in our world cannot live like them, but everyone can respect them and learn from them. This is an important task for the educational systems to undertake, and the number one task is to approach these cultures and their knowledge with respect and an open mind.

6. Conclusions

From a sustainable development point of view, present industrial resource use is a dead-end technology, leading to nothing but resource depletion and environmental destruction in the long run. The exergy capital is used and become waste in a one-way flow (Figure 4). Instead we need to develop a vital and sustainable resource use, similar to what is practiced by nature.

Nature has so far generated sophisticated forms of life by means of natural evolution on Earth. Present social evolution is instead governed by increased wealth in terms of money, often indicated by Gross Domestic Production (GDP). This is when asphalt, smokestacks and color TVs replace rain forests, or when rice fields, cultivated for more than 5000 years, are converted to golf courses. This myth of progress must be questioned if we are serious in our efforts for sustainable development. At first we must find the roots to the problem. The reason for our failure is a consequence of our deep-rooted weakness for building empires. The so-called human civilizations appearing some 10,000 years ago may be characterized as the beginning of an empire builder era of humankind. This empire building era must come to an end in order to reestablish a sustainable development. Then, we must work for a change through education, true actions, practical exercises, and precaution. Finally we must secure a guidance based on morals and responsibility on a social scale (Wall, 1997).

Exergy is an excellent concept to describe the use of energy and material resources in the society and in the environment. A society that consumes exergy resources at a faster rate than they are renewed is not sustainable. From the description of the conditions of the present industrial society, we may conclude that this culture is not sustainable. One may argue about details, such as how or when, but not that a culture based on resource depletion and environmental destruction is doomed. The educational system has a crucial role to play to meet this change towards sustainable development. This must be based on a true understanding of our physical conditions. Exergy is a concept that offers a physical description of the life support systems as well as a better understanding of the use of energy and other resources in society and nature. Thus, exergy and descriptions based on exergy are essential for our knowledge on sustainable development.

Time to turn is here. Time to learn and time to unlearn has come. Education must practice true democracy and morals to enrich creativity and knowledge by means of joy in learning. Culture of peace must replace cultures of empire building, violence and fear. The torch of enlightenment and wisdom carried through the human history must be shared within a spirit of friendship and peace.

Sustainable development is more and more becoming an educational problem in the society. Recent warnings from the IPCC (Intergovernmental Panel on Climate Change) all but confirm an ever increasing climate crisis (IPCC, 2007) due to human activities, e.g. the release of carbon dioxide into the atmosphere from the use of fossil fuels. Planetary boundaries presented by Rockström et al. (2009) even further stress the situation and indicate the need for better management and tools. The increasing lack of understanding and action reveals a need for knowledge with more of a holistic view of the situation. Present fragmented approaches generated by the traditional educational system lack this and rather lead to further confusion. The division of knowledge into disciplines and further into even more specialized areas leads to a common lack of general knowledge and understanding of the problem among many students. This I have experienced many times during my over thirty years of teaching the subject at university and high-school levels. Instead more of a holistic approach must be adopted and applied according to the presentation of this thesis. These concepts must be incorporated into traditional knowledge and be further elaborated within the educational system. All related and relevant areas from both natural and social sciences must be treated simultaneously together with a focus on moral issues to gain understanding of the

problems. Knowledge and culture of indigenous people must also be part of the picture. My own experience of this is a strong positive feedback from the students and parts of the educational establishment, e.g., the UNESCO project *Encyclopedia of Life Support Systems* (EOLSS). However, sometimes there is also a strong skepticism among the academic establishment for this that also has to be dealt with. Thus, traditional boarders between different disciplines must be removed and more of interdisciplinary studies and activities must be employed at both high school and university levels. More problem oriented approaches and a focus on moral issues are also to be encouraged. This in turn implies educational and pedagogical challenges in order to create prosperous knowledge and understanding for the development towards a sustainable or rather vital society. My hope is that this thesis will encourage and further contribute to this process.

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Beyond The Dilemma Facing China's Agricuture – Toward a Chinese Constructive Postmodern Agriculture

Wyzwania rozwoju rolnictwa w Chinach – w kierunku konstruktywnego rolnictwa postmodernistycznego

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Abstract
The accomplishments in Chinese agriculture have been impressive during the past 30 years of growth in the Chinese economy. But the costs have been extremely high as well, including: excessive pollution, topsoil erosion, a loss of fertility, unhealthy food, an increasing gap between the rich and the poor, a destruction of local communities and a loss of vitality in rural life. Who should be responsible for these problems? Should China's agriculture return to the past or should it continue on the current path toward modernization? Is there any alternative to the current form of modern agriculture? Specifically, is there a *third way* for China to pursue agricultural development? Our thesis is that China should explore a Constructive Postmodern Agriculture as a means of resolving its current dilemma. Constructive Postmodern Agriculture is a creative integration of Western thinking and Chinese wisdom. It is constructive in that it seeks to work with nature rather than against it. It is postmodern in the sense that it takes the best of modern farming practices and combines them with the best of traditional practices as well as contemporary sustainable agriculture. A Constructive Postmodern Agriculture could provide healthy food for current and future generations by preserving the fertility of the soil and the well-being of nature to ensure economic sustainability. It also could provide economic support and cultural meaning for farmers and their local communities. Chinese interest in Constructive Postmodern Agriculture has been increasing recently and some recent experiments in postmodern agriculture in China have shown that the Constructive Postmodern Agriculture is feasible as well as promising. Future agricultural development of China will affect food markets throughout the world. Thus, the choice between modern and constructive postmodern agriculture should be a matter of global concern.

Key Words: Constructive Postmodern Agriculture, Chinese Agriculture, Modern Agriculture, Sustainable Agriculture, Ecological Agriculture

Streszczenie
Osiągnięcia chińskiego rolnictwa w ciągu ostatnich 30 lat wzrostu ekonomicznego są imponujące. Równie poważne są jednak także ich konsekwencje, obejmujące: znaczącą degradację środowiska, erozję gleb, utratę żyzności, skażenie żywności, zwiększanie się przepaści pomiędzy bogatymi a biednymi i rozpad lokalnych społeczności. Jak powinno się te problemy rozwiązać? Czy rolnictwo w Chinach powinno powrócić do dawnych form, czy też nadal rozwijać się w kierunku modernizacji? Czy istnieje jakaś inna alternatywna *trzecia droga* rozwoju rolnictwa? Zdaniem autorów tej pracy, aby rozwiązać zarysowane problemy, Chiny powinny podążyć drogą konstruktywnego postmodernistycznego rolnictwa, opartego na połączeniu zachodniego sposobu myślenia z mądrością Wschodu. Jest ono konstruktywne, ponieważ celem jest współpraca, a nie walka, z przyrodą. Jest

postmodernistyczne w tym sensie, że najlepsze praktyki współczesnego rolnictwa łączy ze sprawdzonymi praktykami tradycyjnego, a także, coraz obszerniej dyskutowanego, zrównoważonego rolnictwa. Tak rozumiane rolnictwo powinno gwarantować dostarczanie zdrowej żywności dla obecnego i przyszłych pokoleń, dbając jednocześnie o żyzność gleby i ogólny dobry stan przyrody i zapewniając ekonomiczną zrównoważoność. Ponadto nie można zapomnieć o wsparciu ekonomicznym i kulturowym dla rolników i tworzonych przez nich lokalnych społeczności. Zainteresowanie konstruktywnym rolnictwem postmodernistycznym w Chinach rośnie. Przeprowadzane eksperymenty wykazują, że takie rolnictwo jest bardzo obiecujące i możliwe do wdrożenia. Jednocześnie nie należy zapominać że rozwój rolnictwa w Chinach nie pozostaje bez wpływu na światowy rynek żywności. Dlatego wybór pomiędzy dotychczasowym a konstruktywnym rolnictwem postmodernistycznym jest zagadnieniem o wymiarze globalnym.

Słowa kluczowe: Konstruktywne rolnictwo postmodernistyczne, rolnictwo w Chinach, współczesne rolnictwo, Rolnictwo zrównoważone, rolnictwo ekologiczne

Introduction

Sustainable development is not only *the most important idea of our present time*, as Artur Pawlowski points out, but also has become a worldwide trend, to which China is no exception (Pawłowski, 2010). However, to achieve sustainable development, we need to *integrate the different dimensions of human activity on the basis of a moral reflection as to human responsibility for nature* (Pawłowski, 2006). Sustainable agriculture is an integral aspect of sustainable development because agriculture is the foundation of human civilization and thus is the foundation for all social and economic development. The sustainability of agriculture is current a *problem of sustainable development* because today's modern agriculture, and the global food system that has been built upon it, is not sustainable. One of the fundamental problems of modern agriculture is its lack of moral reflection on human responsibility for nature or even for the future of humanity. Agricultural development in China has been deeply influenced by the modern paradigm of agriculture that currently dominates the United States, Europe, and much of the so-called *developed world*. Therefore, it is critical to sustainable development that the Chinese people, and the people of other *developing* nations, choose a *constructive postmodern* path for development that leads to agricultural sustainability in particular and the sustainability of global society and the planet in general.

Some people may view the future development of agriculture in China as an internal matter that is of little concern to Americans, Europeans, or anyone other than the Chinese people. However, China represents about 20% of the total global population. and the size of its economy is second only to the United States. As the Chinese economy continues to grow and the Chinese people have more money to spend for food, China will become a major, if not dominate, factor in the global food markets. Some agricultural economists already attribute a significant portion of the rise in global food prices in recent years to the growing economies of China and India. In addition, a failure of China to provide for the basic food needs of its people in the future is almost certain to lead to domestic political instability with global social and economic consequences.

Many of those who understand the global consequences of China's agricultural choices are committed to the modern paradigm of industrial agriculture: specialization and standardization to achieve the economic efficiencies of large scale production. They believe that China should follow the path of development taken by the United States and Europe, which led to significant increases *per capita* food consumption without increasing land in cultivation and with far fewer farmers. Few people in positions of political or economic influence seem willing to question whether this path of development is appropriate, or is even possible, for China at this time in history. The basic purpose of this paper is to address this question directly and earnestly. The answer to this question and the resulting choices and consequences will be important not only to China but also to the future well-being of Americans, Europeans, and other people throughout the world.

The predicament facing Chinese agriculture today

The accomplishments in Chinese agriculture have been impressive over the past 30 years as China has been experiencing *a rapid economic growth with GDP increasing from 364.5 billion RMB in 1978 to 40120.2 billion in 2010* (Shan and Bi, 2012).

In 1995, Lester R. Brown, founder of the Worldwatch Institute, in his book, *Who Will Feed China*?, sympathetically expressed his concern over the ability of China as the world's most populous country to feed its people due to a massive grain deficit (Brown, 1995). Ten years later in 2005, China no longer needed grain assistance from the UN World Food Programme and, in fact, became the world's third-largest grain donor, according to China Central Television (CCTV, 2012). Other significant achievements include: *grain yield reached 525 million tons in 2008, nearly 5 times the level of*

1949; Farmers' annual net income, just 60 yuan in 1949, reached 4,760 yuan in 2008; the amount of people living below the poverty line has been reduced from 60% of the population 60 years ago to just 1.1% today (CCTV, 2012).

Given that China only has 7% of the world's arable land and feeds 21% of the world's population, these achievements seem quite remarkable. Lennart Bage, president of the International Fund for Agricultural Development, called it *a miracle* (Marchetti and Aiguo, 2011). He said to a Xinhua reporter, *I'm very impressed by China's development since 1978. Poverty reduction in the last three decades has been the fastest in Chinese history*. Concretely put, *China's poverty rate has gone down from about 30 percent to less than two percent today. The country has reached the first UN millennium poverty goal well ahead of time* (Marchetti and Aiguo, 2011).

However, it is widely recognized that the costs have also been extremely high. So far, much of the emphasis of public concern has been placed primarily on environmental issues such as excessive pollution, topsoil erosion, unhealthy food, and loss of soil fertility.

Indeed, the environmental issue is a very serious one. According to Ye Xingqing, director General, Rural Economy Research Department, Research Office of the State Council, the rapid development of China's agriculture has *heavily relied on the massive consumption of material resource, especially chemical fertilizer* (Ye, 2006). It has been shown that *Chinese farmers are using double the amount of chemicals of their peers in most developed countries, and they are using 100 times more fertilizer compared to 60 years ago (...). The use of fertilizer per hectare should be kept under 225 kilograms according to the international standard, but Chinese farmers on average use 434.3 kilograms per hectare* (Watts, 2010). Modern agriculture, meaning a chemically-dependent industrial agriculture, is inherently *dependent on fossil energy and other finite natural resources* (Ikerd, 2010). *Chinese farms cause more pollution than factories*, says one official survey (Watts, 2010).The first Chinese census on pollution has shown that fertilizers and pesticides, not smokestacks, are the country's biggest sources of water pollution. According to the survey, agriculture is responsible for 43.7% of the nation's chemical oxygen demand (the main measure of organic compounds in water), 67% of phosphorus, and 57% of nitrogen discharges (The First National Pollution Census, 2010).

As a result, *the use of chemicals is threatening food safety and polluting the soil and underground water*, said Jiang Gaoming, chief researcher at the Chinese Academy of Sciences' Institute of Botany. According to Jiang, more than 10 million hectares of farmland or nearly 10 percent of the country's total farmland had been polluted. Because of excess use of various chemicals and hormones for chicken and duck production, *the poisonous substances in the farm chemicals will eventually be absorbed by human bodies via food chains*, he said to reporter (Jiang, 2011).

In addition, *white pollution*, namely plastic pollution, has become another nightmare for China's countryside. Although it is a new member of pollution family, it is growing fast. Plastic has two main uses in farming – to construct plastic greenhouses for growing crops out of season, and to cover the ground to increase the value of crops. This method of farming may be considered a new scientific advancement, but little consideration has been given to whether the Chinese environment can cope with the plastic waste that results. Currently, about half a million tons of the plastic are left in the soil every year, almost 40% of the total plastic used. This forms a layer in the earth which is less permeable to water and air, making it harder to carry out farming practices. Thus, *white pollution* is seen by Chinese environment activists as *a disaster for rural area* (Wang, 2008).

While destruction of the environment deserves high attention it has been given, another important negative consequence caused by China's rapid agricultural development deserves similar consideration: The destruction of rural communities and rural family life. As a great number of farmers have migrated to urban areas for non-agricultural work, only children, women, and the elderly are left in many villages, creating a new phenomenon called *hollow villages.* The *hollow village* displays itself in the spatial shape of the village and in the massive outflows of the young adult labor force. This *causes the draining of human resources in the countryside, which is disadvantageous to the development of rural economies* (Li and Ni, 2009). In an interview, Zhu Qizhen, a noted professor at the China Agricultural University and the author of the book, *Why Farmers Left their Land*? (2011), told the *China Village Report* that *farmers are not willing to farm* and *that has become the most pressing problem facing China*. Some old farmers reported, *our children don't want to come back to farm. We may be the last generation of farmers.* They worry: *Who will farm in the future* (Zhu, 2011)?

The *hollow village* phenomenon also has negative impacts on the happiness of rural families. Studies show that there are some 50 million women left alone in the rural areas of China. These women have suffered emotionally and psychologically due to the separation from their husbands who have gone to the cities to work. Marriages have suffered, one study shows that *50% of divorce cases are due to separation* (Zhang, 2006). In addition, 58 million children are left alone in rural areas while their parents seek work elsewhere.

The *hollow villages* clearly reflect an abnormal disruption of family life in rural areas. *The intimacy, joys and warmth of families have been increasingly decreased* (Guan, 2009). In short, the countryside's vitality is being lost, as a variety of surveys have shown rural people's contentment with life is declining. What is happening in China today is reminiscent of what others have observed in America. Fred Kirschenmann wrote: The *popular perception in America* is that *rural communities are places of failure* (Kirschenmann, 2010). For a young person, *if you can't escape the rural community in which you are unfortunate enough to grow up, then by definition, you are a failure* (Kirschenmann, 2010).

Marxist Theory of Cost suggests that any development must have its cost, and therefore *paying [a] price is inevitable* (Qu, 2011). In the case of China, the happiness of millions of farmers and the health of the land appears to be a very high price to pay. Various studies indicate, it is not a price Chinese farmers willingly pay. As David Schwerin points out, *it is not wrong to pursue wealth, but wealth would be valueless if it comes at the cost of our personal health or the vitality of the planet* (Schwerin, 2008). To constructive postmodern thinkers like John Cobb, *the health of the community in which we participate is crucial to our own well-being, we are persons-in-community rather than isolated individuals unaffected by our relations to others* (Cobb, 1994, p. 33). John Ikerd points out that *our lives have important physical, mental, and spiritual needs that must be met to achieve a desirable quality of life. Our common sense tells us that we need balance and harmony among these dimensions of our lives* (Ikerd, 2007, p. 90). Chinese farmers' lives apparently have become *unbalanced* as a result of the modern agriculture model. This model has been deemed to be unsustainable because *sustainable agriculture* requires creating farming systems in which *environmental stewardship and social-community support are given moral standing with economic principles so that so that economics must be balanced with environmental and social considerations* (James, 2006).

The causes of the current dilemma of Chinese agriculture

This paper focuses on four significant and closely-related factors which share responsibility for the problems mentioned above.

1) Imitation of modern agriculture. During the period of rapid economic development, China has regarded modern agriculture as the only goal Chinese agriculture The modernization of agriculture has been viewed *not only as a long-cherished wish of communist party members for a few generations, but also as the common good of nine hundred million Chinese farmers* (Nan, 2012). In the process of accentuating the advantages of modern agriculture, such as high yields and laborsaving technologies, the negative aspects of modern (or industrial) agriculture such as its *environment-unfriendly* nature (Federico, 2005, p. 1), has been almost totally ignored. Industrial agriculture is widely known to be a major source of pollution. As Ikerd points out, *industrial agriculture pollutes the air, water, and soil with toxic agrochemicals and livestock manure. It is a major source of pollution, accounting for more than twenty-percent of total greenhouse gas emissions – even more than transportation. In fact, agriculture has become the number one nonpoint source of pollution in the U.S., creating huge 'dead zones' in the Chesapeake Bay and Gulf of Mexico. An industrial agriculture is not ecologically sustainable* (Ikerd, 2010). This connection between so-called modern agriculture and its destructive environmental consequences is clear in China today.

2) Overemphasis on economic grown or Gross Domestic Product (GDP). In the past 30 years, following Deng's mantra, *Development is the absolute principl*e, many insist that China must view economic development, industrialization, and modernization as top priorities. They are convinced that China's ecological problems can be solved only after industrialization and modernization have been realized. For them, a rapid-growth economy is the intrinsic requirement for China's social development. When growth in the GDP becomes the only goal, and economic well-being becomes the only standard of value, the value of relationships in human life becomes insignificant. Accordingly, the values and the happiness of people are not given adequate consideration. This materials-based rather than values-based development also causes other social problem such as the *crisis of faith*.

3) The nihilistic attitude toward tradition. The nihilistic attitude toward tradition is an important feature of China's first enlightenment, which occurred in 1919 and was deeply influenced by the European Enlightenment of the 17th and 18th centuries. One of the main slogans of the Chinese enlightenment is *Down with Confucianism* in particular and Chinese tradition in general. The enlightened modern Chinese intellectuals have treated ancient farming theory and practice as an important part of Chinese tradition that should be totally abandoned. Therefore, in China, the words *farmer* and *countryside* have long been synonymous with *old-fashioned*. The family-farm way of production has been regarded as decadent and outdated. A small-scale farmers' *petty-farmer* consciousness permeates modern China. The well-known saying by Mao, a son of China's first enlightenment, that *the serious problem is the education of the peasantry* (Mao, 1991, p. 1477) still deeply influences the communist party in particular and Chinese people

in general. Farmers have been discriminated against by modern civilized people. Even today, *wipe out peasants* remains a favored slogan (Gu, 2012). The discrimination against peasants in China is not only entrenched in many people's minds, but also is embodied in language. *A true peasant!* is sarcasm uttered by some of today's city young people. Here *peasant* turns out to be an adjective which is synonymous with *silly* or *stupid* (Xiao, 2009).

4) An imperialistic attitude toward nature. Stemming from an anthropocentric perspective, this disrespectful attitude treats nature as an object to be manipulated, dominated, and exploited. In the words of Adorno and Horheimer (the authors of *Dialectic of Enlightenment*),: *what men want to learn from nature is how to use it in order wholly to dominate it and other men* (Adorno and Horkheimer, 1997, p. 4). This imperialistic attitude toward Nature has been to treat it as a slave. It is closely related to the disrespect for farmers and peasants who are closely connected with nature, especially the land. Within in this context, it is not difficult to understand the phenomena of excessive pollution and other related ecological problems.

The prescription to these problems offered by some economists is urbanization. As Stephen Green, chief China economist for Standard Chartered Bank, clearly states, the solution is: *getting farmers out of countryside to work for high paid jobs in cities* (Green, 2006). Many Chinese, economists and citizens alike, embrace this proposal. Some claim, *that more people but less land is China's basic reality. Hence, the fundamental solution to China's development is to liberate farmers from farms. This solution is regarded as 'the only way' for China to solve this difficult problem* (Chen, 2007).

Although such a solution may have worked in the US or other western developed countries, the current situation in China is quite different from that of the US or other western countries during the last century. As David Freudenberger, director of science and major projects at Greening Australia, one of Australia's leading ecologists, questioned: *Does China truly aspire to develop 'modern' agriculture similar to Australia and the USA? If so, fully 'modern' agriculture in China would require only about 13 million farmers (1% of China's population). A fully 'modern' Chinese agricultural industry would require nearly 800 million people to continue their vast migration to crowded cities. This migration of people would require China to build another 80 cities with at least 10 million people in each one. This is feasible as seen in the USA, much of Europe, and in Australia which is the most urbanized continent in the world. But are 80 more mega-cities in China desirable?* (Freudenberger and Freudenberger, 2008).

It is estimated that there are 2.7 hundred million manufacturing jobs in the world. So far China has already taken 1.5 million of them. Even if China takes all the manufacturing jobs in the world, there will still be some 1.2 million farmers unemployed. Therefore, *it is not feasible for China to copy America's modern Agriculture* (Nan, 2012). Some Chinese agriculturalists argue that an urbanization policy that will turn millions of farmers into the urban poor is *not a way out*, but *a trap* (He et al., 2011). If this way will not work, where should we go? It is clear that China's agriculture is at a critical crossroad.

On the one hand, nobody wants to go back. Understandably, Chinese farmers do not want to go back to the past or to be stuck in the same place, watching from afar as some urban Chinese enjoy standards of living that far exceed their own. People by nature want to move forward. But, the earth simply does not have enough natural resources for every Chinese farmer to lead a typical modern American life. Fortunately, more and more people have reached a deep-seated recognition that the present mode of industrial agriculture simply cannot work much longer, and that it is up to China to change the paradigm. *The future development of China must avoid the mistakes the West has already made* (Chen, 2012). As some Chinese scholars argue, the fact that different countries in the world took their own roads toward modernization of agriculture shows that there is not only one single way to modernization. A nation's modernization of agriculture can be successful only if it recognizes and accepts the reality of its finite natural resource and current social and economic conditions; Based what is currently know about China's natural resources and current social and economic conditions, imitating Western agriculture would seem to be a dead end. Prof. He Xuefeng, a noted Chinese agriculturalist, believes that so far there have been no successful experiences in other countries from which we can learn to deal with the challenges of modern agriculture. We must profoundly reject the western development model in order to *find a new way* for China as well as the world (He, 2007, p. 1).

As a matter of fact, some American economists have already realized this problem. For them, since the situation of every nation is quite different, *it is wrong to regard the technology and institutions of the western world in 1950 as exogenous elements which could be introduced into the economies in the developing countries* (Kjeldsen-Kragh, 2007, p. 393). For example, *as American agriculture has become more industrial, it has become increasingly dependent on fossil energy and other finite natural resources. The total food system currently claims about twenty percent of all fossil energy used in the US, with farming accounting for about one-third of the total percentage. In fact, our industrial food*

system requires about ten calories of fossil energy for every calorie of food energy produced (Ikerd, 2010). This certainly would not seem to be a good model for China to follow in an era of declining availability of fossil energy.

As Pan Yue, a leading figure in China's ecological movement and Vice Minister for the Ministry of Environmental Protection in China, pointed out, *if China continues to walk the old road of Western industrialization, it will be a dead end* (Pan, 2010). Our limited earth can no longer afford such industrialization. This is the dilemma. Our thesis is that China should consider a Constructive Postmodern Agriculture in order to move past its current dilemma.

Toward a Chinese Constructive Postmodern Agriculture

In the West the term *postmodern* is often used to categorize philosophical approaches to life that deconstruct habitual and ideological ways of thinking and, at the same time, stress cultural pluralism. This is not what we mean by postmodernism in this discussion. We mean instead something more constructive and something that is linked with the physical world and with the needs of the human body for nourishment. It is not simply about pluralistic ways of thinking and writing.

Constructive Postmodern Agriculture is a creative integration of Western and Chinese wisdom, modern and tradition. In this sense it is constructive.

It is postmodern, in that it draws insights from the pre-modern Chinese past and the modernizing West of the present and the contemporary sustainable agriculture movement born in the mid-1980s in the West (Ikerd, 2010). These insights are integrated into a new and creative whole based on China's extremely complex reality. It does not reject the achievements of industrial life. Nor is it obsessively modern achievements. One feature of modernity is that it too often rejects all that is traditional in the name of progress.

In opposition to the modern nihilistic attitude toward tradition, postmodern agriculture steps into the future with a deep respect for traditional wisdom and spirituality. It deeply appreciates the practical value and wisdom of traditional farming and tries to integrate them into a new model. It recognizes that traditional peasant agriculture has served China well in many respects. For example, peasant agriculture has proved remarkably sustainable and has, until recently, provided sufficient food for most of China's large population during most times. For thousands of years peasants fed themselves and their urban neighbors (Zhang, 2004). For instance, *the Fishpond with Mulberry* created by Chinese farmers of the Zhujiang River Delta in their long production practice not only displays a positive ecosystem, but also embodies the ecological wisdom of ancient Chinese farmers: *the leaves of mulberry are eaten by silkworms, the silkworm excrement is eaten by the fish, the pond mud is paved onto mulberry land* (Zhong, 1982). In his well-known book, *Farmers of Forty Centuries,* Franklin Hiram King also spoke highly of ancient farming practices in China, Japan, and Korea, such as: multi-cropping, crop rotation, reservoir systems, and soil fertility management through composting. For King, it is apparent that China in some sense has already *struck the keynote of permanent agriculture* (King, 1927, p. 241) which would benefit other nations. He believes that if we can combine this kind of old wisdom with modern agricultural technology, we can solve the problems of world food supply. According to Wen Tiejun's analysis, it is the fact of resource shortage, huge population, and limited cultivated land that has shaped China's traditional model of farming, as well as Chinese farmers' many virtues such as frugality, restraining desire, and bearing hardship without complaint, which are extremely valuable to us today (Wen, 2011, p. 2).

It is worth emphasizing that the aim of progressively moving agricultural systems off the chemical and fossil energy treadmill and towards lower-input, labor-centered intensification and more biodiversity is not, as Tony Weis states, *about going backwards to more 'primitive' approaches and rejecting modern science. On the contrary, to significantly increase the scale of organic and near organic practices will require much more scientific research and training geared towards better understanding how agro-ecosystems operate and how key dynamics can be selectively enhanced. For instance, scientific research into the functional complementarities of various species can inform biological pest and disease control techniques* (Weis, 2007, p. 170).

That means that postmodern farming is not anti-modern. Instead it absorbs the wisdom from modern Western science, particularly from innovative farming groups that are experimenting with alternatives to high-input modern agriculture. Jiang Gaoming's Hongyi eco-Farm, for example, successfully solves the problems of pests by fully applying principles of modern ecology and physical and biological methods, such as *insect light traps*, on their organic farm.

In addition, constructive postmodern agriculture contains the strength of the free market which can help solve the problem of *laziness*. Today in China, as a matter of fact, *farmers have grown lazy*. Some scholars like Jiang Gaoming think that the laziness is due to *the increased use of chemical fertilizers, pesticides, herbicides and plastic films* (Lu, 2010). This may be one reason. Another reason may be the lack of enthusiasm, since food prices are currently very low in China and, if farmers input too much

energy and money in farming, they will realize a loss on their investments. As Jin Wei pointed out, *since farming takes high risk but low income, farmers who used to regard land as their lives now treat land as something of little value or interest* (Jin, 2011).

However, the modern economic theory, usually attributed to Adam Smith emphasizes *self-interest*. According to which, as Harvey James put it, *it is self-interest that ultimately drives economic activity* (James, 2006). Such a theory not only encourages competition, but also, in John Ikerd's words, *allows a reasonable level of profits to be attained* (Ikerd, 2007, p. 119) It doubtless can stimulate farmers' enthusiasm for organic farming by paying attention to their self-interest profit seeking. In doing so, *the objective of sustainable agriculture* might be more effectively achieved (James, 2006).

Constructive postmodern agriculture originates from the reality of Chinese agriculture and is deeply consistent with traditional Chinese ways of thinking particularly its organic vision of the world. According to this worldview, the universe itself is a universe of values as well as of facts, values are not reducible to human contrivance or power, and that all cultures contain values worthy of appreciation. This suggests that rural people have value in their own right and they can best develop when they are encouraged to recognize, not dismiss, the wisdom of their own cultural traditions. In this sense, constructive postmodern agriculture is values based (McDaniel and Ryan, 2008). It respects farmers and their inner feelings, their families and their communities rather than only concentrating on profit.

There are no blueprints for constructive postmodern agriculture, but some basic principles are emerging:

1) *An environment-friendly agriculture*. Chinese Postmodern Agriculture is an environment-friendly agriculture as opposed to an environment-hostile agriculture. The aim of an environment-friendly agriculture is to preserve soil, water, biodiversity, and surrounding environment by using organic fertilizers and natural minerals rather than chemical fertilizers, pesticides and livestock feed additives and antibiotics. The environment-friendly agriculture has its root in a Chinese tradition emphasizes harmony between humankind and nature. As influenced by Daoism, Chinese Process Philosophy emphasizes harmony with nature. This philosophy resonates with Wendell Berry, a pioneer in organic farming in the US, who uses marriage as a metaphor for the relationship between farmer and farm; that is, as a life-long commitment of mutual nurturing and love. Wang Yangming (1472-1529), a leading philosopher in Neo-Confucianism, used *yiti* (one body) to describe *the intimate relationship between humankind and nature* (Wang, 1997). To Chinese farmers, land not only feeds people materially, but also spiritually. It is *the soul of agriculture culture* (Lv et al., 2011).

An environment-friendly agriculture can help farmers recover a sense of harmony with nature. It recognizes that other living beings and the natural world have value quite apart from their usefulness to humans, and recognizes that humans can work with nature for the sake of human well-being and the well-being of nature.

2) *A sustainable agriculture.* Postmodern agriculture must be sustainable, so that *the needs of the present are met without compromising the ability of future generations to meet their own needs* (WCED, 1987).To realize agricultural sustainability, agriculture must be regenerative. David and C. Dean Freudenberger use the term *regenerative* in the sense that a post-modern agriculture must renew itself, rather than being reliant on external inputs of fossil fuel and agrochemicals. It has the following four rules; the capability of the land must be recognized and respected, bare soil is a crime against the Earth, biologically and solar intensive farming systems must prevail, and diversity of eco-system services must be maximized and conserved (Freudenberger and Freudenberger, 2008).

To understand the more specific methods postmodern sustainable agriculture advocates, it is helpful to look at the work of Wes Jackson, an agricultural researcher working in prairie lands. Jackson believes that *the agricultural human's pull historically has been toward the monoculture of annuals. Nature's pull is toward a polyculture of perennials* (Berry, 1990, p. 71). To briefly define these terms: monoculture is the exclusive cultivation of one crop; polyculture is the cultivation of multiple crops in the same area; annuals must be planted and harvested each year because they live for only one season; perennials do not need to be replanted every year, because they live for multiple seasons. Specifically, a postmodern sustainable farm needs (1) to be smaller, plant mixed crops, maintain a healthy soil, minimize waste, and supply a local community as much as practically possible; and (2) to move away from monocultures of annual plants, which tend to wear harder on the soil, and move closer towards polycultures of perennial plants, which conserve the topsoil more frugally. These are not recommendations of totality, but of scale. It is not feasible to forgo all annual plants, like wheat, corn or soy beans, but it is possible to intercrop and/or mix them with perennials, such as berry bushes.

3) *A farmer-respected agriculture*. Chinese Postmodern Agriculture treasures farmers; unlike modernity, which treats farming as a synonym for backward. Constructive postmodern thinkers remind us that we should not forget that *it is farmers who have been feeding China in the most basic and the most important sense* (New Weekly, 2009).

Constructive postmodern thinkers deeply appreciate what Jefferson said about farmers: *cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country and wedded to its liberty and interests by the most lasting bands* (Jefferson, 1950, p. 426).

The challenge is that more and more people are flocking to ever-growing cities in China today because people desire better education and health services for their children, which have failed to be delivered to rural areas. As discussed previously, many farming families and agricultural workers in China are extremely poor, suffering from inadequate health care, poor education, lack of water resources, and farming infertile land. Their children are among the 130 million workers who migrate to the cities to work in factories or restaurants, earning money to send home. A postmodern agriculture must face this challenge by providing *very sophisticated educational and health services to all men, women and children in all rural areas* (Freudenberger and Freudenberger, 2008). As suggested previously, respect of farmers is an instrumental component of constructive postmodern agriculture. The farmers deserve the same respect as professors, doctors, and government officials, because their inherent values are the same. In Freudenberger's words, *postmodern agricultural requires a transformation of attitudes as well as basic human services. (…) Post-modern agriculture should be based on many millions of farmers rich in education, health, diversity of occupations, and multiple recreational opportunities including access to the arts* (Freudenberger and Freudenberger, 2008). Farmers will lead *a satisfying and creative life, with opportunities for recreation, healthy relations with friends and family, and the enjoyment of life* (McDaniel and Ryan, 2008).

Respecting farmers can also help solve the pressing problem: *Who will farm in the future?* A postmodern agriculture needs not only farmers, but well-educated farmers of high quality. *Sustainable agriculture will require more thinking, caring farmers* (Ikerd, 2010). Fortunately, the Chinese government has already realized the urgency and importance of educating new farmers. According to Wei Chaoan, vice minister of Agriculture Department of China, *educating a new kind of farmer is the key to new countryside construction*. He believes that *thousands upon thousands of new farmers with high quality will help transform huge population pressure into advantage of human resource* (Wei, 2007). As a follow up, the government has launched a project titled the *Sunshine Project,* which has so far trained 5.3 million farmers by investing 1.65 billion Yuan. *In Shandong Province, the local government has planned to train 100,000 rural information assistants in order to help one million farmer families access the Internet* (Shen, 2006).

4) *A community flourishing agriculture*. From a constructive postmodern viewpoint, one of the biggest failures of modern agriculture is the destruction of rural communities. A rural community is a living social community consisting of persons who have close familial and social relationships. As opposed to modernity which devalues these relationships and treats them as *manacles*, constructive postmodern agriculture, which is based on Process or relational philosophy, values these relationships because it regards human beings as social: *persons are internally related to one another (i.e., their relationships define their identities as persons) so that any view of people that treats them as self-contained individuals falsifies the real situation* (Daly and Cobb, 1989, p. 169).

Following this train of thought, constructive postmodern agriculture emphasizes that farmers are persons-in-community and that the communities to which they belong include the biotic communities of the land but also human communities: villages and towns. Constructive postmodern thinkers agree with Wendell Berry[1] when he says, *a nation is a community of communities, and if the local communities do not flourish, the nation cannot flourish* (McDaniel and Ryan, 2008). It is these local communities that make life meaningful and help the nation flourish. Thus, constructive postmodern agriculture advocates local communities, especially small organic farms owned by a family or community of dedicated people. Here *small* is not a negative word, but rather a positive word for constructive postmodern thinkers because *it suggests careful attention to local communities, individual households, ordinary people, and particular bioregions, allowing them to be one's fundamental frame of reference* (McDaniel and Ryan, 2008).

This has special meaning for China because it is a country with a huge population but limited arable land. There are 3.6 million villages and 200 million farmer families in China, while 80% of Chinese lands are non-plain area, mountain areas, and forest region. More specifically, China has only has 1.83 billion mu (1 US Acre = 6.07 MU) of arable land and each farmer family has 18.3 mu; average arable land per Chinese household is 7.2 mu. It is obvious that *big farms and mechanization of agriculture will not work in China* (Zhou, 2004). In fact, the main reason why China could have achieved the great advances in agriculture in the past 30 years, according to Wen Tiejun, does not lie in large scale modern farming, but in small farms which have

[1] Wendell Berry never describes himself as postmodern, instead he would say that he is very traditional. But his way of thinking is indeed postmodern in the sense of critiquing aspects of modern, industrial life.

benefited from agricultural reform since 1978. *With the active input of Chinese farmers, it is the small farms economy characteristic of contract responsibility system, which has created this miracle* (Wen, 2011). Accordingly, if China desires to develop a constructive postmodern agriculture, developing small organic farms should be given priority. This does not mean totally going back to the traditional farming with its disadvantages such as vulnerability to natural disasters and economic risks because small farms today are more scattered and diversified.

Hence, emphasizing various kinds of cooperation between farms, farmer families, even farmers and city citizens would be an important component of constructive postmodern agriculture. As a matter of fact, a new kind of agricultural cooperation has been springing up silently in China's countryside. It is a kind of voluntary cooperation from below, which includes *various kinds of farmers cooperatives, land joint-stock cooperation, rural community share-holding cooperation, and professional economic cooperation, etc.* (Han, 2006). These kinds of cooperation have been to some extent confirmed by the government. Han Kang, Vice president of China National School of Administration calls it *a new extremely important exploration* (Han, 2006).

More importantly, a postmodern agriculture should place stress on improving the quality of these rural communities and making them creative, compassionate, equitable, and interesting. Farmers need to have markets for their food in cities that are relatively close by, thus relieving the need for expensive transport. In addition, constructively postmodern farming can only emerge within the larger context of a creative and harmonious countryside, where there are excellent schools, enjoyable forms of recreation, quality health care, and vital local businesses.

This is what is meant by an organic, harmonious community. This is also consistent with the goal of the *New Countryside Construction* proposed recently by the Chinese government. According to the interpretation of Du Zhixiong, a renowned agriculturalist and head of the Rural Development Institute, Chinese Academy of Social Sciences, Beijing: *improving production condition, life condition, and ecological environment, increasing the index of happiness in order to make farmers enjoy a good and prosperous life is the goal* (Du, 2006).

It is apparent that *enjoying a good and prosperous life* will become an empty promise without flourishing communities. If rural communities flourish, significant numbers of Chinese farmers would stay in the countryside, not because they must do so, but because they want to do so. The countryside will have become a desirable place to live, with a sense of belonging, the meaning of life. There will no longer be artificial separation between husbands and wives, children and their parents.

5) *An aesthetic appreciative agriculture.* Although modern agriculture has produced huge material wealth, that wealth has also accelerated the destruction of beauty in the countryside and in nature. In China, people can no longer enjoy the beauty of the countryside in many rural areas due to various forms of pollution. Deeply influenced by the concept of profit maximization based on a dogmatic free market economy that neglects the sustainability of the human civilization (Udo and Pawłowski, 2010), a beautiful countryside is conceived of as a resource pool to be exploited. *The [economic] value of a forest merely consists in the price on the market as dead woods.* The ecological value and aesthetic value *have been totally ignored* (Sun, 2005). The influence of the radical utilitarian thinking is so strong that a great many Chinese farmers still believe that *beauty cannot play food, (..) planting trees cannot make quick dollar* (Xu, 2007). This radical utilitarianism is a cause of the spiritual poorness or sense of emptiness of many farmers even while some are materially very rich. Their spiritual poorness is, to a large extent, due to the loss of aesthetic ability, an ability to feel the beauty of nature, which is a priceless treasure for human beings (Fan, 2006, p. 11). In Marcia Muelder Eaton's words, *aesthetic values play an important role in human experiences of landscapes* (Eaton, 2008, p. 339). A beautiful countryside can not only free us from various kinds of anxiety, but also stir our passion for life, reverence for earth, and sense of responsibility. Hence, a constructive postmodern agriculture must consider *beauty* as an important principle for its countryside construction.

Another damage modern agriculture has inflicted upon the beauty of the Chinese countryside results from its obsession with homogenization and its suppression of the beauty of diversity. Today, this kind of homogenization thinking has influenced a good number of Chinese including government officials. For example, a government official visited Mazhuang Village, Zuhou, Jiangsu Province and he ordered the farmers to pull the loofah off their walls, to cut off the wild flowers in their gardens because they are not of the most desirable of plants. Instead, he asked the farmers to buy paint to paint their walls in order to preserve uniformity. But his order was rejected by the farmers. *We like loofah, we enjoy wild flowers,* responded the farmers (Zheng and Sun, 2006).

These farmers understand that beauty consists of diversity, not sameness. The central government has begun to realize the importance of beauty in agriculture. It has proposed *creating an Ecological Civilization Society with beautiful mountains, rivers, charming natural sights.* Many local governments have proposed *beautifying countryside* and

hope rural areas become *both rich and beautiful*. All of these indicate that all of society has increasingly recognized that a prosperous rural community should include beauty; accordingly, a happy rural life should include the aesthetic life.

An aesthetically appreciative countryside will not only enhance the sense of pride and quality of life of farmers, thus allowing them to live and work in peace and contentment, but can also encourage more and more city people to move to the countryside. In doing so, the great wall of misunderstanding that has separated city and countryside, that has divided China for so many years, will fall down. While not an easy task, this should be an indispensable part of Chinese constructive postmodern agriculture.

Such a unique approach has been attracting the interest of more and more Chinese scholars. In an article titled *Development Trend of World Agriculture and China's Postmodern Agriculture Development: A Suggestion*, Wang Lingxiang and Sun Jinfu wrote: China should *push on the sustainable development of agriculture and rural-urban integration by developing postmodern agriculture* (Wang and Sun, 2011).

Some Chinese agronomists argue that modernization is not the only way for farmers to eat well, have books to read, afford medical care... A postmodern ecological agriculture will be a better choice (Tang et al., 2010).

Although some scholars criticize postmodern agriculture, saying it does not provide perfect solutions to the drawbacks of modern agriculture (Tan and Du, 2010), others argue that postmodern agriculture indicates *the new direction of modern agriculture* (Zhu, 2011). For some Marxist scholars, *Postmodern agriculture is a new train of thought for building a socialist New Countryside* (Li and Li, 2009). Professor Zhou Shu is even convinced that *for China, postmodern agriculture is the only way out of the predicament caused by imitating the western agriculture model* (Zhou, 2004). The Taigu Conference on postmodern agriculture held in 2008, in Taigu, China, showed that many participating scholars and government officials were convinced that *postmodern agriculture is possible* (Dong, 2008). Since that time, three conferences themed *Constructive postmodern agriculture* have been held and more and more Chinese people have shown interest in this unique approach and have tried to put this idea into practice. In a recent article published in the Journal of the Party School of the Central Committee of the C.P.C, the Party's top venue for training senior Party and government officials such as governors and ministers, the author claims that *Chinese agriculture must make shift* and *to walk a postmodern agriculture road with Chinese characters* (Zhuang, 2012).

Several experiments in postmodern agriculture in China

The question remains of whether it is possible to develop a Chinese constructive postmodern agriculture, ecologically sustainable, and socially harmonious, which will allow farmers to live happily in China?

Admittedly, constructive postmodern agriculture has not yet become mainstream and may take a long time to realize its goals. However, some believe that *China has the strong motivation and background condition to take the lead to launch a postmodern agriculture* (Zhou, 2004). In addition, *China's traditional natural farming wisdom and its matured technology lay a solid foundation for developing a postmodern agriculture* (Zhou, 2004). In fact, there have been some sincere endeavors in this direction. At the government level, in 2006, the Chinese government launched the *New socialist countryside construction.* The aim of this program is to boost ecological agriculture, develop new relationships between industry and agriculture, cities and countryside, and increase rural affluence. This initiative includes investing trillions of yuan into rural education, medical services, and infrastructure construction. In 2007, at the 17th National Congress of the Communist Party of China, the government called for creating an ecological civilization to promote harmonious relationship between citizens and nature. Its primary goal is to form *an energy- and resource-efficient and environment-friendly structure of industries, patterns of growth and modes of consumption* (Hu, 2007). This political turn toward ecological civilization, not only provides constructive postmodern agriculture with political support, but also allows for some experiments in ecological agriculture. So far, some 100 ecological counties in China have been established.

At the individual level, some activists have been dedicated to constructive postmodern agriculture, even though some of them may not use the term. Wen Tiejun, Sheri Liao, and Jiang Gaoming can be regarded as the representatives.

Wen Tiejun, an agricultural economist, is the prime mover of the New Rural Reconstruction Movement in China. The aim of this program is *to promote innovation and evolution for rebuilding a positive social and economic structure for rural sustainability* (Wen et al., 2012). The participants of the movement include villagers, city citizens, intellectuals and a great many volunteers. The philosophy of the movement is captured in the three Ps (or three Peoples' Principles): *people's livelihood, people's solidarity, and people's cultural diversity* (Wen et al., 2012). As a very influential NGO movement, it has helped advance ecological civilization as a people's endeavor to promote village cooperatives, organic farming, and eco-architecture.

In addition, it also promotes fair trade and consumer participation in urban areas, drawing on the integrated efforts of rural villagers and urban citizens, including women and the aged, as well as input from intellectuals and urban youth (Wen et al., 2012).

Sheri (Xiaoyi) Liao, a leading figure in the environmental movement in China, a winner of Cobb Common Good Award, and her Beijing Global Village, a leading NGO in China, has put constructive postmodern thinking into practice by developing the Lehe Home Project in the Sichuan earthquake area. The Lehe Home Project (Lehe, 乐和, in Chinese means happiness and harmony), which supports 94 families and over 200 villagers, implements the concept of *a system with conservation culture* in six aspects:

Residence – to build environmental-friendly residences;

Economy – to redirect the development mode to a synthetic ecological economy composed of environmental-friendly agriculture, tourism and handicraft industry;

Ethics – to revive the traditional Chinese morality and civil consciousness by building schools and libraries to further education;

Social Groups – to organize local green groups participating in the reconstruction process and cooperating with the government;

Health – to form a western-Chinese new style of health promoting solutions including building qualified clinics and popularizing a set of Taiji-like exercises;

Environment – to encourage locals to be more involved with soil, water and air protection in Daping Village.

After her success in Daping village, Liao went to Wuxi County and is working on making Wuxi a Lehe County.

Jiang Gaoming is chief researcher at the Chinese Academy of Sciences' Institute of Botany. He is convinced that *The key to solve problems like inflation, unemployment, energy shortages and pollution is to develop ecological towns suited to the needs of China and a sustainable rural economy* (Tang et al., 2008). In 2007, he and his research team started experimenting in a field in Jiangjiazhuang, in Shandong's Pingyi county. This was the worst land in the village, leased to us for only 110 yuan (US $17) per *mu* – a plot of the same size on good land near the village would have cost 300 yuan (US $46). The ground was rocky, and the soil only 20-centimetres deep. Thirty years ago, the community had used this piece of land as a threshing ground, since not much could be grown on it. It was this kind of land on which his team of scientists started testing organic methods, *strictly avoiding the use of man-made fertilizer, pesticide, herbicide, additives (manures from pig and chicken farms are polluted with additives), agricultural membranes and GM technology* (Jiang, 2012).

Five years later, production has clearly increased. Even the locals find it hard to believe this *organic miracle.* Zhou Jinglin, secretary of the local Communist Party branch, told a reporter from Shandong's television network about the changes in detail. And, since having seen the trial for themselves, nearby farmers have become more enthusiastic about eco-farming. The methods used by Jiang's team from the Chinese Academy of Sciences included: taking straw normally burnt off by farmers and processing it into fodder for cows, saving 1,500 yuan to 2,000 yuan (US $232 to US $309) per head of cattle; using some of the cow manure to make methane, to be used as an energy source, and to use as quality organic fertilizer for the fields; and tackling pests with *physical and biological* methods – using insect light traps year round and keeping chickens in the field to feed on the insects. Weeds were hoed up and used as organic fodder for geese, fish and locust farming; and appropriate levels of irrigation used to maintain soil moisture. These methods allowed ecological restoration of unproductive land that had been polluted with fertilizer, pesticide and herbicide and allowed production levels to increase. Jiang believes that *in future, it should be simple to make eco-farming profitable* (Jiang, 2012).

China's road to constructive postmodern agriculture is deemed to be a long and hard one given its extremely complex situation. But if Hongyi Farm could succeed, others should be able to succeed also if the government gives its full support to the postmodern paradigm of farming.

As Lu Xun, one of the greatest writers of the 20th Century in China has written: *hope is like a path in the countryside: originally there was no path – yet, as people are walking all the time in the same spot, a way appears* (Lu, 1921). It is critical to the future of global society that the Chinese people are allowed and encouraged to tread a constructive postmodern path into the future, a path that leads to agricultural sustainability, which undoubtedly should constitute a fundamental component of a Sustainable Development Revolution (Pawłowski, 2009).

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PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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The Rights of Local Communities and Their Role in the Sustainable Exploitation of Biodiversity

Prawa społeczności lokalnych i ich rola w zrównoważonym wykorzystaniu różnorodności biologicznej

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Abstract

Agricultural biodiversity is the biological and cultural heritage of the world. Human food safety and opportunity for further development depends on the behavior and the ways in which agricultural biodiversity is used. The protection of the diversity is primarily based on the knowledge and practical experience of small rural households and communities. The system of maintaining and expanding the potential of genetic diversity of plants and domestic animals has been reliable, though now it has become seriously endangered. In the context of sustainable development, there is an urgent need to find new legal and organizational ways to protect this wealth from the seemingly uncontrolled influence of modern biotechnology on agriculture and food production.

Key words: genetic diversity of organisms used for agriculture, sustainable use of biodiversity, the rights of local and rural communities

Streszczenie

Bioróżnorodność rolnicza jest dziedzictwem biologicznym i kulturowym świata. Od jej zachowania i sposobu wykorzystania zależy bezpieczeństwo żywnościowe człowieka i możliwości dalszego rozwoju. Ochrona tej różnorodności opiera się przede wszystkim na wiedzy i praktyce funkcjonowania małych gospodarstw wiejskich oraz życiu społeczności lokalnych. Jednakże ten niezawodny do tej pory system utrzymania i powiększania potencjału różnorodności genetycznej roślin i zwierząt użytkowych jest obecnie poważnie zagrożony. W kontekście zrównoważonego rozwoju istnieje pilna potrzeba szukania nowych sposobów prawnych i organizacyjnych zabezpieczenia wciąż jeszcze posiadanego bogactwa przed (wydaje się niekontrolowanym) wpływem nowoczesnych biotechnologii w produkcji rolno-spożywczej.

Słowa kluczowe: różnorodność genetyczna organizmów rolniczo wykorzystywanych, zrównoważone wykorzystanie różnorodności biologicznej, prawa społeczności lokalnych i wiejskich

Introduction

This paper is an analysis of the rights of local communities[1] in determining the possibilities of influencing the conservation and rational usage of biological diversity in areas occupied by them in the context of sustainable development and, thus, caring for the welfare of present and future generations (Sztumski, 2006).

The main aim is to analyze the current legal situation in this subject, and on the other hand, to trace the factors determining the content and scope of legal regulations to protect the genetic diversity of plants and domestic animals, as well as of wildlife. This will help to formulate *de lege ferenda* proposals strengthening the position of the custodians

[1] A local community is a community living in an isolated, relatively small territory, such as a village, located close to each other or the housing estate, where there are strong ties with community interests and needs and with a sense of rootedness and belonging to an inhabited space.

of traditional knowledge as the guarantors of biosecurity of food in the sustainable use of agricultural and natural diversity.

Biodiversity and its importance to humanity

Since the 1900s, modern agriculture has led to the extinction of more than 75% of the varieties of crop plants. In Italy, over the past 40 years nearly all cultivated species of wheat, onions, tomatoes, lettuce and peas have died out. In South Korea in the late 1980s and early 1990s, over ¾ of crop species ceased to exist. In China, in 1949 there were still 8,000 kinds of rice, whereas today only 50 kinds are cultivated. Out of 10,000 types of wheat that could be found there in 1949, only a thousand lasted until 1970s. In Mexico, 80% of corn species have become extinct since 1930 and in the United States, over 7300 varieties of vegetables had been deleted from the national seed list by 1983 (Agrinatura.pl, 2011).

This raises a number of questions: Is it possible to find the biotic and abiotic causes of the decline of biodiversity in legal factors? What are, or could be, the economic consequences? Is this a threat to the humanity and to present or future generations? What can be done to prevent it? What can local communities do to protect biodiversity?

These questions point to a more general problem: To what extent could the rights given to local communities affect the conservation of biological diversity, upon which the future of agriculture and food security depends?

A literature-based general hypothesis can be put forward, indicating that the current regulations at the international level assigned to the local communities do not provide adequate protection for all human society in the maintenance of biological diversity of the world, which is evidenced by the rapid extinction of commercial and wild species.

What, then, is biodiversity and why is it so important?

Biodiversity is usually understood as the diversity of all living organisms from terrestrial, marine, and other aquatic ecosystems, and the ecological complexes they are part of. It includes diversity within species, between species and between ecosystems, (Art. 2 of *The Convention on Biological Diversity*).

Most often, the following division is suggested:

a) agricultural biodiversity (organisms used in agriculture);
b) the biodiversity of wildlife[2].

Agricultural biodiversity is the biological and cultural heritage of the world. Used by humans, both wild or locally produced species have many beneficial characteristics, such as resistance to diseases, drought or cold, they may give early fruit or be well-conserved. Similarly, indigenous breeds of farm animals can adapt to local climatic and feeding conditions and are resistant to diseases. The limitation of biological diversity in agriculture involves the replacement of local varieties and species by species and breeds that have been *programmed* in terms of productivity characteristics.

Agricultural diversity is primarily seen as a securing source of our basic needs, such as food. It is the result of domestication, selection and adaptation of the ancestors of wild plants and animals, carried out by many generations of farmers and shepherds over a period of more than ten thousand years. In other words, agricultural biodiversity, in addition to a purely biological component, represents centuries of cultural evolution as the human race has evolved in different ecosystems along with other species.

Biodiversity of wild organisms is seen as the wealth of nature. Non-specialists often associate it with the endangered species of plants and animals living in ecosystems characterized by a low degree of human influence. Biodiversity is therefore based on living creatures inhabiting our planet, which also are the *factory of life* because they are alive and determine the conditions of this life.

Many available publications on this topic focus on the commitment and an understanding of the risks arising from the rapid disappearance of wild and commercial species. However, a broad and comprehensive analysis of related issues in the era of sustainable development requires many skills and extensive knowledge (even in the field of genetics, biology, ecology, sociology, international and economic law, environmental and patent law, and bioethics). Taking into consideration today's pace of learning, carrying out such an analysis is a very difficult task because of the extensive specialization in biological sciences. Inevitably, available publications usually restrict discussions to a specific topic in detail. Although such approach raises their scientific value enabling a careful reflection on the selected problem, it also significantly impedes a comprehensive look at the phenomena of the modern world, including the problem of the rapid extinction of species, which is the subject of analysis in this paper.

The international community has demonstrated certain foresight, e.g. by introducing legislation on the role and rights of local communities in the conservation of biological diversity for food and agriculture (such as the *International Treaty on Plant Genetic Resources for Food and Agriculture*). Unfortunately, they seem to be too modest and insufficient.

[2] This two-part division broadly overlaps, mostly regarding the ability to access and share the benefits arising from both agricultural biodiversity – usually collected and protected *in situ* and *in vitro* – and natural biodiversity (mostly still occurring *in situ*, and only in a minimum amount of stored and protected in controlled *ex situ* (Szulc, 2011) seen in the *Convention on Biological Diversity*.

The destruction of biological diversity has resulted in the destruction of livelihoods for a large part of the population of the Third World countries, which mostly consists of small farmers, fishermen and craftsmen. This, in turn, has caused irretrievable loss of knowledge and experience gained from the local community through contact, observation and use of elements of the surrounding world. The destruction of these measures is mainly due to modern agriculture.

Local communities understand agriculture as an activity resulting from the internal and material needs of man, using skills and experience specific for a certain place and transmitting them from generation to generation. However, modern agricultural production by introducing foreign plant varieties and animal breeds, ignores and *stifles* local farming culture (Szulc, 2011, p. 141-146). In this perspective, it is clear why globalization and industrialization (based on simplified technological and economic mechanistic models of biological treatment of wealth on a par with minerals) lead to a rapid dissemination of agricultural (genetic) and social mono-cultures, which results in destruction of diversity (Myga-Piątek, 2010; Urbisz, 2010). This raises a legitimate concern, for example, because of a direct threat to food security, because genetic monocultures artificially unify methods of production, which is associated with environmental instability and – paradoxically – it may increase the cost of growing a type of crop (at least in the context of increasing the number of necessary agro-technical procedures)

However, by 2000[3] 95% of the genetic diversity used in agriculture at the beginning of the 20th century had been lost. Out of 6400 known breeds, 1,000 had disappeared forever and in the next decade further 2000 will disappear. This is partly due to the so-called *green policy* revolution – a new production model based on mono-cultures, mechanization and chemicals used in agriculture[4]. The current revolution – this time a genetic one – continues the uniform and homogeneous model of agriculture, oriented to economic benefits and short-term satisfaction of the needs of a growing number of people in the world.

It should be emphasized that attempts at helping the poorest farmers with access to modern biotechnology and its benefits which ignore the needs of local communities and the prevailing agricultural conditions by implementation of industrial production based on technologies foreign to such ecosystems, are detrimental to them.

Having regard to these far-reaching and mostly unknown profound changes related to possible economic, ecological and social consequences (and thus covering all three pillars of sustainable development), we should reflect on the importance of small farming/rural communities in protective programs and the knowledge they possess, the specificity of local culture and the natural resources that make these people involuntary creators and custodians (unfortunately, marginalized by the invasiveness of advanced technologies). This issue certainly requires more attention. Meanwhile, even the *Convention on Biological Diversity* (paragraph 12 of the Preamble and Art. 8j) and the *Cartagena Protocol* (Art. 26) only briefly mention the importance of biodiversity for local communities and their achievements. Only recently, the *International Treaty on Plant Genetic Resources for Food and Agriculture* clearly distinguished the contribution of small farmers in this area (paragraph 7 of the *Preamble*).

Local communities and the protection of genetic resources in the Convention on Biological Diversity

The first initiatives to preserve crops and livestock were related almost entirely to *ex situ* protection (outside their place of origin, including *in vitro* gene banks). Only *the Convention on Biological Diversity* imposed an obligation on countries to preserve endangered native species in agricultural use on farms, or in a place where they have *always* been[5].

The *Convention on Biological Diversity* can be regarded as a sign of growing concern and of seeking legal ways to save the living environment and preserve the balance between *the ecological principles* of biodiversity and economic sustainable use and social requirements of a growing human population in the world (*Preamble*, paragraph 20). It shows, among others, the growing awareness of the *significant importance of biodiversity and the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components* (paragraph 1 of the *Preamble*). In the definition of biological diversity adopted in the document, it is easy to notice scientific and naturalistic aspects (Art. 2). It was also noted that the protection of *biological diversity, sustainable use of its components and the fair and equitable sharing of benefits arising from*

[3] The phenomenon of loss of diversity is associated with food production in yet another way. In the history of agriculture and for nutritional purposes, man used about 10,000 plant species to various degrees. Currently, 90% of our diet is provided by less than 120 species and only 12 species of plants and five animal species provide more than 70% of the food. Half of the food is provided by four plant species: rice, corn, wheat, and potatoes (http://agrinatura.pl/o-bioroznorodnosci.html (20.12.2011).

[4] The accelerated erosion of the species *helped* the belief that every product diversity can be replaced by something else: fossil wood, or animal manure with mineral fertilizers, or synthetic compounds of natural substances.

[5] The same course was adopted by the FAO in developing the *Worldwide Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources*.

utilization of genetic resources (Art. 1) is in the interest of all humanity and should contribute to the stabilization of relations between states[6]. Unfortunately, except for the general rules concerning the use of genetic resources of another country, the *Convention* did not specify effective protection measures that could be used by economically weaker countries, especially the so-called Third World countries, which are usually extraordinarily endowed with various species of plants and animals. It just *appeals* to create national legislation that would protect and maintain knowledge and practices of indigenous and local communities, leading traditional lifestyles conducive to the conservation and sustainable use of biological diversity (Art. 8j). These countries, of course, also recognize the need to adopt economic measures conducive to social and legal protection of genetic resources, but the *Convention* does not provide them with profits derived elsewhere (i.e. in rich countries) in patents and is limited only to stating that the country of origin may determine the means of access to these resources on mutually accepted principles (Art. 5, Paragraph 4).

Biodiversity protection in the European Union

The European Union was, in a sense, forced to form a new approach to biological diversity – today practically worldwide – by assigning a significant scientific and economic value to it. The component that connects legislative undertakings designed to counteract *genetic erosion*[7] of local agricultural ecosystems and wildlife is that the disappearance of species, varieties and breeds has a negative influence on economic development, because they constitute the natural basis for the production of food, feed, fiber, beverages, medicines, and biotechnological processes in many branches of the economy (agriculture, fishing, reclamation), upon which the continued existence of our species depends. Hence, the EU seeks to integrate environmental issues with other sectorial policies (Jaśkiewicz, 2009), in particular, those relating to economic and social aspects, in accordance with the terms laid down in Art. 130 R, Paragraph 2 of *the Treaty establishing the European Community*. The continuing debates over the future of agriculture and the conservation of agricultural and wildlife biodiversity are intended to draw attention to the dependence of the *world* economy on *local* economies. Meanwhile, today's global market requirements tend to subdue the traditional ways of management and use of goods produced by traditional methods. It is therefore necessary to apply existing legal tools (or create new ones) to reconcile market needs with the need to preserve resources by local communities and practical knowledge about them (Pawłowski, 2009).
The interest in the importance of biodiversity for sustainable development of agricultural production and rural areas has been manifested by the adoption of *Ordinance* 870/2004/EC. The document was published under the name 1590/2004/EC as a specific intervention program for 2004-2006 on *the conservation, characterization, collection and utilization of the potential of this diversity in a sustainable way to promote the objectives of the Common Agricultural Policy (CAP)*. Among the tools necessary to accomplish this task, the protection of genetic resources *ex situ* , i.e. beyond the natural place of occurrence, and *in situ*, i.e. in the *natural* ecosystems, has been pointed out. This involves, for example, the maintenance and rebuilding of viable populations of species and breeds in their natural environment or on farms where these plants and animals have developed their own specific characteristics (Article 3, e and g).
In the view of the new awareness of the importance of maintaining diversity and the growing competitiveness of biotechnologically *improved* seeds, there is an urgent need for legislation to protect all of the traditional crops. Despite the still-imperfect international rules to constitute a reference point, the EU legislature attempted to regulate and develop a comprehensive policy of coexistence of households which use different methods of breeding and cultivation. This concerns Commission Recommendation 2003/556/EC on the development of national strategies and the best practices for the co-existence of genetically modified crops, organic crops and conventional crops mostly based on local agricultural diversity. The content and character of the document reveals serious difficulties faced by the European institutions in reaching an agreement between Member States (who display a reluctance towards the introduction of GMOs into the agro-food industry), which would result in establishing uniform rules for the co-existence of different models of management and matching them to the requirements of the global market. As a result, we are dealing with recommendations only, rather than binding legal regulations.
The purpose of the document was not to clearly limit the *genetic pollution* of traditional crops (already impossible to avoid), which incidentally leads also to a reduction in diversity, but only to guide and support the Member States in implementing the general principles in developing *national strategies and the best practices for the coexistence of genetically modified crops with conventional and organ-*

[6] This approach can be considered as a kind of concession that the developing countries lent the developed countries, because the former rightly recover dominion over the genetic resources in their own territory (Paragraph 4 of the *Preamble* and Art. 3 of the *Convention*).
[7] *Genetic erosion* means a progressive loss of genetic diversity between and within populations or varieties of the same species, or reduction of the genetic basis of a species due to human intervention or environmental change (Article 2 of Directive 2009/145/WE).

ic crops (Paragraph 9 of the Introduction and Point 1.5). Of course, the question of co-existence refers not only to economic aspects, but to environmental and sanitary ones, as well (Paragraph 4 of the Introduction and Point 1.2).

Rights of local communities and the exclusive right to sowing substance

There is no doubt that free exchange of seeds among farmers has always been the basis of maintaining (and even increasing) biodiversity and food security. Along with the seeds (especially in poorer countries), the knowledge of the agronomic requirements, methods of cultivation, and advances in culture, technology, customs, traditions, and beliefs has been passed on between neighbors and from generation to generation. This exchange was part of the tradition and the local law of rural communities. Due to the succession and specific *co-existence* of generations (past, present and future), there should not be any exclusive right to the genetic heritage and local varieties, which can be managed and passed on. However, these rights cannot be appropriated, rejected or withdrawn. The local exchange of the reproductive material produced on subsistence farms should include the sanctioned rights of the community. Such rights cannot be the subject of derogation, authorization or restrictions, as the exchange of seeds is a practice which allows communities to survive and maintain diversity and, as such, belongs to the primary law, which preceded and was the starting point for any subsequent statutory law. Meanwhile, new technologies, related to large-scale farms operating on different principles and intellectual property rights, has led to a reduction in the diversity of local varieties, while inducing the introduction of mono-cultures, *tied production* and acts of *bio-piracy*. This has led to individual communities losing control over the heritage of local species and transmitting it to third persons or institutions. It means depriving local farmers of their right to produce, sell, develop, use or distribute individual species. Unless a new set of rules for marketing and property (based on a different legal and economic logic) to protect local *knowledge* is established, the aspirations of native communities for the management and control of local genetic resources will remain elusive (Gajuś-Lankamer, Wójcik, 2011).

To achieve this goal, it is necessary to go beyond the strict mentality of ownership and individualism which, in this matter, is guided by the law. Exclusive rights and patents for new plants give developers *ius excludendi alios*, which is essential only for the achievement of economic goals and does not take into account the need to preserve the integrity of the property, even in order to pass it on to future generations. This is a violation of the fundamental principle of sustainable development relating to the inter-generational justice[8].

Thus, by granting exclusive rights, seeds are taken out from their ecological context and placed on the market as an ordinary *res in commercio*, and their biogenetic heritage, which has arisen spontaneously as a result of evolution or was given intentionally by the owner, has no significance for the buyer, and it is impossible to valuate it objectively and express it in financial terms, although it is inextricably linked to it. It is necessary to assign a legal value to an intangible asset (expressed by invisible set of information by which a particular plant or animal is distinguished by its unique characteristics that may be used or will be necessary to use). It is equally impossible to value components of genetic resources and the cultural, historical and environmental factors inextricably linked to a specific organism which is connected to, or manufactured by, local communities.

Current protection of agricultural diversity is based on two systems: (a) the exclusive right of the creator to varieties, and (b) patents, the use of which generates many controversies[9]. It is implemented at three levels (Gacek, 2012):

1) International – *sui generis* system of the *UPOV Convention on the Protection of Plant Varieties* and the *TRIPS Agreement on the Trade-related Aspects of Intellectual Property Rights*.
2) Regional – *Community Plant Variety Right* (CPVR) based on the *UPOV Convention* and European Council Regulation No/2100/94. It should be noted that in the EU countries, the patent system is not used for the legal protection of varieties [10].

[8] This can be described as a *conditio sine qua non*, without which, in the context of sustainable development, it is not possible, or even desirable to maintain a large biological diversity of wild organisms or the ones used in agriculture.

[9] Case C-305/00 Schulin 04/10/2003 Treuhandverwaltungs Saatgutc; Enola beancase, Monsanto rapeseed case in Canada, p. 89-91, Basmati rice, Turmeric herb – for wound healing, Neem has strong anti-bacterial, anti-viral, anti-septic, anti-fungal, anti-parasitic properties. In addition, it has anti-inflammatory, anti-pyretic, diuretic and insecticidal effects. Individual parts of plants are used externally and internally as a natural remedy to treat malaria, cholera, leprosy, diabetes, pneumonia, urinary tract infections, gangrene, ulcers of the skin, any skin inflammation, eczema, acne, fungal infections, eye and mouth diseases and in combating parasites, brazzaina – flavored protein (fruit sugar bush from Gabon); Kamut.

[10] In the European Union there is a law against patenting new varieties of plants, contained in Council Regulation 2100/94/EC (from 2707.1994 on communal protective system of plant variation (Journal of EC 227, 09.01.1995, p. 1-30) as amended by Regulation 2006/95/ECand and in European Parliament and Council Directive 44/98/WE of 6 July 1998 on the legal protection of biotechnological inventions.

3) National: *sui generis* system of the *UPOV Convention;* patent systems (the USA, Japan, Australia), combinations of both systems (e.g., in the USA).

The *UPOV Convention* provides protection of the rights of the author of new varieties by the *sui generis* system, which applies only to the commercialization of the material, not the method of obtaining it or its use. It deprives a small farmer of the possibility to use seeds for another sowing on their own farm, or sell or exchange them without appropriate charges. It provides for dual protection (the creator and patent rights) of the *improved* variety, but not the traditional one, the characteristics of which do not meet the requirements of novelty, distinctiveness, uniformity and stability. Farmers' rights in this system are therefore not sufficiently protected. In this way, an ordinary, spontaneously spreading clover, gathered along a roadside in Poland, may be transported together with its genetic code to an institution, for example in Australia, where it obtains the status of a certified seed and the rights belong to the person who *improved* it. An institution or an individual will be able to seek its rights when any other farmer, including a Polish one, obtains the seeds of an *improved* version of the clover which has grown next to his field for a long time. If a *self-sowing gene* is discovered, the institution may treat it as a new variety and patent it. In this way, the clover will become the sole property of the patent owner and anyone who wants to use it will have to pay the appropriate fees and will not be granted permission for seed production for his own use, although this plant grows wild in Poland.

Some limitations of the legal protection of genetic resources

Despite the growing public concern about the phenomenon of *bio-piracy* as one of the reasons for the decline of genetic diversity, the research of multinational corporations in the agro-food sector has not declined. This progressive process of privatization of primary agricultural and environmental knowledge has led to:

a) weakening of the public, national and international research system,
b) concentration of the seed industry,
c) negative effects on the economy, food security (especially in the poorest countries) and agro-ecology in protecting agricultural biodiversity (Fonte, 2004, 92).

Appropriation of nature is usually done by biotechnological corporations which are able to obtain exclusive rights, to the detriment of the poorest countries, which are then deprived of their most important resources which form the foundation of their economies. For example, the current rules of intellectual property protection regulate only formal innovation systems, whereas the informal systems, characteristic for conventional farming and local communities, are not only devoid of profit opportunities provided by law, but also are doomed to fail in fight against the obligations under international rules (mainly under the WTO agreements). Thus, the damage done to local biodiversity is ironic because the patent system in such cases actually involves the appropriation of others' achievements, knowledge and gained experience.

The current provisions for the protection of intellectual property rights recognized in the *TRIPS Agreement* are also unsatisfactory, because they *do not guarantee protection of knowledge and skills of local communities. This situation favours a phenomenon called 'bio-imperialism', i.e. the unlawful appropriation of genetic resources in poor countries by industrialized countries* (Pavoni, 2000).

Local communities and the protection of agricultural biodiversity in the *International Treaty on Plant Genetic Resources for Food and Agriculture*

Art. 8 of the *Convention on Biological Diversity* can be a normative starting point for this problem. In this document, the task of *in situ* protection of biodiversity was entrusted to the States-Parties, which have been committed to the protection and maintenance – with the help of national laws – of knowledge and skills used by indigenous and local communities as well as innovations and practices conducive to the protection and sustainable usage of biodiversity. A particular method of *in situ* protection is the so-called *on farm* assumed storage of genetic material in the households of farmers interested in maintaining these resources.

In *International Treaty on Plant Genetic Resources for Food and Agriculture* States recognize *the tremendous contribution of local and indigenous communities and farmers in all regions of the world, particularly in regions of origin and centers of crop diversity, the preservation and development of plant genetic resources, which are the basis of food and agricultural production worldwide* (Art.9.1). For this purpose, responsibility for implementing farmers' rights related to genetic resources and concerning protection of traditional knowledge of plant resources for food and agriculture purposes, the right to participate in decision-making at the national level on matters related to the maintenance and sustainable use and participation in the sharing of benefits arising from the use of those resources, was granted to the governments of individual countries.

The Treaty does not provide the explicit definition of the word *farmer*. Therefore, it should be assumed that this task also rests on the national legislation. However, in Paragraph 7 of the *Preamble* it is indicated that the foundation of the rights of farmers is the *past, present and future contribution of farmers from all regions of the world, especially in the*

regions of origin. It can be concluded that the primary recipients of the provisions of this document should be associated with geographical origin (Article 2), namely, the countries of the South, where the vast majority of centers with considerable genetic potential are concentrated. This interpretation is supported by Article 13, Paragraph 3. The main beneficiaries of the proceeds from the use of genetic resources under the *Treaty* and the *Multilateral System of Access* and *Benefit Sharing* are farmers from developing countries and countries undergoing economic transformations.

Conclusions

Maintaining local plant varieties is a very difficult task due to the fact that these plants, unlike the modern varieties, are heterogeneous and show a high variability of their characteristics. These varieties are called *traditional*, as they have been commonly cultivated in a specific place and passed on for many generations (Angelini, 2004)[11]. The model of an *extensive* seed market interferes with the regime set out in the *TRIPS Agreement*, which provides patent protection and the rights associated with it. Therefore, it is recommended to look for a balance between the rights of creators of traditional varieties and the rights of patent owners.

What can be done and why is it so important? First of all, local authorities should take care of cataloguing varieties and breeds, and require industry to disclose the source of biodiversity as the basis of patenting. Since the policy of conservation of biological diversity in agriculture is generally geared to action in two nearly opposite directions, i.e. the maintenance of diversity as a common good affordable for the whole human community, and on the other hand, protection of the interests of large companies investing in this sector. In the meantime, the third direction should be managed by enhancing the protection of collective rights to resources used by agricultural entities on a specific territory (Article 10d of the *Convention on Biological Diversity*).

Reconciling these three seemingly disparate goals is possible through a broader understanding than just the corporate interests of the farmers, which, to be able to protect the biodiversity, should apply to everyone, including – according to the concept of sustainable development – future generations. This aspect of protection and use of biological diversity was clearly highlighted, for example in Paragraphs 23 and 3 of the *Preamble* of the *Convention on Biological Diversity*.

The institutional measures aimed at the search for collective entities (mainly local), which would be able to pursue public purposes (i.e. protection of biodiversity) in the interests of society as a whole and at its expense, should be initiated. This is consistent with the logic of fostering social responsibility which reflects a more general philosophy of subsidiary and the concept of sustainable development. The protection of the interests of the farmers is also included here. The proposed solution, which does not consider individual intellectual property rights, would function as the conservation of biodiversity (through storage, improvement, innovation, sales and exchange of seeds), which would have involved the implementation of farmers and indigenous and local communities. The protection of the interests of farming communities understood in this way would serve at the same time to:

a) maintain species,
b) provide access to genetic resources by a larger number of potentially interested parties,
c) reduce the desire for easy profit from the use (with simultaneous depletion) of natural resources by *the third parties*.

This would also be a form of investment in biological resources in order to achieve a balance between scientific and technological capabilities and the richness of nature. This is another reference to sustainable development, which will not be a limiting factor from the perspective of the biological impoverishment of the capital. The protection of the interests of local farming communities, together with the protection of the environment as a public interest, would then be able to withstand the economic power of the set of benefits dictated by the need to maximize profit by uncontrolled destruction or the use of biological resources.

Bearing in mind the above-mentioned goals and also the real opportunities and the necessity for long-term development, it is worth noting the content of Art. 10c of the *Convention on Biological Diversity*. In this *Convention*, the parties encourage the *customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation and sustainable use*. This is another argument for the development of social awareness (Hłobił, 2010) and a system of guarantees (which should be supported by international, national and regional institutions) covering the interests of local communities. After all, it is the local communities which throughout history have protected and developed traditional agricultural production and refined plant and animal reproductive material, and they have done so without burdening, but rather to the benefit of the whole society.

[11] The title of common ownership in this case should not be inferred from public or private law, but rather should relate to the material, legal and symbolic spheres of the community expressed in the habits, customs, places of worship, language, and others (Angelini, 2004, p. 111).

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Economic Crisis, Trust and Socio-Economic Aspects of Sustainable Development

Kryzys ekonomiczny, kryzys zaufania a społeczno-ekonomiczne aspekty zrównoważonego rozwoju

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Abstract
Authors described the relationships between economic crisis and a crisis of trust. This study identifies key elements that play significant role in trust building and destruction. The consequences of behavioral factors of the market players are discussed. Relationships between social status, higher acceptance of risk and decrease of trust in the economic system are analyzed. The importance of trust and intergenerational justice as a base factor for long-term socio-economic growth are also highlighted.

Key words: sustainable development, trust, crisis, economy, financial markets, intergenerational justice

Streszczenie
W artykule podjęto tematykę relacji pomiędzy kryzysem ekonomicznym i kryzysem zaufania. Omówiono elementy kreujące i destruktywne w procesie budowy zaufania w gospodarce. Przedstawiono konsekwencje wynikające z zachowań uczestników procesów ekonomicznych oraz relacje zachodzące pomiędzy statusem materialnym inwestorów, a akceptowaniem przez nich wyższego poziomu ryzyka i spadkiem zaufania do systemu ekonomicznego. Wskazano istotność zaufania do systemu ekonomicznego oraz sprawiedliwości międzypokoleniowej jako podstaw zrównoważonego, trwałego, długoterminowego rozwoju społeczno-ekonomicznego.

Słowa kluczowe: rozwój zrównoważony, zaufanie, kryzys, ekonomia, rynki finansowe, sprawiedliwość międzypokoleniowa

Introduction

The development of neo-liberal economic thought, together with massive successes by Margaret Thatcher's cabinet in the UK and two decades of growth in USA, brought a deeper belief in economic development being understood as a growth of economic indicators. This included the matter of entrepreneurship being positively measured by increased profits. This is commonly known under the phrase *greed is good*. This decreased the perceived importance of research in the field of welfare, replacing it with counting Gross Domestic Product as somehow a basic measure of development. It was strengthened by a basic rule of liberal capitalism – *grow or die* (Pawłowski, 2010; Fotopoulos, 2007). Unfortunately, this was accompanied by the slow disappearance of traditional market values, especially trust. It also lessened the importance of increasing socio-economic and ecologic risks that resulted from this growth model.

Belief in the free market as the best possible mechanism leading to optimal solutions oversaw important behavioral aspects of its players. The free market is driven by human behaviors and they quite often follow instincts rather than knowledge. It was forgotten that people change their behaviors depending on their economic status, and this may lead

to irrational, risky market decisions. This was brutally reinforced by the financial crisis of 2008. The rapid spread of so called *turbo capitalism* resulted in the division of global society into a tiny elite of winners, who struggled only a little during the last crisis, and a constantly growing number of others experiencing structural unemployment, especially young people, who feel forgotten and lost. Capitalism without ethical and moral boundaries leads to degradation and exhaustion of natural and social resources (Ikerd, 2008). Its growth is connected with a shortening of the planning horizon, and results in not taking proper account of many long-term threats.

In this study, reflections on these observations and factors are presented. Trust and boundaries seem to be irreplaceable in building and sustaining socio-economic growth.

Market Growth Factors Before the 2008 Financial Crisis

The economy grows in cycles and follows turns in growth and decline that can be observed. Its current state is reflected in stock markets, where stocks rise up in the long term but face short-term pitfalls as well. This mechanism may be illustrated by a pendulum, which is shifting one way and shifting the opposite later on. Stock market shifts depend in great measure on investors' moods. Prices increase when greed wins and they decrease when fear wins (Kossecki, 2011). Long-term sustainable development derives from the perception of common interest by society's members (Fiut, 2007); greed comes from selfishness.

The two decades before the 2008 economic crisis were a time of unprecedented, long-term economic growth and a period of *bonanza* on financial markets. It was supported in the last decade of the 20th century by IT technologies development, as well as by a decrease in IT hardware and telecommunication services prices. The primary source of this economic growth was in the decrease in prices of semi-conductors. It indirectly influenced other sectors of the economy as well (Jorgenson, 2001). According to economists, basics of the new economy in the USA were created by:

- re-birth of productivity increases in American companies after 1995;
- IT technologies development, which led to increased productivity in other market sectors;
- organizational changes in companies forced by the necessity of incorporating digital economy rules.

The scale of these changes made many economists judge that basic economic laws were changed (Bryson, 2005). Development in IT technologies enabled unprecedented growth on financial markets. Investments became far easier and available to many new players (quite often to people not really wealthy) who haven't the necessary knowledge on how financial markets work. Meanwhile, the markets developed many financial instruments that from beginning were bringing enormous gains, but even their creators had no clue on the risks they brought.

The other important factor was a boom in the real estate market, which gained strength in the middle of the 1990's. People who rarely purchased flats were becoming investors. Many people started to buy estates not for living in them, but on a speculative basis. One may ask: what were their goals?

Behavioral Mechanisms of Investing on Financial Markets and Investment Rules

According to the behavioral portfolio theory, people when investing are driven by two emotions: fear and greed (Shefrin, Statman 2000; Szyszka, 2009). Greed makes investors hoping to gain high returns, but accepting relatively high risks, turning investing into a kind of a lottery. On the other hand, fear drives one to keep part of assets in secure investments, bringing low returns but guarantying real value. In these terms, fear comes from being afraid of a decreasing level of consumption while greed comes from a hope for immediate increase (Szyszka, 2009).

The wide spread of investing and gaining high returns brought a belief that welfare levels comes not from work, but from capital investments where risk seemed to be low. In consequence, big financial players begun to rank the financial dimension of investments as the most important, or even the only one (Puls Biznesu, 2011). Meanwhile, the turn in market trends brought a decrease of purchasing power to many people in society. This can be illustrated by the quite massive trust in derivatives that as came out later, were bound to a high investment risk of loss. This risk was however very difficult to observe by common investors due to the complication of these instruments. At the same time, investors were experiencing unprecedented high returns on these instruments for a longer time.

In October 2010 at Leon Koźmiński Academy, Prof. Kołodko said at the conference *Report on Management* that the main reason for the last crisis was the greed of investors. In his opinion, with acceptable levels of risk, it is possible to expect a long-term return at the level of 8-10%. Meanwhile investors had gotten used to return levels of about 20-30%. Such levels must relate to high risk, as traditional investments and the economy simply can't generate and sustain gains at that level. Therefore in the long term, greed and demand for such high returns had to drive into crisis, leading to the mechanism of a speculative bubble.

Speculative bubbles are created when the market price of an asset becomes to be calculated on the change in its level predicted for the future. In such

cases, everybody starts to buy because *it will be more expensive* later, which drives to a self-realizing prophecy and a risk of losing its fundamental value. Such a market is usually very sensitive to all negative information, which as time passes is more and more likely to drive a crash. The more speculative prices are, the worse the crash is. In this case, it is easily illustrated using a pendulum. With such a mechanism, one could see it in the real estate markets before the crisis of 2008.

The beginning of the 2008 crisis had prior scandals but symbolically began with the bankruptcy of Lehman Brothers, which was one of the oldest investment banks. It caused an almost complete freezing of the interbank market as banks lost trust to their partners. Many institutions faced liquidity problems and deposit rates dramatically rose. On the stock markets, fear appeared and lack of trust, one of the basic values underlying normal functioning of the financial markets, was lost.

Role of Trust in Markets and the Economic System

Trust is one of the terms that is intuitively understood but very difficult to define. Usually people state easily if they trust another person or institution. On the contrary, it is not easy to explain what factors influence these opinions. This is partially caused by the fact that some people use rational indicators, while other use highly subjective ones. This may be because trust is being built by objective facts (keeping promises, professional service, office in a good place) as well as by subjective ones like non-verbal communication and way of speaking.

Interpersonal trust is very important in social life and seems to be one of the factors regulating social relations (Markowa-Gorki, 1990). Increasing trust allows decreased control; it is seen to be one of the key organizational factors (Mayer, Davis, Schoorman, 1995). Interpersonal trust may be observed in relation to people and institutions as well.

Another important type of trust one can distinguish is trust in a system. It is a belief that non-personal (usually social) structures are able to guarantee a good (perceived safe) future (Lewis, Weigert,1985). Such non-personal structures may use different means of protection such as regulations (e.g. legal regulations), guarantees, and contracts. The term *system trust* is always used in a specific situation and specific context. It is usually connected with so-called *normality* (Baier, 1995), *right order of things* (Lewis, Weigert, 1985) and structural safety. For instance, a company undertaking construction, which consists of parts measured in the metric system, trusts that participants all use the same metric system; hence it is a commonly used and officially recognized standard (Mc Knight, 1996).

An interesting illustration of this problem may be the case of bankruptcy and misleading bookkeeping in Enron, an American corporation discovered in 2001, as well as in similar following scandals like the WorldCom bankruptcy in 2002. This result in a decrease in trust towards Arthur Andersen (Enron's auditor) and in general to leading audit companies, or even to all institutions connected with the New York Stock Exchange (The Economist, 2002). George Bush, the President of the USA, stated in one of his speeches that *basic rules underlying capitalism have been denied* (Węglarczyk, 2002). But leaders hadn't learned the lesson, and the next crisis to a great extent was caused by inadequacy in financial reporting and not informing about the level of risk that had been taken by companies.

According to some economists, the series of accounting scandals has destroyed trust and endangered the fundamentals of the free-market economy. R. Skidelsky, a member of British Parliament, said that the global crisis resulted from abnormality, i.e. errors in asset pricing by banks and rating agencies (Skidelsky, 2011). J. Stiglitz claimed that one of the reasons for the last crisis had been a moral deficit, which resulted in common use of creative bookkeeping as well as irrationally risky activities in the financial sector (Stiglitz, 2010). The financial sector time after time crossed the thin line between *creative bookkeeping* and book deception. The crisis itself brought a dramatic correction in real estate and financial instrument prices.

Baier claims that a system creates trust when everyone performs their work and duties accordingly (Baier, 1995). System trust, especially in initial relations, positively influences interpersonal trust creation (Mc Knight, 1996). Trust is built over a very long time, but is easy to quickly destroy. According to M. Deutsch, one has trust of an event when he or she expects it, which leads to behaviors perceived by that person as having bigger negative consequences when it fails than the positive consequences in the opposite situation. This causes an asymmetry of award and punishment connected with trust (Deutsch, 1958).

Lack of trust results in decreased comfort as well as usually higher costs. This is due to the necessity of checking each partner, collecting information, and safeguarding for the situation where partners don't keep their commitments. When one does not trust people, quite often the joy of life is lost as well. One has to check workers and friends and turns suspicious. When people don't trust economic development, usually they withdraw assets from markets and exchange them for so-called *safe assets*, such as noble metals. The economy shrinks. Expenses were then cut in programs, as recommended by international institutions in countries like Greece, which brought further economic shrinkage. One may connect this to a decrease of optimism and trust towards the economic order in these coun-

tries. People and entrepreneurs stopped trusting the system, which deepened the shrinkage effect in economies.

The recovery process is connected on the other hand with an increase in optimism among economic parties, and a belief that the situation is going back to normal, i.e. a growth trend. This will mean that investments are to bring positive returns. Consequently, it should become unnecessary to pay extra costs for safeguarding trust, which additionally raises the benefits by a positive multiplier effect.

Trust plays a crucial role in each transaction even though it isn't an integral part. Any person deciding to sign a contract is in a situation that is somehow risky, i.e. a situation in which after a decision is made, the result to be achieved is not definite (Encyklopedia psychologii, 1978). In many crises, one could identify the events that undermined trust in the economic system, just like the Lehman Brothers bankruptcy. Decrease in trust causes an additional necessity in checking partners and institutions and quite often results in finding that some parties cannot be trusted. This results in a general decrease in the level of trust between entities in the economy, which is reflected in economic indicators.

Material Status as a Determinant of Risk Taking and Entrepreneurship

Most investors see a decreasing marginal usability of goods, which may be reflected in their attitudes towards risk taking. They feel stronger negative emotional feelings from losing a currency unit than positive feelings from gaining one (Zarzecki, 1999). Poor and rich people, just like poor and rich countries, have different attitudes towards risk taking. A rich one, that already achieved a certain level of consumption, is afraid to lose it. A poor one is dreaming of a possible consumption increase. This is the reason that he or she is willing to take a much high risk. This may be an explanation to the phenomena of an enormous popularity of lotteries in developing countries. Lotteries are a way of selling dreams, emotions and hopes for a better tomorrow, such as gains in consumption. On the other hand, the rich have less unfulfilled dreams, especially those that may be bought with money. Instead, they are afraid of losing what they already have.

Poor people and poor countries dream of having more and having a higher rate of return, they often accept disproportionate increases in risk taking. This can be illustrated by the fact that in poor countries, it is possible to find so many poor and desperate people that are willing to take a part in drug smuggling. This is a way for earning easy money, but requires taking an enormous risk of destruction of one's own life. Similarly, poor countries quite often seem to take on too many public debts.

Before the 2008 crisis, investing in the real estate market were encouraged for relatively poor people. They were urged to start buying houses and flats with credit to increase their standard of life. They believed that they were making wise investments. In parallel, more small investors begun to invest in derivatives, not being aware of the risks they bring. The crisis brought verification of these investment risks, which led to impoverishment of the lower class (which was unable to pay mortgages) and of fresh investors from the middle class.

The world seems to be dividing more and more along this line, and the last crisis made this division even bigger. So-called *aid programs*, that were run during crises in different parts of the globe, were set up to help large international financial institutions, that had miscalculated risks in their own investments and may lose their own assets.

The aid program offered to Greece has been aimed to decrease the losses of big European banks. Those banks were not able to properly assess risks related to their bond investments. In the USA, huge funds have been raised for helping bankrupt big investment banks, but citizens having problems with paying their mortgages have been largely left on their own.

In a society, economic relations are being regulated by many contracts that are important for its proper running. For financial institutions and international capital, the most important would be the ones for paying debts to lenders, as their frauds or bankruptcies undermines trust in such capital entities in the financial market. This is why international institutions help countries experiencing problems, delivering billions of dollars for borrowers to pay debts on-time. On the other hand for the common people, more importance seems to be placed on *social contracts* for basic social and economic security of citizens and on pensions. Undermining these social contracts quite often leads to street protests, which reflects later on the nature and level of the economic climate.

Sustainable Social Development as an Economic Dimension

The present generation in Poland and in other European countries is living on the cost of future generations. For instance, this relates to their pension systems. Today's retired pensions are paid for by working people's contributions, which are becoming higher and higher while the retirement age is being increased. At the same time, it is predicted that the future pensions for people that work nowadays will be drastically lower. Symptomatic of this is the decreasing Demographic Reserve Fund, which in Poland is a kind of social retirement insurance for future generations. In 2010, it went down 7.5 billion PLN and in 2011 dropped another 4 billion PLN. In addition, the Social Insurance Institution (ZUS) is being financed from the current

budget and in 2011 received 37.1 billion PLN from public money (Gazeta Prawna, 2011).

One may add, that discussions on extending the working time before retirement are not supplemented by any discussions on ways how to promote having more children in families. This might be a simple way of reducing the consequences of changes in the age structure of polish society. Meanwhile, in newspapers, one can read calculations on how high is the cost of child raising in Poland. This is still unsolved, which is a problem because intergenerational justice is a cardinal rule of sustainable development (Pawłowski, 2010). The present generation, and especially its narrow establishment, is living on the credit of future generations.

In the USA, the 2008 crisis has deepened differences between rich and poor people. During the years of the Bush presidency, taxation of dividends and capital gains was cut. Between 1980 and 2010, the incomes of 90% of American society significantly shrunk. Meanwhile, between 1980 and 2006, the share in total incomes of the 1% of the richest Americans grew from 10 to 23%. Average young Americans are less educated, earn less money and have worse educational possibilities than their parents. At the same time, 400 of the richest in the Forbes annual list gained more than 60% of all Americans (Zawadzki, 2011).

Earnings of CEOs in American corporations grew 4 times in real terms since the 1970s. During the same period, earnings of the average worker in real terms slipped by 10% (Lubowski, 2011). An extreme illustration of this might be the earnings of Richard Fuld, CEO of Lehman Brothers, which during the 8 years before its bankruptcy totaled $300-$485 million USD (Wikipedia, 2012). Similarly, $47 million USD was paid to Martin Sullivan, CEO of AIG at the moment of his resignation in 2008 (CNBC, 2008). The bankruptcy of Lehman Brothers, the biggest one in US history, was one of the main reasons for the problems of giant insurance company AIG, which received $115 billion USD of public aid during the crisis. A year later in 2009, the same company announced its willingness to pay $165 million USD in benefits to its managing directors.

Growing social disproportions have already been pointed to as one of the most important disorders of the neoliberal economic system. They cause growth of structural unemployment and concentration of the world's capital in hands of only a few entities, which enforce their vision of economic order on others (Gawor, 2006).

Constantly richer elites are alienating themselves from the rest of society. At the same time, the tax system burdens mostly touch the people who earn little or average amounts, who are paying relatively high income and social taxes as well as indirect taxes. At the same time, people who earn the most may avoid paying taxes, for instance by using so-called *tax heavens*. The Cayman Islands, a British territory, have 580 registered banks and the value of assets and holdings registered there is about $500 billion USD. There is also registered about 2,200 investment funds, 500 insurance companies and 40,000 off-shore companies. In Lichtenstein, another *tax heaven*, there are about 75,000 off-shore companies (Gontarczyk, 2010).

In the developed countries, corporations are paying lower and lower taxes. Corporate income tax, as a percentage of total US federal tax income, fell from 32.1% in 1952 to 11.5% in 1998 (Klein, 2004).

Nowadays, fiscal policy tightening is done in most countries by raising indirect taxes and social expenditures cuts, and not by raising capital taxation, especially on derivative markets. Introduction of even small taxation on derivatives dealing would highlight its effects and limit natural adjustment to the real economy size. More and more fortunes are being created separately from the actual production processes. At the same time, there was introduced some financial markets deregulation, which enabled creation of many market bubbles – Internet, real estate, food, and energy. Those bubbles influenced the living levels of common citizens that now have to face rising prices of gasoline, energy, food or mortgages.

Another factor is the running out of natural energy carriers. Current estimates show that at a constant power consumption level, all oil resources will dry up in about 40-50 years, natural gas in 60-70 years, and coal in 140-150 years (Pawłowski, 2010). At the same time, one can observe the growing influence of power supply companies on the political establishment, which can be seen in both underdeveloped and developed countries. Large international energy companies *hurt* natural resources (Gawor, 2006). However, the energy lobby has only a minor interest in alternative energy development and production.

The current investment bubble in energy markets is mainly caused by transactions on the derivative markets, which are only loosely connected with real energy demand. In 2008, 71% of future oil contracts were traded by financial investors (Kublik, 2008).

Low wages, especially among young people, lead to shrinking of the middle class and is dividing society. The number of millionaires grows along with the number of poor people. Children of middle class parents have small chances to achieve a similar to their parents material status. Thanks to this, big corporations, especially in services, have lower personnel costs. Specialists have had to accept constantly deflating wages, which may not secure their living conditions above a social minimum.

The middle class is living in constant uncertainty and frustrations are growing. Social division causes a drop in social trust of the economic system. The young generation is losing its hope for a better

future. The recent crisis led to breaking the social status-quo, which brought social deviations, criminality, terrorism and other dangerous effects (Mączyńska, 2011). Stiglitz has been pointing that neoliberal globalization and lack of social security will lead to growing brutality all over the world (Stiglitz, 2004).

Ensuring mutual trust and taking into account a longer planning horizon are basic requirements towards fighting the current crisis and securing long-term, sustainable development. During a meeting with members of the Rome Society of Industry and Finance Specialists, Pope Benedict XVI stated: *the most certain way of fighting against the fall of entrepreneurship is set on a net of contacts with other social subjects, investing in research and innovations, not running towards unfair competition between companies, not running away from own social duties and securing high productivity, which would answer real human needs. The company may (...) produce 'social goods' when only finance officers and managers will follow the long term vision, which brings long-term gains over speculative incomes, which promote innovations instead of collecting richness* (Benedict XVI, 2009).

The Pope also sees the problem of unemployment among youth: *following steps of my predecessors, I stressed that facing the unemployment rise, especially among young people, economic poverty of many workers and discovering new forms of slavery, and equal access to decent work is a matter of a top priority* (Benedict XVI, 2009).

These problems may be observed in Poland as well. According to research of the Public Opinion Research Center (CBOS), 74% of Poles regard that equality is more important than economic growth. Poles prefer slower, but equitable, improvement for all. According to 37% of respondents, justice in society means that all have a similar level of living and that there are neither very poor nor very rich ones (CBOS, 2012). Increased disproportionate conditions, that accompany economic crises, are undermining trust in society towards the economic system. Therefore, gaining huge individual richness should be considered as a threat to long-term, sustainable development.

Conclusions

The financial crisis of 2008 painfully reminded everyone that sustainable development is a base for national wealth. Its creation is not possible with financial speculation and risk over-acceptance. Economic thinking cannot be separated from traditional values of the classic capitalistic growth economic model, in which one of the basic wealth creation factors is human work, that should allow a decent level of life without having to take unnecessary risk. The paradigms, that were functioning during the prior decades, caused a situation in which growth couldn't be sustained, which finally brought on the latest crisis.

One of the basic rules of sustainable growth is inter-generational justice, which allows future generations to have their needs satisfied, and which has been disturbed. Blind greed of some present leaders may threaten the lives of future generations.

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PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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Sustainable Development's Issues in the Light of Karol Wojtyła – John Paul II's Political Philosophy and Theology

Problematyka rozwoju zrównoważonego w świetle filozofii i teologii politycznej Karola Wojtyły – Jana Pawła II

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Abstract
Philosophical and theological thought of Karol Wojtyła – John Paul II was also concerned with ecological issues. Generally, it is a part of his ethical and moral consideration, becoming important element of his political philosophy and theology. Personalistic hermeneutics is a key for understanding his sustainable development conception. It sees a fundamental criterion of ethical and moral evaluation of diverse forms of activity in human being. Firstly, pro-ecological activity means directing human being towards good. Pope John Paul II noticed many dangers for man and environment. He was convinced that whole international community should be involved in finding solutions.

Key words: John Paul II, social philosophy, political philosophy, sustainable development, Catholic social doctrine, personalism

Streszczenie
Myśl filozoficzna i teologiczna Karola Wojtyły – Jana Pawła II obejmuje również problematykę rozwoju zrównoważonego. Wpisuje się ona generalnie w jego rozważania etyczne i teologiczno-moralne, stanowiąc w istocie ważny element jego filozofii i teologii politycznej. Kluczem do zrozumienia jego koncepcji rozwoju zrównoważonego jest hermeneutyka personalistyczna, która podstawowe kryterium oceny różnego rodzaju działań widzi w człowieku. Działalność proekologiczna zakłada przede wszystkim nakierowanie na dobro osoby ludzkiej. Papież Jan Paweł II dostrzegał liczne zagrożenia tak dla człowieka, jak i środowiska naturalnego. Uważał, że w ich przeciwdziałaniu powinna być zaangażowana cała wspólnota międzynarodowa, co jest wyrazem realizacji dobra wspólnego w jego najszerszym, to jest uniwersalnym wymiarze.

Słowa kluczowe: Jan Paweł II, filozofia społeczna, filozofia polityczna, zrównoważony rozwój, Katolicka doktryna społeczna, personalizm

Introduction

The issues related to sustainable development are among the key issues of the contemporary intellectual discourse (Papuziński, 2006; Udo, Pawłowski, 2010; Wosińska, 2010). They are reflected in the popular culture as the fashion for ecology. At the same time, however, in the background of the pop-cultural ecological trends, a serious philosophical discussion is held between the worlds of culture and nature. The sustainable development idea is often treated as a domain strictly related to philosophy or political ethics. The issue is also present in the research conducted in the field of political science, either as an important element of the so-called *public policy* or a *branch of global science and interna-*

tional relations (Brand 2010; Gao 2009; O'Riordan 2009; Pietraś, 2000; Potulski 2011; de-Shalit 1995; Thompson 2008; Valentine 2010).

This article is devoted to the ecological thought and the idea of sustainable development as present in the political philosophy and theology of Karol Wojtyła – John Paul II. Where does this interest in Karol Wojtyła come from? He occupies a prominent place among the contemporary Polish social and political thinkers. His position is determined by both his intellectual potential – as he is regarded as one of the leading philosophers of the Polish Catholic Church, combining in his thought both Thomism and Phenomenology – and by dissemination of his ideas, especially his papal teaching, among billions of people in the whole world. The latter makes him probably the most recognised Polish intellectual in the world. Although he is more commonly perceived as a religious or spiritual leader, he also proved to be a distinct and skilful participant of intellectual debates.

Eco-philosophy or eco-theology?

The philosophical and theological ideas of Karol Wojtyła – John Paul II – on the subjects related to sustainable development (eco-philosophy and eco-theology respectively) are particularly visible in the works he wrote as a pope. Nevertheless, the sources of these ideas may be traced back to such early works as his academic papers on moral theology, ethics and anthropology, in which Wojtyła specified his approach to the relations between the human and the nature and pointed at the consequences of these relations both in terms of ethics and morality.

It is our opinion that the issues of ecology and sustainable development in Wojtyła's papal, philosophical and theological writing do not constitute an autonomic section of philosophy or theology – neither in terms of problems nor in terms of methodology. As mentioned above, they are an integral part of Wojtyła's ethical and anthropological thought. They are embedded in the general context of social, civilization, cultural, political and international issues. Therefore, we treat them as an element of his philosophy and political theology, including the philosophy of international relations (Modrzejewski, 2009). They are predominantly normative (the ethics and theology of morality) but they also include diagnoses of the current ecological, social and economic problems. The issue of eco-development and sustainable development is also an important part of the *civilisation of love and life,* which the Pope postulated (Dołęga, 1997).

At this point, we should draw attention to an important methodological issue. In Wojtyła's writing, philosophical and theological contents intertwine, sometimes so close that it is difficult to separate philosophical speculation from theological reflection. Therefore, his idea should be treated as philosophical and theological at the same time, as it is often the case that his philosophical speculation, which originates in reason, is accompanied by theological interpretation of the reality, which takes its origin from Devine Revelation. Wojtyła perceived both the natural environment and the human person through their ultimate relation to God – the Maker. He was convinced that the harmony of nature reflects the perfection of the Absolute, which was confirmed in the incarnation of God's Son. It revealed the perfection of the creation, of the material world, including the natural environment (McFarland, Taylor, 2007). The Pope pointed at the foundations of the Christian faith, emphasizing that the death and resurrection on Christ brought reconciliation between mankind and the whole world. This leads to a theological interpretation of the devastation of nature – as a result of *the original sin* (John Paul II, 1990) Referring to the biblical message (and indirectly also to Stoicism), Wojtyła's thought approaches at times *apocatastasis*, which assumes the ultimate return to the state of original perfection from the times before the fall of the first human. The eschatological aim of the whole creation is to achieve, thanks to the sacrifice of God's Son, the *lost paradise* (Hryniewicz, 2006).

Wojtyła's ability to combine philosophical and theological content was visible as early as in his PhD thesis, which was devoted to the ethics of Max Scheler (Wojtyła, 2008). From the perspective of methodological strictness, the above comment could naturally be seen as an objection (Bartoś, 2008). Notwithstanding, Wojtyła's approach gives a holistic presentation of the reality. The philosophical approach he represents is described as Christian philosophy, so any reference to God and theology seem to be natural, as a complement of strictly philosophical reflection. The predominance of theological contents over philosophy can be seen in his homiletic and catechetical writing. He often spoke not as a philosopher but as the highest prelate of the Catholic Church, a priest and a theologian. This area of his writing includes numerous references to ecological issues and issues related to sustainable development, which are usually embedded in a broader context of social, political and international problems. This is the most visible in such documents as encyclicals[1] *Redemtor hominis, Evangelium vitae*, social encyclicas *Sollicitudo rei socialis, Centesimus annus* and, indirectly, also in the previous *Laborem exercens*, in apostolic exhortations

[1] We use commonly accepted abbreviations and numbers. The abbreviations applied for the encyclicas: RH: *Redemtor hominis* (1979); LR: *Laborem exercens* (1981); SRS: *Solicitudo rei socialis* (1987); CA: *Centesimus annus* (1991); VS: *Veritatis splendor* (1993); EV: *Evangelium vitae* (1995); the abbreviations for apostolic exhortation: FC: *Familiaris consortio* (1981); ChL: *Christifideles laici* (1988); EAs: *Ecclesia in Asia* (1999).

and Apostolic Letters, as well as in homilies and addresses (as the Pope's message for the World Day of Peace in 1990, which was devoted entirely to broadly understood ecological issues).
From this perspective, John Paul II can be regarded as the follower of the intellectual heritage of his two great predecessors on St. Peter' throne – Pope John XXIII and Paul VI. They both concentrated on social and ecological consequences of the moral degradation of the human beings (Sebesta, 2007).

Personalistic hermeneutics

Personalistic hermeneutics is the key to understand the philosophy of Karol Wojtyła. His philosophical concept emphasises the life of a person – *being a person* – as the highest value and the criterion for ethical and moral evaluation, also with respect to political decisions, including those which lead to pro- or anti-development actions. It is, in its essence, ethical universalism in which the common measure of evaluation is the good of the human (Bartoś, 2008). This personalistic universalism reaches the deepest anthropological layers, the essence of the human and humanity, searching for ontological bases for the universality in the phenomenon of *being a person* (Półtawski, 2011).
Personalistic prerequisites also lead Karol Wojtyła to the idea of the world community of people. The community is not defined by the common species in its biological sense – it is a conscious community of persons, manifesting itself in common actions for the common good, which takes the form of the general human good (Modrzejewski, 2011).
How does Wojtyła understand the common good? He opposed reducing the notion to the theologically understood *good of the community*, as he considered such approach too limited and superficial. At the same time, he put emphasis on a more empowering approach to the problem. For him, the common good was connected with participation as a quality of both the person and the act. It is participation that develops in people the *empowered community of action*, creates common good through cooperation and is a manifestation of the empowerment of the human. He understood the common good first of all as *the principle of proper participation, thanks to which an individual, through their cooperation with others, can perform authentic acts and through them achieve self-realisation* (Wojtyła, 1994). In terms of axiology, the common good leads to the creation of the conditions of common existence and action. They are most visible in those communities which *appreciate the stability of pure existence*, i.e. in a family, nation, state or in a religious community. Therefore, those groups in which *immediate* common goods are achieved are not the main area of Karol Wojtyła – John Paul II's social interest. He concentrates on the communities which he calls natural. In *Person and act* Karol Wojtyła wrote: *everyone expects that in those communities of existence (...), they can choose what others choose and because others do it – as their own good, leading to their own self-realisation. At the same time, on the basis of the same ability to participate which constitutes the essence of existence and cooperation with others, in communities founded on the common good one expects their own acts to contribute to the good of the community, sustain and strengthen it. In such an axiological system one is open to sacrificing their particular good to the common good. Such sacrifice is not 'against human nature' as it appeals to the need for participation, present in each person, and this need leads such a person to self-realisation* (Wojtyła, 1994).
In the philosophical concept of Karol Wojtyła, the common good is superior to individual goods but it does not stand in the opposition to the ontological superiority of an individual over the society. His philosophical concept includes the so-called *existence paradox* law. This involves sacrificing individual goods for the common good; naturally, not under pressure but out of free will. Such sacrifice has positive effects for the human being allowing for their fuller self-realisation. *Working for the common good, one ultimately one safes also themselves, as the good they contribute to – even if the contribution is hard – is the good through which they consolidate their own being, the good which defends also their own existence* (Galarowicz, 1996). Karol Wojtyła thought that existing and acting within a human community gives one a possibility to realise all one's abilities which distinguish a given person from others, so in the end – it emphasizes the person's individuality and uniqueness.
The common good is also a manifestation of the realisation of a community. A community, whether it is a marriage, a family, a nation or an international community forms itself through the common good and the awareness and fulfilment of the common good. Karol Wojtyła thought that the common good *unites a number of entities into one 'we'* (Wojtyła, 1994). It is therefore *the good of many* and in its fullest dimension – *the good of all*. The size of the *we* depends on the kind of community. It can be a married couple, several members of a family, thousands and millions people in a society, billions in the case of the whole mankind (Wojtyła, 1994).
Such an ethical and anthropological approach implies a specific view on issues related to sustainable development.
First of all, the person is always the greatest value and the person's good is the essential aspect of political, social, economic and ecological activity. The person here means both a concrete human being (every person) and the universal human in spatial terms (people living on the whole Earth) and in terms of time (the present and the past genera-

tions). Hence, the pro-development activity will always mean concentrating on the good of the person, which means creating conditions for the person's fullest self-realisation. This, in turn, determines such issues as taking care of the cultural and natural environment, eliminating ecological threats, creating proper conditions for the material and spiritual development of the human.

Secondly, the issues of sustainable development suit the postulate of the fulfilment of the common good. The common good is superior to the immediate and individual interests, which could generate various threats for the natural and human environment.

Thirdly, each individual is responsible for the realisation of the common good. The process of repairing the world should start inside an individual. As the human is responsible for their acts they should not harm other people or the natural environment in the course of their self-realisation. Moreover, the human's causative acts should be aimed at creating better living conditions for the community, which at least indirectly assumes acting for the improvement of the quality (both material and spiritual) of life and the condition of the natural environment.

From autonomy to personal development

What must be emphasized is that the personalistic thought of Karol Wojtyła stems from experience and theoretical reflection (Merecki, 2006). As an philosopher who for many years lectured at the Catholic University of Lublin (KUL), Wojtyła held a constant dialogue, or even a kind of dispute, with the intellectual heritage of Europe (Karol Wojtyła – Johannes Paul II, 1981). As early as in his *Elements of ethics* (1957-58) he tried to define what humanism consists in from the perspective of the greatness of human life. The basis is always the irreducible value of human life and the autonomy of the person. It has already been mentioned above that the fullest interpretation of sustainable development can be found in Karol Wojtyła's papal teaching. The Pope himself experienced the system of social utopia, which in theory focused on development but in reality led to the pollution of the natural environment and the sphere of culture, which prevented comprehensive human development. The greatest mistake of totalitarian utopians lied in reductionism, especially with respect to the human nature, and in the pragmatic approach to moral norms. Therefore, those societies with adopt reductionist assumptions prevent the integrated development of people and communities. The scope of freedom is limited for ideological reasons. Seeking solutions to various types of shortages and in the face of increasing competition, a reductionist society is doomed to overexploitation. Each type of totalitarianism ignores the real human nature and its personal dimension; each interferes even with such areas as art and religion, in order to *bend* the reality to suit its ideological assumptions. This was Wojtyła's personal experience from his own country, which constituted a stable context for his anthropological analysis.

John Paul II believed that achieving a planned goal and development requires a balanced approach. The human nature itself is *potentiality* which, experiencing the recognised truth, aims at its realisation for the sake of goodness. This is due to the transcendent aspect of the human nature. It is in the analysis of the human act where Wojtyła sees this human nature. People aim not only at satisfying their basic needs and find self-realisation not only in temporality. The human is focused on the absolute good. And so is the human culture – in spite of all its faults and all the confusion. The pursuance of the absolute good, however, must be reasonable and responsible, and – as a result – sustainable in the process of all kinds of development. The basis for activity is the act of recognising the truth about existence, the criterion of justice and love. Otherwise, the criterion of activity is limited to temporary utilitarianism. For Karol Wojtyła the notion of *use* stands in opposition to his understanding of *love* as a focus on goodness. The significance of moral values in the fuller realisation of empowerment and the criticism of utilitarianism can be found in one of his works – *Love and responsibility* (1986).

The Pope took into account the integral development of the human being, meaning his physical, intellectual, emotional, moral and religious development. Integrated development should be understood as a process leading to such efficiency which means not only gaining a certain quantitative or qualitative characteristic but also allows for better, more aware and freer living. Thus, it is about the autonomy of empowerment and not about being a link or an instrument in social and production structures. Empowerment as the foundation for dignity cannot be reduced. This is indicated by the ability – or in other words – disposition of self-determination, self-possession and self-control. The realisation of these dispositions implies a sphere of freedom, irrespective of individual conditioning. Moral skills, on the other hand, which must be constantly improved and the differences in the realisation of the dynamics of nature and the person only facilitate the process. *A human being can never be treated as an instrument to be used to achieve goals hardly related to the human being's development (...). That is the teaching of the Church* (Second Vatican Council, *Gaudium et spes* 1966, no 24). As it has already been mentioned, Wojtyła reached these conclusions through the analysis of the human act. This brings the aspect of cooperation, social co-dependency and co-responsibility, as it appears that integral development is only possible through co-operation within a community. Karol Wojtyła

wrote: *the human – as an individual representative of a given species is and never ceases to be human, regardless of any systems of interpersonal or social relations; at the same time, the human as a personal entity may be alienated in those relations – in a sense 'dehumanised'*. Thus, participation as defined in *Person and Act* – primarily as the quality through which people, existing and acting in community with others, i.e. in various systems of interpersonal and social relations can be themselves and achieve fulfilment. The reflection of this kind of anthropological thinking was constantly present in Wojtyła's papal teaching: *therefore, not rarely are we the witnesses of frightening examples of the progressive auto-destruction of the human. Some reigning opinions seem to be telling us that there is no moral value anymore which should be regarded as indestructible and absolute. The disrespect for the human life is manifested in front of us all – the life conceived but not yet born; the basic rights of the human person are constantly violated; goods necessary for the human life are meanly destroyed* (VS, no 84). The Pope argues with postmodernist trends and points out that all of them are wrong in *deconstructing* the subject and trying to read the truth about the existence while at the same time denying and preventing integral development. Moreover, in his previous writing Wojtyła blamed both totalitarianism and individualism for the alienation of the human. He adds that alienation prevents people living in such kinds of communities from achieving *self-fulfilment* understood as development at all the levels of activity. *While participation implies such a structure of human 'we'-groups – societies, nations or states – and such an order in them which allows all those who exist and act within such 'we'-groups to be themselves and to fulfil themselves, alienation is the opposite of this structure and such an order* (Wojtyła, 1994). Thus, in his analyses of the human essence Wojtyła tries to combine the conditions necessary for development, which are possible and compatible in the structure of the subject and the social system. This philosopher from a Polish town of Wadowice always saw the human in the centre of his analysis and practised philosophy with the aim of its practical use. He focused on *human self-fulfilment* (Buttiglione, 1996), which should be understood as achieving the maximum personal development. Wojtyła reveals the conditions for acting and existing in creative acts of love, which are the fulfilment of the person and of the person's development. The human exists among other people and *in community with others* – this is the precondition for human development. John Paul II confirms this belief even when he talks about *the person's social instinct*, as there is a real threat that the human can be used by various forms of social organisation and in particular – by various forms of production and consumption. And it is not only about the kind of development understood as technological progress, but also about the self-improvement of the human. A free act aimed at such improvement is a basis for self-fulfilment. This is a dimension of auto-theology. People fulfil themselves not as means – they shape themselves, set themselves goals and achieve them. This leads to their improvement and better efficiency. This makes them *persons* not *things*. As usual in the writing of John Paul II, the leading thought stems from the right concept of the person, which means that anthropology is the foundation for creating development's goals and for taking actions (CA, no 11). The sources of this kind of thinking may be found in the specificity of the Cracow school of anthropology, in the creation and development of which Wojtyła participated. Its characteristic features include: sensitivity to freedom, values, norms and human dignity (Kupczak, 2009).

Solidarity as common development factor

The basis for solidarity according to Karol Wojtyła is the fact of *living with others*. The good of the community, as well as its development, is conditioned by the development of particular people. To develop means both to participate in good opportunities and to realise one's own capabilities, accepting the support of others. According to John Paul II, sustainable and thus ecological approach always takes into account all the relations, connections and, co-dependencies of various elements, often seemingly unrelated. Ecological balance breaks down in extreme, partial or unbalanced approaches and actions which ignore the common good and the human nature. These are, in general, anti-solidarity actions.

Co-participation means the dynamics of decisions and actions which encompasses a chance to oppose and to enter into a dialogue. Karol Wojtyła confronted the social philosophy which he practised and taught his Polish experience. Hence, he was aware of the fact that opposition can also be a confirmation of solidarity and a sign of remaining within the community and a manifestation of will of cooperation. Wojtyła gives the example of parents, who – in the name of responsibility, co-participation and creating opportunities for development do object, especially in relations with their children. Naturally, the position of constructive opposition is different at various levels of co-participation in contemporary communities, whether political, vocational or national. A community which prevents the expression of rightful opposition is not able to realise the common good, does not allow for dialogue and provokes deeper conflicts, tensions and antagonising activities. Integral development, especially in the personalistic perspective, is possible exactly in the situation of overcoming difficulties in dialogue and solidarity. This means respecting the person's rights understood in terms of human tran-

scendental dimension, although in practice various accidents do happen, an example of which is plain conformism (Wojtyła, 1994). Common attitudes of consumerism, materialism, and utilitarianism lead to ignoring the truth and consequently – the common good and the duty of solidarity. It is plain to see that neither the abundance of goods and services itself nor the size of consumption guarantees happiness. Therefore, the Pope takes care to speak to his contemporaries to explain what development consists in. The *economist* concept itself is a road to nowhere. *As a consequence, also the access to various real goods, which in recent years have been provided by science and technology, including the IT technology, will not bring liberation from different kinds of human slavery. On the contrary, the experience of the past years has shown that if the whole mass of resources and opportunities given to people is not directed by moral sense and oriented at the real good of mankind, it easily turns against human and becomes a kind of slavery* (SRS, no 28). These are important comments, also in the context of sustainable development. Once again, we should point at the indispensable ethical dimension which overcomes the areas of underdevelopment, social exploitation and injustice. According to John Paul II, solidarity and cooperation are real methods to be applied to overcome the *civilisation of consumption.* Solidarity in this respect is a personalistic approach to the development of the social life. People depend on one another and John Paul II rhetorically asks: *can the world – a great and constantly growing human family – exist and develop among rising opposites between the West and the East? The North and the South? And such are the divisions in the contemporary world; such are the discrepancies in it. Can a better future arise from differences and opposites growing in the course of mutual fight? The fight of one system against another, one nation against another – and finally, one human against another?* (John Paul II, 1987/1990). This principle of solidarity expressed in words *all with all* and *all for all* is for the Pope the most rudimentary dimension of people's union. This principle is in accordance with the general principle of sustainable development included in the report from 1987 entitled *Our Common Future* and emphasizing the need for solidarity of all people and all generations.

The awareness of co-dependencies between people has a moral dimension and a dimension of personal duty. It is not sympathy but courage and a will to engage, an awareness of conscience and responsibility of all and for all: *thus, it is not only vague compassion or shallow distress at the misfortunes of so many people – both close and distant. On the contrary, it is 'a strong and durable will' to engage for the sake of 'the common good', i.e. the good of all and everyone, as we all are really responsible 'for everybody.' This will is based on the fundamental conviction that preventing the full development is caused by greed and desire of power* (SRS, no 38). John Paul II was convinced that the awareness of the co-dependencies will grow and he himself thought and presented problems in the global scale of the universal look into the future. The common good and the development of communities may be secured when it is part of the development of people, although in the personalistic perspective a community may never be more important that the good of the person. The theological and philosophical perspective of thinking allowed the Pope to see the whole of the creation as an extremely rich *symphony of existence* and a never-ending change and development. Since it is not only about technological development, the human in this vision develops the most – the human is the first and most important aim of the creative development. It is, however, necessary for the human to find the most adequate place for their activity in their whole life. The place should be found first of all in the closest community but finally in the solidarity of greater human communities. Such reflexion allowed the Pope to formulate *the environmental problem in a broader context (theological anthropology – RH, theology of development – SRS, theology of 'the quality of life' – CA, the morality of human life – EV).* Nevertheless, the broadest presentation of the environmental problem can be found in John Paul II's message for the 23rd World Day of Peace in 1990. The Pope indicates the close connection between the ecological approach to the natural environment and constructing conditions for peace. In the opinion of Tadeusz Ślipko, the aforementioned message is *a small summary* of the holistically approached environmental problem. Without the coherent and moral approach to the participation in the commonness of the human fate and the fate of the world it is impossible to make a rational attempt to solve conflicts and problems, and to fulfil the needs necessary for integral development. Only such moral approach encompasses the question of the immeasurable value of the human in the face of trends concentrating on seeking economic profits; in the light of scientific achievements and the use of state-of-the-art technologies which may interfere with the respect for life. Civilisation progress made by people affects both the environment and people themselves. Therefore, the Pope drew attention to the rules that cannot be ignored. Those issues alone require adducing to the principle of the harmony and order of the universe. Participation requires common sense and a broader perspective on various connections and dependencies. All goods constitute a common heritage to which everybody is entitled. In this respect, the principle of justice and necessary savings and limitations on predatory behaviour are particularly important. There is a need for international agreement and cooperation for the sake of ecology. This does not mean that economic and

social reforms are not needed. On the contrary, we should fight poverty and shortages in resources. However, political actions and decisions must have the character of moral choices and dilemmas. The Pope formulates direct moral and pragmatic directives, calling for: *a genuine conversion in the way of thinking and acting.* The necessary qualities include: *self-restraint and moderation, internal discipline and a spirit of sacrifice, so that all the people do not have to bear the consequences of the negligence of the few* (Ślipko, 1999). What stands in the way is hedonism, consumerism, the lack of balanced social policy and the lack of readiness to altruism for the good of a broader community. In the cooperation of responsibility for sustainable development respecting the natural environment everybody should find their place. This concerns both political and religious organisations, economic entities and intellectual circles. The programme requires a proper status and the recognition of the irreplaceable role of the family, where the human learns the values and responsibility, as well as solidarity. The cooperation raised to the international level is in the Pope's teaching *a moral necessity for new solidarity.* It is a genuine manifestation of *the general social sense of environmental responsibility.* The Pope presents his views basing on *anthropological and normative assumptions* and it is a real proposal of sustainable development which takes into account the good of the human (Ślipko, 1999). All the economic processes and the impact on the broadly understood environment must be subordinated to the good of the human. In this approach, solidarity excludes extreme individualism and unlimited exploitation of natural resources. Naturally, the realisation of the programme proposed by the Pope requires immense moral effort and agreement of conscious people acting for the common purpose.

Human development as measure of progress

For John Paul II economic development was not an aim in itself. Reducing development to purely economic categories leads, in the Pope's opinion, to subjecting the human person and the deepest human needs to the *requirements of economic planning or pure profit* (SRS, no 33). Therefore, economic development in the social thought of the Polish Pope was subordinated to the more general category, i.e. the development of the human and was just one of the elements of this development. In encyclical *Centesimus annus* the Pope clearly states: *development cannot be understood only in its economic sense, but also in an integrally human sense* (CA, no 29). The basic aim of all the activities should be the integral development of the human. In the Pope's opinion, this integral development means genuine and common progress, contributing to the lasting peace in the world. Progress assumes the holistic vision of the human, i.e. the vision taking into account the human nature in its spiritual and material dimension, of which the world of the human spirit constitutes the superior value, as it is the source of culture and as it determines the human as a person. Hence, economic development appears as a struggle for providing the human with decent conditions of living. It is, however, subjected to cultural development, leading to satisfying the spiritual needs of the human, which of course may adopt a materialised form, such as a work of culture, but which essentially express the human spirituality. In encyclical *Soliciduto rei socialis* the Pope pointed out that *the gathering of goods and services itself, even if it is to the benefit of the majority, is not enough to guarantee human happiness* (SRS, no 28).

The human needs something more than just the improvement of the economic conditions of living. People need an integrated balanced vision of development, ensuring their decent living, allowing for their self-realisation as subjects of culture and for the satisfaction of their spiritual needs. Finally, in order to live decently and safely, the human needs unpolluted natural environment. In other words, sustainable development in the philosophical vision of John Paul II assumes balance between economic development and the need for the protection of the environment – both human (culture) and natural.

Human ecology

Especially the human environment has always been a subject of the Pope's special attention. In the Pope's opinion, the problems related to the human ecology are marginalised in the contemporary public discourse, as more attention is devoted to the problem of the protection of the natural environment. John Paul II thought that the natural environment required special attention, which was still insufficient in the global scale. Nevertheless, the Pope perceived the destruction of the human environment as a more dangerous phenomenon which had to be confronted with determination. Discussing the protection of *moral conditions of the genuine 'human ecology',* he used mostly theological arguments. He claimed that *the human is a gift for himself received from God and therefore must respect the natural and moral structure with which he has been equipped* (CA, no 28). In the opinion of John Paul II, social institutions may either support the moral development of people or lead to their moral degradation, turning into the so-called *the structures of sin.* The most important institutions of social life as well as *the first and the most fundamental element of 'the human ecology' is family,* where people for the first time encounter the notion of truth and goodness, and where they learns love (CA, no 39). However, the Pope understood that there were families unable to fulfil this vocation

and their social mission for reasons both internal (i.e. the egotism of the family members, leading to the total disintegration of the family and the devaluation of the family ties), as well as external (related to the pauperisation of the family or, in the contrary, to excessive concentration on material matters: to the *civilisation of consumption* (CA, no 39; FC, no 6).

John Paul II opposed especially the ideology of consumerism subjecting the vision of development to consumption growth. This is an important context, also in the discussion on sustainable development. The Pope thought that such approach causes depreciation of the human and other negative social consequences, while at the same time leading to the degradation of the natural environment. Consumerism reduces the human person to the role of a consumer whose ever new needs are stimulated by experts in advertising and social engineering. This results in the sense of *radical insufficiency*. The human tries to satisfy artificial needs, which gives him new things he often does not really need in life. This happens according to the principle that *the more you have the more you want to have.* At the same time, the deepest human desires – spiritual ones – remain unsatisfied, as the satisfaction of them would negatively influence the micro- and macroeconomic ratios. Therefore, both companies and governments support the high level of consumption of goods and services, ignoring the long-term risks it involves, concerning the mental and moral sphere of the human existence and his relations with other people. They ignore the negative effects of unrestrained consumption to the natural environment (also with respect to the growing consumption of nearly depleted natural resources and the growing level of environmental pollution). What counts is only the immediate economic goal, which in the micro scale is defined by the profit of the company, whereas in the macro scale – the level of gross domestic product.

For John Paul II the real development meant the moral development of the human, in their personal and social dimensions (Kowalczyk, 1995). Its measure is the focus on the human perceived holistically, i.e. in a way which takes into account his material and (first of all) spiritual needs. The human has the right to the resources which ensure his good living. Nevertheless, subjecting the human person to material values is abuse. The Pope emphasized the difference between *being* and *having* giving superiority to the personal existence of the human, i.e. the value of *being*. Nevertheless, he did not preach the idea of total poverty and denial of material things. He claimed that: *evil does not consist in 'having' per se but in such type of 'having' which does not take into account (...) the quality and ordered hierarchy' of the goods possessed. 'The quality and hierarchy' which come from subjecting the goods to human 'being' and using them respectively* (SRS, no 28). He was convinced that human dignity and respect for the human life, which includes such *being* was *the basic principle of healthy economic, industrial and scientific development* (John Paul II, 1990). The Pope's thought inevitably leads to the question of the protection of human life from conception to natural death. This aspect of his considerations, highly controversial in the contemporary philosophical and scientific discourse, is strictly integrated with the problem of development. In the Pope's opinion there are two variants of civilisation. In metaphorical terms there is *the civilisation of life*, synonymous to *the civilisation of love*, in which the most important value is human life in all its manifestations. The Pope confronted it with the development of *the civilisation of death* or *the civilisation of consumption*, which is the antithesis of the first notion (SRS, no 28; EV).

In fact, this is where John Paul II touched upon the problems of demography. During his pontificate, Pope called for the start of well-thought and moral actions aimed at solving the demographical problem, at the same time opposing the idea of demographic growth an obstacle in the way to social and economic development. He claimed: *just like the statement that all the difficulties come from the demographic boom is not proven, it has not been proven that every demographic growth must stand in opposition to planned development* (SRS, no 25). With this respect, the Pope's approach was ambivalent. On the one hand, he opposed reducing the global problems of today's world to the enormous demographical growth, at the same time regarding all birth control tools, whether mechanical or pharmacological, as immoral, with abortion as particularly so and viewed as murdering of the unborn. On the other hand, he rejected the ideas of irresponsible reproduction of humans on the Earth, claiming that the *demographical growth has to be taken into account* (John Paul II, 1994; EV, no 13).

Natural environment protection as international responsibility

Much as the human person was the main object of ecological reflection and care of the Pope, he did not ignore the questions of environmental science. He paid attention to both the growth of ecological awareness in societies and to the increasing degradation of the natural environment, seen a source of social tensions and even international conflicts. He spoke highly of the increasing environmental awareness. During the much-quoted message for the 23rd World Peace Day he said: *in the face of the common degradation of the natural environment, people understood that we can no longer use the world resources in a way we used them in the past. The phenomenon of environment degradation worries the public and politicians, whereas experts in various areas of science investigate its causes. This*

shapes environmental awareness, which should not be thwarted – on the contrary, we should facilitate its deepening and maturing, so that it can be manifested in various concrete programmes and initiatives (John Paul II, 1990).

The Pope sees the sources of the devastation of nature in an anthropological mistake. Selfishly disposing of the natural earthy goods, the human acts against God's plan for the Earth. He claimed that such approach is first of all *a manifestation of the poverty or mediocrity of the way of looking at the human, driven by the desire to possess things more than by a desire to approach the truth, lacking the unselfish, noble and sensitive approach to aesthetical values which is born from elation at life and beauty, and which allows you to read the invisible message from God inscribed in visible things he has created* (CA, no 37). Instead of being the *master and guardian* of nature, the human becomes its *ruthless exploiter*, unable to see meanings of the natural environment other than those which serve immediate and individual interests, which is characteristic for utilitarianism and consumerism (RH, no 15). In the philosophical thought of Karol Wojtyła nature is understood as a gift from God and as such it must be respected. Human approach to nature is characterised not only by surrendering to biological rights but first of all – due to perceiving the problem in theological categories – to moral rights (ChL, no 43; EAs, no 41). In one of his addresses to the faithful the Pope said: *some elements of the current ecological crisis prove that it is a moral problem* (John Paul II, 1990).

The challenges related to the ecological crisis which humanity has to face require coordinated actions at the international level. John Paul II noticed that *the problems of the natural environment in many cases cross the borders of countries, which means that also solutions to those problems cannot be found within one country.* Among the problems mentioned by the Pope are: the pollution of land and water as a result of industrial activities and the use of chemicals in agriculture, air pollution and the hole in the ozone layer, the greenhouse effect, overexploitation of mines and forests, as well as – difficult to foresee at this moment – effects of genetic modification of animals and plants. Pointing at ecological threats, the Pope refers to the questions described and commented in the world media, reports of ecological organisations and debates of intellectuals (John Paul II, 1990). Naturally, he did not conduct or commission scientific research in the field but he based on commonly accessible information. His intention was not to comment on chemical, physical or biological effects of the natural environment degradation, but to evaluate them from the perspective of ethics and morality. Hence, his conclusions are general calls for taking responsibility for the natural environment and taking concrete actions to improve the present situation. And although he noticed that the *recent promising progress in the field of this desired international cooperation,* he also saw that *the existing tools and organisations still do not meet the requirements of the implementation of a coordinated action plan. What gets in the way is political issues, extreme nationalism and economic interests, not to mention some factors which impede or even entirely prevent the international cooperation and taking long-term efficient actions* (John Paul II, 1990). However, despite those tendencies, the economic crisis emphasized, in the Pope's eyes, the need to create an international environment protection system based on the principle of solidarity. This means first of all the solidarity which developed countries should show to the developing ones. Cooperation in the field of natural environment protection between countries of various levels of technological development should not be limited to imposing restrictive ecological standards on developing countries. According to John Paul II, developed countries should be the first ones to take on themselves the effort of implementing those restrictions.

Moreover, making environmental problems international does not exempt particular countries from individual pro-ecological activities. He thought that governments were obliged *not only to implement standards approved in cooperation with governments of other countries but also to take care of their own social and economic order, including in particular sensitive areas of the social life. Each country should protect its own territory against atmosphere and biosphere pollution though – among other measures – strict control over the results of technological or scientific discoveries. Each country should also protect its own citizens against the exposure to toxic or other harmful substances.* In relation to developing countries, John Paul II postulated that they should fulfil their moral obligation of avoiding the mistakes made in the past by developed countries. He firmly added that the countries cannot *continue destroying the environment with pollutants, cutting out the whole miles of forests and exploit without limitations the richness that will one day be depleted* (John Paul II, 1990).

Instead of conclusion

Among the participants of the world ecological debate there are definitely many intellectuals whose erudition exceeds the ecological knowledge of Karol Wojtyła. Nevertheless, exploring the writings of the Pope and studying his philosophical, theological and literary works allows to see in him a thinker not unfamiliar with contemporary global problems, including environmental issues. He analysed and interpreted them not as an ecologist or environmental scientist but first of all as an ethicist and moral theologians. This broader view is in accordance with the idea of sustainable development. That

is why his works will definitely not provide us with detailed solutions concerning pro-environment activities but they will give us ethical and moral guidelines, which are to a large extent political and international. Hence, they may be treated as an element of philosophy and political theology, as the human – the discoverer of so many natural secrets – must redefine his place in the wholeness of the universe and in the social life.

The originality of the ecological thought of John Paul II consists in referring to personalism and making the ecology of the human a fundamental eco-philosophical and eco-theological problem. As it is always the case with such great and integral visions of development, our presentation of the Pope's teaching is a proposal for further research. In the light of the contemporary discourse on sustainable development in the world of philosophy and political theology, the thought of the Pope is consistent and worth all the attention.

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PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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Walery Goetel and the Idea of Sozology

Walery Goetel i idea sozologii

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Abstract

The article presents the concept of sozology, formulated by Walery Goetel in the 1960s, an innovative proposal to establish an autonomous and interdisciplinary branch of science concerning the protection of the environment. The essence of this idea was to determine the subject matter of the postulated branch science that would include the protection of the natural environment as well as the social environment, which was a major breakthrough and is now an indisputable axiom of ecology, ecophilosophy, the study into the protection of the life of human environment, and the idea of sustainable development. Furthermore, the text contains a short biography of the Polish scientist and presents the reception of Goetl in modern Polish *ecological* thought in the form of systemic sozology and sozophilosophy.

Keys words: ecophilosophy, ecology, nature, protection, sozophilosophy, sozology, systemic sozology, environment

Streszczenie

Artykuł prezentuje sformułowaną przez Walerego Goetla w latach 60. XX w. koncepcję sozologii – nowatorską propozycję ustanowienia autonomicznej i interdyscyplinarnej nauki o ochronie środowiska. Istotą tego pomysłu było określenie przedmiotu postulowanej nauki obejmującego ochronę nie tylko środowiska przyrodniczego, ale także i społecznego, co stanowiło prawdziwy przełom a współcześnie jest niepodważalnym aksjomatem ekologii, ekofilozofii, nauki o ochronie życia środowiska ludzkiego, a także idei zrównoważonego rozwoju. Tekst zawiera także krótką biografię uczonego polskiego oraz ukazuje recepcję Goetla we współczesnej polskiej myśli *ekologicznej* w postaci idei sozologii systemowej oraz sozofilozofii.

Słowa kluczowe: ekoflilozofia, ekologia, przyroda, sozofilozofia, sozologia, sozologia systemowa, środowisko

The 20th century was one of the most interesting periods as far as the development of science is concerned. It is enough to mention two fundamental *scientific revolutions* which happened during that time – *information revolution* (which has radically changed the methods of communication and transformed social organization of humanity) and *biological revolution*, spectacularly manifested in medicine and genetics (eg. transplantology, xenotransplantation, in vitro fertilization, research on the genome of various plants, animals, and on human genome; cloning, transgenic research or eugenics pertaining to humans) (Piątek, 2007). A significant distinguishing mark of this period has been the demand for interdisciplinary or multidisciplinary research, an answer to the challenges of always complicated and multidimensional reality, as well as an attempt to impart a homogenous and integrated character to science (Kamiński, 1981, p. 244-258). Such approach resulted in the creation of numerous new scientific disciplines both in natural history (e.g. bionics or cybernetics), humanities (e.g. family science or European studies), but also on the intersection of these areas of science (e.g. sociobiology).

A classic example of this last trend is ecology – the science of the environment. Invented by Haeckel (1869) as a biological subdiscipline, dealing with the relationships between animals and their environment, in the course of the 20th century ecology evolved into an interdisciplinary science reflecting on mutual influence of living organisms (including

humans) and both natural and social environment (Zięba, 2004). Wide understanding of ecology, including humanistic perspective, gave rise to different variants of ecophilosophy (ecological philosophy), which together study the areas of human activity particularly connected with socio-natural environment (Dołega, 2006, p. 17-22; Tyburski, p. 7-15). The most significant element of the *ecological* perception of the world is noticing the negative impact that man has on nature. Degradation of the biosphere, increasing immeasurably quickly since the end of the 19th century, has been the subject of numerous alarming studies which usually concluded with appeals for putting a stop to the overexploitation of natural resources. As a result, in the last decades the idea of *ecodevelopment* was created, followed by the notion of *sustainable development,* which is about restructurization (having in mind the future of humankind) of current human civilization, mercilessly exploitative towards nature, into a society full of reverence for nature (Pawłowski, 2011, p. 1-36; Gawor, 2009, 2010;).

Another important element of an *ecological* view on reality is an axiological perspective that demands to protect nature (Papuziński, 2007; Hull, 2008). It has a long tradition that reaches as far as the antiquity (Pawłowski, 2011, p. 1-2).

The concept of protecting nature first appeared on a socially larger scale only in the second half of the 19th century (symptomatically, A. Humboldt coined the term *natural monument* in 1819). From the beginning of the 20th century, the idea of the protection of the environment was being given legal foundations (first comprehensive acts on protection of the environment were passed in Germany in 1902, France – 1906 and Norway – 1910; in Poland in 1934).

The idea of protecting nature fully entered the public consciousness in the second half of the 20th century. It was in that period when, as the destruction of natural environment progressing for economic reasons was clearly visible, first scenarios began to be created that predicted a disaster for human civilization unless it alters its acquisitive attitude to nature. In this context, the words of U'Thant, the author of an United Nations report from 1969, proved to be significant: *It has become clear that we all live in one biosphere within which space and resources, though vast, are limited* (U'Thant, 1969). Such a viewpoint imposed a necessity for a scientific description of the biosphere subjected to human activities. Such a study would take into consideration a description of the processes taking place in the natural environment, a presentation of the negative influence a man exerts on nature and the ways of preventing ecological disaster. This viewpoint is a basis for modern interdisciplinary environmental science, which combines ecology and natural sciences: physics, chemistry, pedology, hydrology, oceanography, meteorology, biology and geography. It is also a point of departure for formulating foundations of a separate branch of science – environmental protection.

In the abovementioned contexts (interdisciplinarity of scientific research, ecology, the science of environmental protection) a substantial role was played by a Polish scientist, Walery Goetel. He is the author of the concept of a new interdisciplinary science of environmental protection which he named *sozology*.

Walery Goetel (born 14 April 1889, Sucha Beskidzka, died 6 November 1972, Cracow) was one of the lead Polish geologists in the first half of the 20th century. He studied natural sciences in Cracow at Jagiellonian University (1907-10) and in Vienna (1910-12), and that was where he obtained his Ph.D. degree in 1913 writing a thesis about rock formations in the Tatra Mountains (southern Poland). He worked at the Academy of Mining (renamed the Academy of Mining and Metallurgy in 1949) in Cracow in 1920-60 (as a full professor from 1923; performed the function of the rector of the Academy in the years 1945-1950), he became a member of the Polish Academy of Sciences. Goetel conducted his field studies mainly in the Tatra Mountains and in the area around them, as he was a great admirer of this region. For that reason, he was an avid activist of Tatra mountaineering, tourism and mountain sports. In that very place, before the First World War, he began his campaign for the protection of the Tatra nature (from 1913 he was a member of the Tatra Society's Section for the Protection of the Tatra). He cooperated with numerous eminent personalities who shared his fascination with the Tatras and who were the pioneers of the idea of the protection of the environment in Poland: Jan Gwalbert Pawlikowski, a professor of economy at Agricultural Academy in Dublany and a writer (1860-1939; he was the author of the treatise *Culture and Nature*, the first Polish manifesto of the protection of the environment), and professors of Jagiellonian University in Cracow, botanist Marian Raciborski, acknowledged physicist Marian Smoluchowski and botanist Władysław Szafer (1886-1970; he was the editor of a two-volume textbook *The Protection of Nature and Its Resources. Problems and Methods*, Warsaw 1965). Szafer, Goetel and Pawlikowski were co-originators of the Ligue of Nature Conservation (1928).

From 1922, Goetel was a member of the State Commission for Nature Conservation (Państwowa Komisja Ochrony Przyrody, PKOP), transformed in 1925 into State Council for Nature Conservation (Państwowa Rada Ochrony Przyrody, PROP); from 1925 he was a representative of PKOP (later PROP) for establishing national parks (designed to be set up in the Tatra Mountains, Pieniny Mountains and on Babia Góra Mountain). He was actually the initiator of the idea of creating such parks. He significantly contributed to combining the questions of

nature conservation both with science and with tourism within Polish Tourist and Sightseeing Society. From the moment of the creation of Tatra National Park in 1955 he was a member of its council and in the years 1956-72 the chairman of the council.

In the interwar period, Goetel extended the activities for the nature conservation in the Tatras to the idea of protecting the environment on an international scale. He was one of the initiators and implementers of the project to broaden the old idea of nature conservation and include simultaneous protection of natural resources which consisted in their rational exploitation. He proposed this fully formed concept at a conference on nature conservation in Brunnen in Switzerland. At the conference, together with Szafer they presented a project to set up an international organization that would encompass a wide scope of the protection of the environment. As a result, the International Union for Conservation of Nature in 1948 was formed, renamed International Union for Conservation of Nature and Natural Resources in 1956 in Edinburgh, which is still functioning with its head office in Switzerland. It is the first pro-ecological organization of an international scope (Wikipedia, 2012).

From the point of view of the history of ecological thought, Goetel's most significant achievement was the formulation in the mid-1960s of a project of a new scientific discipline that would deal with widely understood nature conservation. As he wrote modestly (Goetel, 1966, p. 480), he was not alone in the undertaking; he mentions Adam Wodziczko (1887-1948), Włodzimierz Michajłow (1905-1994) and Władysław Szafer as Polish naturalists who called for making research on nature conservation a separate branch of science (Wodziczko, 1933, p.89-96; Michajłow, 1958, p. 533-536). He was the author of an outline of the subject and the methodology of this new science concerning the protection of the environment, as well as the originator of the term *sozology* (formed from the Greek word σωζό; *sodzo* = protect, rescue, save, help).

Goetel was aware of the fact that the question of the creation of a new science dealing with the protection of the environment *was in the air*. He wrote: *it should be taken into account that the question of the protection of natural resources and securing the stability of their use will grow to become one of the major problem of human life, and that a new branch of science dealing with these issues will develop* (Goetel, 1971, p. 20). He was the first to propose o project of such a science, although soon after numerous similar propositions appeared abroad, under various names: sozoecology, chorology (from Greek *oros* = land, space), sozonomy (science concerning the man and economy) or synecology (Goetel, 1971, p. 18-19).

The idea of creating an autonomous science concerning the conservation of nature first appeared as a careful assumption in Goetel's article *New Ways of Conserving Nature* in 1949. It was introduced in more detail in the text *For the Stability of Use of Natural Resources* in 1963. It was fully expounded in an essay *Sozology – the Science Concerning the Conservation of Nature and Its Resources*, published in 1966. The concept of new environmental science was most fully expressed in the publications from 1971: *Sozology – a Branch of Science, Its Content and Objectives* and *Sozotechnology* (Goetel, 1949; 1963; 1966; 1971). Another factor considerably important for the formulating the project of sozology was the Seminar of the Conservation of Natural Resources and Securing the Stability of Their Use, which Goetel taught from 1963 at the Department of General Geology at the Academy of Mining and Metallurgy in Cracow.

The concept of sozology has its roots in three fundamental premises.

The first one of them concerned the scope of the traditional idea of the protection of nature, created in the second half of the 19th century, which consisted in conservational activities and, according to Goetel, was too narrow. In this perspective, rare and unique natural formations were treated as museum objects which needed to be cared for and left intact. The fruit of these activities, highly valued by the Polish scientists, was the creation of National Parks, nature reserves (of wildlife and inanimate nature), numerous natural monuments (peculiar rocks, trees, plants) and the protection of animals and plants which are rare or vulnerable to damage. This direction in conservational activities in face of an unprecedented civilizational development occurring since the end of the 19th century turned out to be insufficient. Goetel pointed to three factors of this development which fundamentally and irreversibly changed the 19th-century status quo of nature: radical population growth, the processes of global industrialization and urbanization. These phenomena have directly resulted in an increasing exploitation of natural resources, dictated by the growing consumer needs and, as a consequence, in the progressing degradation of nature (e.g. in the form of gradual exhaustion of depletable resources, destroying the landscapes in ever-increasing areas, or exterminating numerous species of animals and plants). In this perspective, Goetel found it vital to protect not only the spectacular elements of inanimate nature, flora and fauna, but also all natural resources: water, air, soil, ores and minerals. *What good will bring – he asked rhetorically – the protection of particular elements of nature, when deep changes in human life, and especially the destruction of nature will cover the entire Earth, or even only its particular but vast areas?* (Goetel, 1966, p. 477). In this way, he showed new ways for nature protection that definitely exceeded the scope proposed by the conservational concept.

The second premise for creating a separate branch of science dealing with the protection of the environment was, according to Goetel, the necessity to introduce to the environmental issues a factor which had been overlooked so far – that of human health, to a large extent conditioned by the natural environment. As an example of this relationship he mentions diseases associated with the progress of civilization: different kinds of cancer (e.g. lung cancer), cardiovascular diseases or neuroses. In his view, these diseases are directly associated with the processes of civilizational development and with their negative influence on natural environment. By pointing to this connective and reciprocal aspect of the relationship between man and nature, Goetel enriched the understanding of the idea of nature protection to a large extent. This idea was to be extended by the issue of the influence of the nature, devastated by humans, on their existence on the one hand; on the other, the value of the quality of human life was clearly highlighted. This value was treated as one of nature's resources. In such a holistic perspective, man is treated as an indispensable element of nature, influencing it and at the same time suffering the consequences of his relation to it. This view is connected with a radical departure from anthropocentric attitude to nature: *Nature together with the human environment can be saved only on the condition that man will recognize his affinity to nature instead of gradually distancing himself from it* (Goetel, 1971, p. 25). With this proposal, Polish scientist opened the door to specific humanization of the environmental science. The idea *to protect nature alone* was replaced with the idea *to protect the entire environment*, including inanimate nature, wildlife and anthroposphere. This demanded to include in conservational activities not only the natural history perspective, but also technical, economic and social perspective. Therefore, he made the coexistence of humans and nature one of the superior questions of sozology. It is worth mentioning that this perspective in perceiving the man-nature relationship became some time later a point of departure for the concept of ecodevelopment and the idea of sustainable development.

The third premise for the formulating the idea of sozology concerned Goetel's conviction that the research area framed in the two previous assumptions could be penetrated only with a joined effort of natural history and social sciences as well as technology. Particular natural resources are subject of interest of specific natural sciences such as hydrology or pedology; including the questions of *human life in the environment* into the scope of sozology determines incorporating, for example, medicine, economy and sociology; while taking into consideration the human influence on nature, it is necessary to include in analyzing natural environment and the possibilities for its safe transformation – technology and engineering. Only the combination of these various ways of perceiving the relationship between humans and nature will allow for the description of its actual state, diagnosing the existing or potential threats for both sides of this relationship, as well as designing the methods of solving the present and urgent problems in this respect. This last task of sozology should be particularly stressed. According to Goetel, the proposed environmental science must be of practical nature; it must be an applied science. It is fully reflected in his words: *The new branch of science which we propagate is complex and applied. The goal of this science, containing economic and technical elements, is to aim through the conservation of natural resources to secure their stability of use. In this way the new science strives to bring direct benefits for humanity, for whom using the natural resources constitutes the basis for existence. A science perceived in this way requires the cooperation of naturalists from all branches of this field, as well as technicians and humanists, among them especially economists* (Goetel, 1966, p. 480). Apart from the demands to save natural resources and the practical dimension of sozology, *the benefits for humanity* are taken into consideration, which is directly linked with positivist idea of utilitarianism. Another important fragment of this quotation is the phrase *to secure [the] stability of use [of natural resources]*. In a later text, *Sozology – a Branch of Science, Its Content and Objectives* (Goetel, 1971), he further developed this statement: *securing the stability of use of natural forces and resources, so basic* ***for the future of humanity***. This goal of sozology, described as above, was fully adopted, what needs to be stressed, about twenty years later by the idea of sustainable development. *Nota bene,* in the discussions about the notion of *sustainable development* there appear a number of positions according to which the stability of natural resources constitutes the fundamental element of the definition of this idea (Pawłowski, 2011, p. 39-45).

On the basis of the three abovementioned premises Goetel concluded that sozology can definitely be a separate science, as it fulfills the basic criterion of a science: it has a precisely determined and separate from other branches field of study, and it is equipped with a methodology appropriate to its subject matter. Two first premises delineate its field of study, that is natural environment and especially its resources and the human presence in it. The protection of this holistically perceived environment constitutes the aim of the conducted research. In turn, the third premise points to the research methods sozology should use. These methodologies are varied and well-practiced, used depending on the particular subject matter (specific natural resource). Among them, we count the methodology of natural (and medical) sciences, methods used in

engineering and technology, and the methodology of social sciences. Furthermore, sozology through multidimensional nature of its subject matter very clearly reflects the tendencies of modern science to undertake interdisciplinary research.

Taking into account both practical and applied dimensions of sozology, Goetel proposed that sozotechnology should be isolated from the scope of this science. *Sozotechnology is an introduction to the practice of the recommendations of sozology, and in the face of its extensiveness and the complexity of its tasks it should be a separate branch of technology* (Goetel, 1971, p. 42). At the basis of this conclusion lies the Polish scientist's conviction reflecting moral responsibility – that what has been destroyed in nature by technology and industry should be in turn fixed by them; furthermore, he points to the fact that only suitable technologies as well as rational attitude of the whole of human economy can effectively protect natural resources and prevent further biodegradation. However, above all *Sozotechnology consists in the practical activity of industry that aims to counter the negative sides of scientific-technological revolution and to protect the humans from the future dangers brought about by the excessive technologizing of life* (Goetel, 1971, p. 26). According to Goetel, who in this statement decidedly opposes technocracy, sozotechnology is on the one hand to be a tool of direct conservation of natural resources; while on the other, indirectly, an expression of commitment to the protection of humanistic values of human environment.

Goetel's concept of sozology was broadly accepted in Polish scientific environment. It also drew a wide response in the press. It was discussed, among others, in *Argumenty (Arguments), Kultura i Ty (Culture and You)* and *Kultura (Culture)* magazines (Czerwieniec, 1974, p. 11; Jarocki, 1973, p. 10; Leszczycki, 1972, p. 7-8). It became subject to analyses in works devoted to Goetel and in numerous scientific conferences (Kozłowski, 1989, p. 26-28; 1990, p. 43-48). At the turn of the previous century, the idea of sozology met with increased interest. It resulted in, among others, a suggestion to extend environmental sciences adding sociological issues, as part of so-called *sozosociology* (Piątkowski, 1994). However, the most interesting development of Goetel's idea of sozology was its presentation in a systemic way accomplished by Józef M. Dołęga (2001, 2005).

According to Dołęga, environmental sciences can be practiced according to many different approaches. In relation to this he lists: empirical sozology, which undertakes research on the mutual influence of nature and anthroposphere using the methods of natural history; humanist (anthropocentric) sozology which brings to the fore the humans and their values confronted with nature; and philosophical sozology (which is in fact referred to as *theological sozology*) which highlights the indispensability of placing the idea of nature conservation within philosophical anthropology and natural philosophy (limited in this case to neothomistic interpretation). Dołęga himself is in favour of systemic sozology, which he perceives as a science *about systemic protection of nature from the destructive influence of anthroposphere* (Dołęga, 2006, p. 17). The key notion is that of *systemic protection*. It means to view the environment as a system comprised of a number of interrelated components – subsystems (atmosphere, hydrosphere, lithosphere, the cosmosphere, biosphere and anthroposphere), which together constitute an orderly whole. Each of the systems falls into chaos once any of its components begins to disrupt the inner balance of the system. This is what currently happens in the environment, in which the anthroposphere exerts pressure on the other elements of the system on an unprecedented scale. The general tasks of systemic sozology arise from this condition. This branch of science is to record, control and assess the current state of the environment; to seek the sources of pollution and threats to natural spheres as well as the social element of the environment; to study the influence of the changing environment on the life on Earth as well as on human life and health; finally – to find measures and techniques (new technologies) to protect the environmental system, taking into account the natural and social dimension (Dołęga, 2006, p. 19). The most important question is that of the anthropospheric subsystem. It is not only the reason behind the destructive processes happening in nature's particular subsystems (physical and biological), but at the same time their victim. Therefore, the fundamental sphere of interest of systemic sozology consists of the problems of the quality of human life (health, conditions of life in particular regions, especially the devastated ones, natural surroundings with accompanying flora and fauna) on the one hand; on the other – the possibilities of anthroposphere for protecting widely understood environment (mainly through technology and work on ecological and sozological social consciousness, which should be expressed to the fullest extent in economic activities, politics, law, upbringing or morality). The aims of systemic sozology determined in this way can only be realized through its close cooperation with ecology and other sciences dealing with particular subsystems of the environment: biological, chemical, physical, geological, technical, as well as economic, philosophical, humanistic, legal and social. Such interdisciplinarity is indispensable, as the results of the research obtained by specific sciences constitute the base for the analyses of systemic sozology. It is only on this basis that the directions of conservational activities are formulated, both in respect to particular subsystems, especially anthroposphere, and to the environment as a whole. This cooperation, particularly

with social and humanistic sciences, gives rise at the same time to the creation of a number of new fields of science, such as sozotechnology, sozoeconomy, sozopsychology, sozoethics (environmental ethics), sozological law, sozological politics or sozological pedagogy (Dołęga, 2006, p. 19).

Dołęga's systemic sozology is one of the most mature concepts derived from Goetel's idea of environmental science.

Another idea inspired by Goetel was that of sozophilosophy, conceived by Wiesław Sztumski. According to him, just as it is justified to create ecophilosophy on the basis of ecology, sozophilosophy should be an extension of sozology (Sztumski, 2012, p. 73). He emphasizes, that sozophilosophy is rather a project for the future than an existing separate subfield of philosophy; he notes, however, that from the beginning of the 21st century a number of texts have appeared, written by ecologists, ecophilosophers, sozologists and other authors interested in the problems of nature conservation, which tackle sozophilosophical questions in various aspects, though from a philosophical point of view It is, he stresses, a mark of the beginnings of sozophilosophy (what is worth to be added – as Sztumski writes – in Poland, sozophilosophers gather around the magazine *Problemy Ekorozwoju/ Problems of Sustainable Development*).

The aim of sozophilosophy is to present the perspective in which some of the elements of the environment are particularly significant for determining the goal and sense of human existence. They have an axiological dimension for humans and they belong to various subsystems (spheres) of the environment. If they are in danger of destruction, or irreversibly destroyed, the framework of human life is fundamentally altered. Each of these changes is of a definitely negative nature, as it impoverishes human existence. The sum of these changes could even mean a catastrophic end of humankind. From this point of view, it is essential to undertake conservational activities, encompassing nature and anthroposphere, and especially those components which are most valuable for humans (e.g. clean water, varied fauna and flora, mineral resources, health, faith, privacy) and whose future existence is endangered by the destructive influence of the development of modern civilization. The emphasis that sozophilosophy places on the indispensability of conservation and activities saving the components of the environment which are crucial for humankind is the reason why it is not *a speculative or academic philosophy, but a practical one – a philosophy of life* (Sztumski, 2-12, p. 76). As far as its meaning for the functioning of future human society is concerned, sozophilosophy is to perform a role comparable to that of science and technology.

To make it possible for sozophilosophy to flourish, specific educational conditions need to be met. Sztumski places them in the sphere of social consciousness and he lists among them: assimilating the notion of sozology, distinguishing sozology from ecology, developing sozological consciousness – by analogy to ecological consciousness; and propagating the knowledge of the subject matter of sozology, which includes nature as well as widely understood environment consisting of natural, social and cultural elements (to some extent, this program is realized by the UN in the organizational form of *Decade of Education for Sustainable Development* [2005-2014]). It is even postulated to introduce general and compulsory education in sozology (Sztumski, 2012, p. 74).

The problems of the philosophy of nature conservations are delineated on one hand by natural philosophy and philosophical anthropology. On the other, it is a more general reflection on the place, role and quality of human existence within various subsystems of the environment of human life than it is established in the scope of detailed sozological research. Sztumski particularly highlights this reflection in the studies dedicated to selected spheres of conservation of human surroundings (or as he terms it – landscapes) belonging as subsystems to anthroposphere. They concern the protection of faith, knowledge, space, language (as a means of communication), silence (noise), time, naturalness, freedom, privacy and common sense (Sztumski, 2012, p. 73-230). From the point of view of sozology, not all of the abovementioned spheres of human existence could be a subject of interest (eg. faith, knowledge or common sense). This is the sense of Sztumski's concept of sozophilosophy. It is as if a theoretical extension of the idea formulated by Goetel.

The figure of Goetel is memorable for a number of reason. He was an eminent scientist – a geologist, and had a tremendous impact on the organization of Polish education (especially the Academy of Mining and Metallurgy). His activities in the field of sport and tourism have also received praise. However, he is above all universally recognized as a pioneer of propagating the idea of nature conservation in Poland and as a long-time, devoted initiator, activist and theoretician of this concept. Especially the action in the latter field brought him fame both in the country and abroad. His most significant achievement in this sphere was the formulation in the 1960s of the concept of sozology – an innovative proposal to create an autonomous and interdisciplinary branch of science dealing with nature conservation. The most significant part of this idea was the subject matter of the proposed science – it was supposed to include the protection of not only natural, but also social environment, which was a real breakthrough at the time and today amounts to an indisputable axiom of ecology, ecophilosophy, environmental science (dealing with the protection of widely understood environment) and the idea of

sustainable development. Goetel's role in establishing this premise is invaluable. From this point of view, he is one of the *founding fathers* of dynamically developing abovementioned fields of science and *proecological* philosophical reflections. Numerous current scientists concerned about the state of the environment of human life refer to his idea of sozology. Without Goetel, neither the modern environmental science, nor the concepts of systemic sozology or sozophilosophy discussed in the present text would have been created.

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Challenges for Sustainable Development: The Case of Shale Gas Exploitation in Poland

Wyzwania dla rozwoju zrównoważonego: przypadek eksploatacji gazu łupkowego w Polsce

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Abstract
In the current century, natural gas has become the most important fossil energy resource and also important energy fuel in general. And these are both due to significant resources, especially of unconventional natural gas, and ease of transport or transmission, use but also the level of carbon dioxide emissions from burning natural gas.
Significant increase in gas consumption, in all regions, will be marked in the energy sector. Northern America and Western and Central Europe consume most of the gas on electricity and heat production. The exploration of unconventional gas reservoirs has been discussed recently in several scientific fields. Technical, organizational and economic challenges related to sustainable exploration, documentation of reserves, exploitation and development of shale gas technology have been addressed in this paper. Activities oriented to acceleration of prospecting and investment activities as well as difficulties with introducing pro-ecological procedures and technical modifications caused by minimization of influence of the drilling and environmental simulation of production wells have been presented. This study explains some ecological aspects of the extraction technology.
The pace of technological development in Poland may be considerably delayed by the new requirements set by geological and mining law, slowing down of exploration works and recognition of most important gaseous horizons. The scope of investments spent on infrastructure for treating, transport and distribution of gas may have an impact on the rate of realizing energy investment. The rate of development of industry will be conditioned by properly defined economic objectives and the feasible development of gaseous energy industry, being an element supporting the classic coal energy, now mainly a regulation of energy sales in peak seasons.
Probable scenarios (based upon business, legal and geological situation) have been discussed.

Key words: sustainable development, sustainable energy, oil shale, gaseous energy industry

Streszczenie
Gaz ziemny jest obecnie jednym z najważniejszych nośników tak energii kopalnej, jak i energii w ogólności. Dzieje się tak z uwagi na powszechną dostępność zasobów, łatwość w jego transportowaniu, a także z uwagi na niski poziom emisji CO_2 podczas spalania tego nośnika energii. Prognozuje się dalszy wzrost wykorzystywania gazu w sektorze energetycznym i to we wszystkich regionach świata. W Ameryce Północnej a także Europie Zachodniej i Wschodniej gaz służy do produkcji energii elektrycznej i cieplnej. Ostatnio coraz częściej na naukowych forach dyskutuje się zagadnienie eksploatacji zasobów gazu niekonwencjonalnego. W tym artykule przedstawiamy uwarunkowania eksploatacji gazu łupkowego w kontekście rozwoju zrównoważonego, prezentując aspekty techniczne, organizacyjne i ekonomiczne odnoszące się do stanu rozpoznania zasobów i ich eksploatacji. Przedstawiono podejmowane działania mające na celu zwiększenie poziomu pozyskiwania gazu łupkowego i problemy związane z wdrażaniem procedur proekologicznych i modyfikacji technicznych, wynikające z

obowiązku minimalizowania wpływu na środowisko procesu wiercenia. Artykuł wyjaśnia także podstawowe aspekty ekologiczne związane ze szczelinowaniem.
W Polsce rozwój tych technologii może ulec ograniczeniu z uwagi na nowe wymagania wynikające z prawa geologicznego i górniczego, spowalniające prace poszukiwawcze i rozpoznawanie zasobów. Niezbędne jest określenie poziomu środków finansowych niezbędnych do tworzenia infrastruktury związanej z pozyskiwaniem, transportem i dystrybucją gazu. Ujmując inaczej, szybkość rozwoju przemysłu gazowego będzie uwarunkowana przez właściwie rozpoznanie uwarunkowań ekonomicznych.
W artykule przedstawiono także prawdopodobne scenariusze na przyszłość, oparte na podstawach biznesowych, prawnych i geologicznych.

Słowa kluczowe: rozwój zrównoważony, zrównoważona energia, gaz łupkowy, energetyka gazowa

Introduction

In this century, natural gas became the most important energy raw mineral and energy fuel both because of its considerable reserves, especially natural gas from unconventional sources, and also easy transport, use and carbon dioxide emission accompanying combustion of carbon dioxide – factors crucial in the context of sustainable energy.
Natural gas is one of the most desired energy carriers in the World, having a higher level of social acceptance than other energy carriers, nuclear energy, in particular.
Considerable increase of gas consumption in all regions will be well seen in the energy sector. North America as well as Western and Central Europe consume most of the gas for electric energy and heat production. The development of gas-energy over the last ten years was caused by (Siemek & Nagy, 2012):

- Introducing on large scale comfortable combined-cycle technologies (CCGT, CHP – associated use of gas and steam turbines or gaseous motors from some kW to 300 MW of turbines).
- Reaching high efficiency of cycles – over 50% (full cycle *electric energy – heat* – about 90%).
- Lower capital and exploitation cost, shorter time of building and start-up, fewer complex designs, simpler constructions and installations as compared to atomic technologies and hydropower plants. However, the unit cost hydrocarbons, i.e. natural gas and oil are higher than that of coal and nuclear fuel, at least in Europe.
- High degree of social acceptance.

Other factors additionally accelerated the development of gas industry in the World, i.e.:

- Development of liquid natural gas (LNG) and its markets.
- Large scale gas from unconventional sources, mainly in the USA.
- Unprecedented craving for long-term gas production, transportation and distribution (energy safety of countries).
- New principles according to which gas industry and gas market are regulated.
- Natural gas – the only primary energy carrier controllable at every link of a gaseous chain stays under strong political influences owing to its transport possibilities.

The world's population in 2030 may exceed 8.2 billion, to increase to about 9 billion in 2050. Energy deliveries to those people at that time can be realized only with a considerable share of recoverable energy carriers, i.e. natural gas, oil and coal. The share of those minerals in the primary energy profile of 2030 will be about 80%. The considerable share of natural gas will be maintained and may even increase over 23-24% according to EIA and IGU predictions (Siemek & Nagy, 2012).

The world's natural gas resources

By the end of late 1990's the natural gas resources have been associated exclusively with conventional resources, where gas was deposited in porous and permeable sandstones or limestones. Such resources may be found at some hundred to some thousand meters of depth (6000-8000); they are usually limited by impermeable layers, underlying layers and water-saturated surrounding layers. This naturally closed geometrical structure formed traps for the migrating gas generated in source rocks. The magnitude of conventional gas resources was described by the International Energy Agency (IEA) as: documented resources and perspective resources. Their magnitude has been illustrated in figures in table 1.
Perspective resources are over 2 times bigger than the resources in well recognized and documented natural gas fields. The World's gas consumption in 2008 was equal to ca. 3 018 billion m^3 (bcm), and this quantity of gas in documented reservoirs would suffice for over 60 years; however perspective reserves considerably elongate this period by over 120 years. Accordingly, this primary energy carrier can be viewed as dominating in the 21st century. It is also important that gas reserves from unconventional gas sources started to be documented.
Those reserves still remain poorly recognized in the World, except the USA; however, the recently assessed resource potential has revealed their significance, mainly due to the fact that they can be explored and documented on a local scale.

Table 1. Distribution of natural gas from conventional sources in various regions of the World, 2008. Source: IEA, 2009.

	Documented resources (tcm)	Share in World's resources (%)	Recoverable resources (tcm)	Recovera-ble so far (tcm)	Reservoir leftovers (tcm)	Share in World's resources %
Middle East	75.2	41.2	134.8	2.3	132.5	32.8
Eurasia	54.9	30.1	151.8	15.2	136.5	33.8
Pacific Asia	15.2	8.3	33.9	3.1	30.8	7.6
Africa	14.7	8.1	29.9	1.2	28.7	7.1
North America	9.5	5.2	68.8	36.6	32.2	8.0
Latin America	7.5	4.1	24.5	2.1	22.4	5.5
Europe	5.4	3.0	27	5.7	21.3	5.3
World	182.4	100	470.7	66.1	404.5	100

1 tcm = 10^{12} Sm^3 , 1 bcm=10^9 Sm^3, 1 mcm=10^6 Sm^3

Tab. 2 Gas reserves from unconventional sources. Source: IEA, 2009.

Region	Tight gas	Coal-bed methane (CBM)	Shale gas	Total
Middle East and North Africa	23	0	72	95
African countries south of Sahara	22	1	8	31
Former USSR	25	112	18	155
Asia – Pacific	51	49	174	274
Middle Asia and China	10	34	100	144
OECD Pacific	20	13	65	99
South Asia	6	1	0	7
Far Asia - Pacific	16	0	9	24
North America	39	85	109	233
Latin America	37	1	60	98
Europe (total)	12	8	16	35
East and Central Europe	2	3	1 (underrated)	7
West Europe	10	4	14	29
World	**210**	**256**	**456**	**921**

1 tcm = 10^{12} m^3 , 1bcm =10^9 m^3

Total unconventional gas resources considerably exceed gas resources from conventional sources nearly seven times, with the dominating role of the shale gas in the source rock (tab. 2).

Another evaluation of natural gas resources in unconventional sources has been made by Dong, Holditch et al. (2011) and repeated by Wilson (2012). It is also worth noting that there exists newest correlation between gas from conventional sources and hydrocarbon from unconventional ones, coal including. It shows a simple relation between Original Initial Gas in Place (OIGIP) from conventional and unconventional sources, shale gas including:

$$G_{CBM} = A \cdot G_c \quad (1)$$

where:

G_{CBM} – OIGIP coal-bed methane,
G_c– OIGIP coal beds.

$$G_{TG} = B \cdot G_g \quad (2)$$

where:

G_{TG} – OIGIP from low permeable reservoirs (tight gas),
G_g – OIGIP of natural gas from conventional sources.

$$G_{CBM} + G_{NGS} = C \cdot (G_{TG} + G_o + G_g) \quad (3)$$

where:

G_{NGS} – OIGIP of shale gas,
G_o – original initial oil in conventional reservoirs.

In place resources were calculated with probability calculus method and they were equal to 3590 tcm (P50) of World's natural gas in unconventional resources, i.e. nearly four times more than 1300 tcm (Roger, 1997). The P90 (exploitable) gas from unconventional resources was 2380 tcm. The total initial coal-bed methane resources are P50 231 tcm and P10 (exploitable) 37 tcm. The tight gas resources of P50 and P10 are 2500 tcm and 1400 tcm, respectively. Natural gas from shales is: P50 1420 tcm and P90-943 tcm, respectively. For Europe, the two shale gas category resources are: 63 tcm (P50) and 43 tcm (P90), respectively.

Gas industry development

Another important stimulator of natural gas production is a breaking-through technology of gas exploitation from unconventional sources, successfully implemented in the USA.

That gas production technology, improved over the last decade, is a central reference point for the American economy. Let's quote Dr. Guy Lewis (Gas Technology Institute) in the Wall Street Journal (2009): *Technology of shale gas exploitation looms as the biggest innovation in the energy industry of the decade. Others call this 'revolution'. Regardless the name, these are not new energy sources.* ***The technological novelty lies in the way 'unconventional' gas becomes exploitable locally and globally with the use of advanced technology capable of 'opening' rich energy sources***.

This quote shows how technological achievements can be perceived from the point of view of civilization changes (local access to gas resources, limiting of CO_2 emission). In the context of a general trend to partially refrain from the planned investment on the nuclear energy industry (or lower the investment rate) or classic coal-based energy industry it gives a clue as to the direction we should be heading, how the energy policy should be changed in the case of confirmed resources or technical and economic production.

Using geological and economic factors jointly as an adaptation of the existing technologies will decide about the development of energy sector in Poland. It cannot develop if the gas exploitation costs remain at a high level. In such a situation one can expect an energy breakthrough both in Poland and in Europe especially that Europe has not been interested in the technological development and is ready to pay a high price for the access to natural gas resources.

The situation looks different in the USA, where the development of production technology completely reversed trends with energy investments, mainly in relation with four times lower gas prices as compared to Europe's standards. The low energy price trends will stimulate the development of the American economy in the coming years, with special emphasis on rapid expansion of the 'energy-consuming' branches, apart from traditionally developed new information technologies.

In the context of hopes for full energy independence from neighbouring countries, we may ask a question of whether the gas madness in the USA over the last years can be implemented in the Europe's conditions, Poland in particular. Did not we have such a rush in the Silesia region in the 1990's when the annual production of coal-bed methane was assessed to 2 billion normal cubic meters? This time the expectations reached a higher level of tens billion cubic meters per year.

The expectations were rapidly chilled down by recent reports by PIG (2012) and USGS (2012). These reports are in a complete opposition to their predecessors EIA (2010), ARI (2009), Wood Mackenzie (2009).

However, it seems that estimations presented in these reports will be verified many times, regardless the fact that each of them was performed on the basis of other assumptions and data. The lack of real exploitation data complicates comparing those reports and reveals shakiness of data used.

Although every adult in Poland is familiar with the technology of shale gas exploitation, and every such person also has his viewpoint shaped by media or such films as, e.g. *Gasland*, it is still worth presenting the most characteristic elements of this technology:

1. Geological characterisation of unconventional resources.
2. Technology of drilling and fracturing.
3. Enhancing gas production, cleaning, processing and transport.
4. Issues related to the minimization of environmental impact.
5. Process economics and possible influence of technology on the sustainable development of country's economy.

Characteristics of shale gas rocks & natural gas from shale's

The origin of hydrocarbons is usually connected with the transformation of organic matter in definite thermodynamic conditions. This view is commonly encountered in modern science, though we should be aware that shallow natural gas resources may be of biogenic (bacterial) origin. Owing to the presence of methane in meteorites one cannot exclude the *inorganic theory of natural gas origin*. Further in the paper the authors will refer to the gas generated in thermogenic processes, among which are oil windows, gas-condensate and oil windows, related to the temperature of the process (and indirectly with depth).

Classic oil and gas reservoirs are mainly connected with the processes of hydrocarbon migration from source rock (where hydrocarbons were generated) to reservoir rocks with perfect or good hydromechanical properties (proper permeability and considerable porosity). Such classic reservoirs, deposited in the so-called *structural, lithofacial* or *tectonic traps* significantly differ from unconventional reservoirs. The latter usually has low or ultra-low permeability (usually below 0.1 md (10^{-16} m^2).

There can be distinguished four main types of unconventional gas reservoir (scheme of gas reservoir formation in fig. 1, classification of reservoirs after Halliburton in fig. 2, resources pyramid in fig. 3):

1. Gas in low-permeability reservoirs (from <0.1 to <0.001 md), deposited in pores

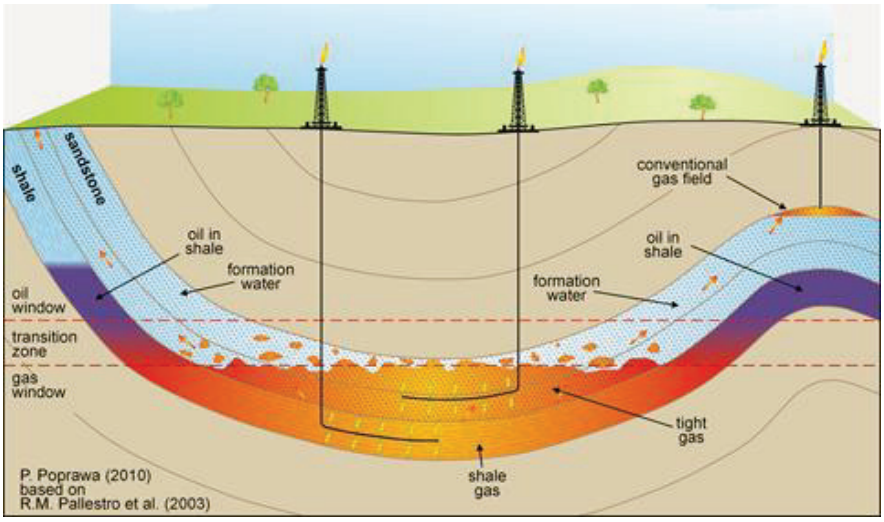

Figure 1. Scheme of natural gas formation in unconventional sources. Source: Poprawa, 2010.

with limited interconnections (*tight gas*).

2. Gas (methane) in coal beds, both as free gas in fractures and adsorbed (*coal-bed methane*).
3. Gas from clayey-mudstone rocks (*shale gas, natural gas from shales* (NGS).
4. Bounded gas in the form of hydrates – no efficient technology for its recovery is available now.

According to another classification, a number of other unconventional gas and oil reservoirs, can be distinguished: shale oil and oil shale, gas fields formed as a consequence of underground gasification, artificial reservoirs related to the biogas generation, natural gas fields in porous structures *permafrost*, reservoirs in very deep structures, gas dissolved in high-pressure hydrated horizons.

Something makes these reservoirs different from the classic ones, i.e. these gases cannot be extracted without additional operations, which artificially change the structure of the rock. Such unconventional gas reservoirs also differ from their classical counterparts in accumulation, as they are **dispersed over a large area** covering considerable geographic regions.

Another distinguishing property is the **necessity of drilling horizontal wells and multilevel fracturing of wells to obtain commercial-scale gas production.**

Among the best known such unconventional reservoirs in Poland are shale gas and coal-bed methane reservoirs, then undiscovered *tight gas* in the Rotliegendes strata in central Poland (Siemek & Nagy, 2012; Nagy & Siemek, 2011).

Organic matter generating hydrocarbons (oil, natural gas) is kerogen (insoluble). The ability to generate hydrocarbons depends on: oxygen to carbon in kerogen ratio as well as hydrogen to carbon ratio. The best properties refer to type-III kerogen, partly type-II kerogen within the *gaseous/gaseous-condensate window*, where natural gas is generated.

When assessing potential resources, there are also evaluated Total Organic Content (TOC) and vitrinite reflectance (the main component of kerogen) $R_{o.}$

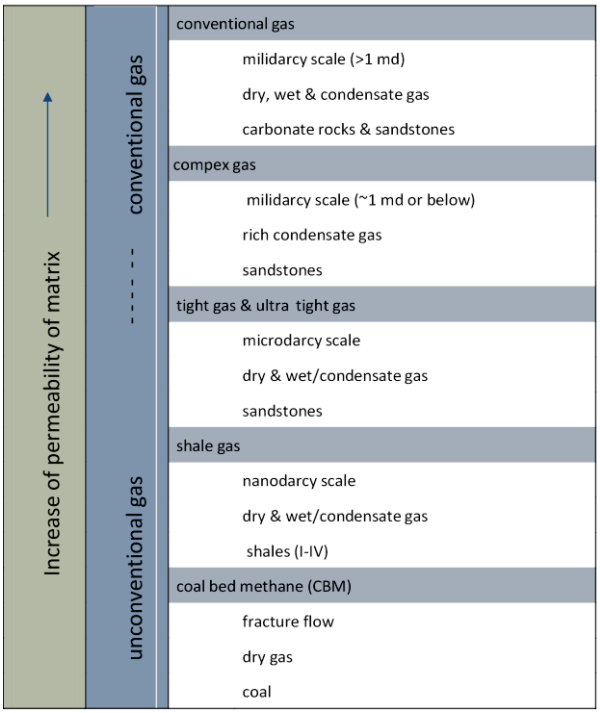

Figure 2. Conventional and unconventional resources. Classification after Halliburton.

It has been assumed that shales containing over 1-2% TOC have enough gas and are exploitable. The best shales may reach up to 12% TOC. Apart from the mentioned properties, it is also other reservoir parameters which are indicated: porosity coefficient >4%, permeability coefficient >100 nanodarcy ($>10^{-19}$ m^2), vitrinite reflectance R_o > 1.3-1.5%.

Shale rocks hosting natural gas are typically very thick and regionally extended, with no visibly developed insulating layers and structural traps, no

distinct gas-water contour, though water can be present in 75-80% of saturation, a natural system of fractures occurs in the reservoir, though the rock matrix has very low-permeability.

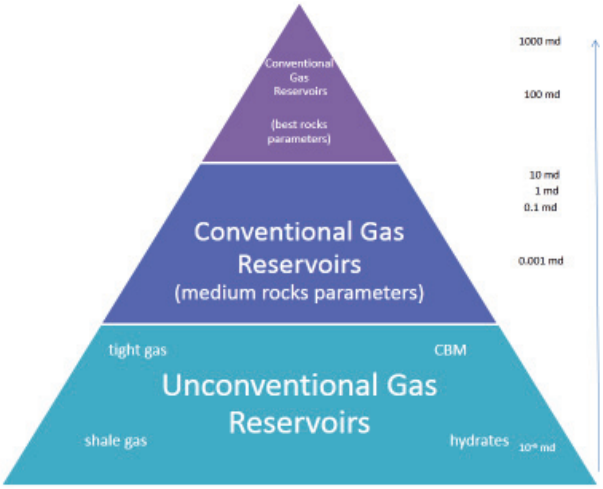

Figure 3. Classic pyramid of unconventional and conventional gas sources. Source: EIA SP, 2011, mod.

Table 3. List of basic parameters typical of selected sedimentary basic. Various sources.

	Poland		
	Baltic Basin	Podlasie Lowland	Lublin Region
Age [million years]	420–445	420–445	420–445
Top [m]	2500–4500	2000–3500	2000–5000
Total thickness [m]	<600	< 120	< 120
TOC [%]	1–4	1.5–6 (<20)	1–3
Ro [%]	1.3 – 2.5	0.8 – 3	0.8 – 5
Kerogen (type)	II	II	II

	USA	
	Barnett	Marcellus
Age [million years]	340	385
Top [m]	2300	2150
Total thickness [m]	90	105
TOC [%]	4.5	3.3
Ro [%]	2	1.3
Kerogen (type)	II	II and III

	Canada
	Horn River
Age [million years]	370
Top [m]	2700
Total thickness [m]	140
TOC [%]	3.0
Ro [%]	2.5
Kerogen (type)	II

Three main basins exist in Poland: Pomerania (Baltic), Podlasie and Lublin basins. Some parameters of selected shale basins in Poland and North America are presented in tab. 3. The characteristic areas where shale resources occur in Poland and Europe are visualized in figs. 4 and 5.

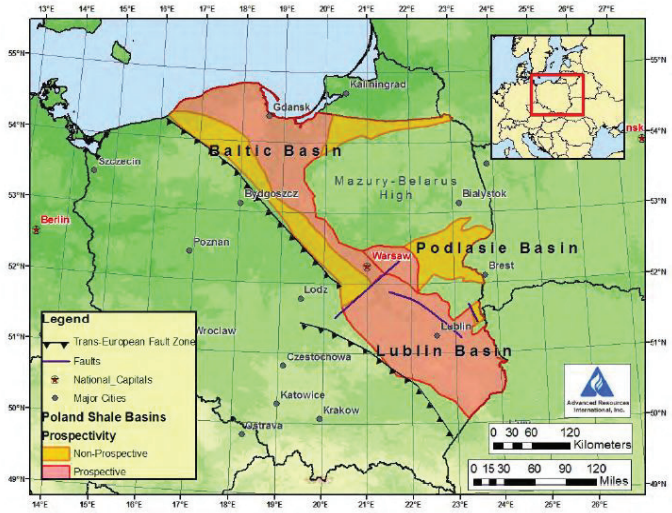

Figure 4. Main areas of gas production from unconventional reservoirs. Source: EIA, 2011.

Advanced drilling technology of horizontal wells

Gas exploitation must be preceded by drilling the wells. By the half of the last decade vertical wells prevailed, though for the last five years mainly horizontal wells have been mostly used. Horizontal wells are drilled perpendicular to the existing network of fractures in the shale deposits. The drilling operations are followed by multistage fracturing. Fracturing operations generate fractures along the well (perpendicular to the horizontal well axis). They increase the surface of contact with shales thus stimulating gas flux. The formed fractures propagate to over 300 m distance from the well (Davies, 2012). The vertical range of penetration usually does not exceed 200 m (up and down from the fractures layer) (Shale Gas Primer, 2009; Davies, 2012).

The environmental issue connected with limiting the space occupied by drilling has been solved since 2007. This is one of the subjects frequently discussed in the press in relation to prior technologies used for gas exploitation of *shallow* shale resources, mainly in Texas and Marcellus Field (Shale Gas Primer, 2009).

The present technologies offer the possibility of drilling up to 32 wells from one site, which is both economic in view of leasing the site, access to the drilling place, rigs, mud circulation systems, fracturing systems, post fracturing cleaning systems, etc. Moreover, the wells can be connected with the collector and transport pipelines faster and cheaper.

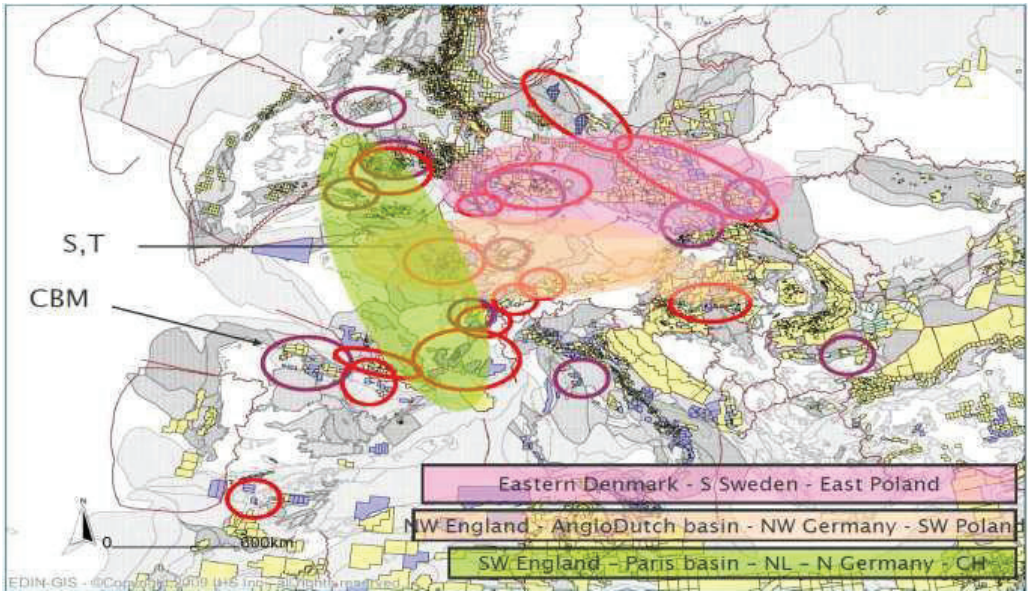

Figure 5. Main basins of shale gas presence in Europe. Source: EDIN-GIS HIS CERA, 2010 after Kuhn & Umbach, 2011.

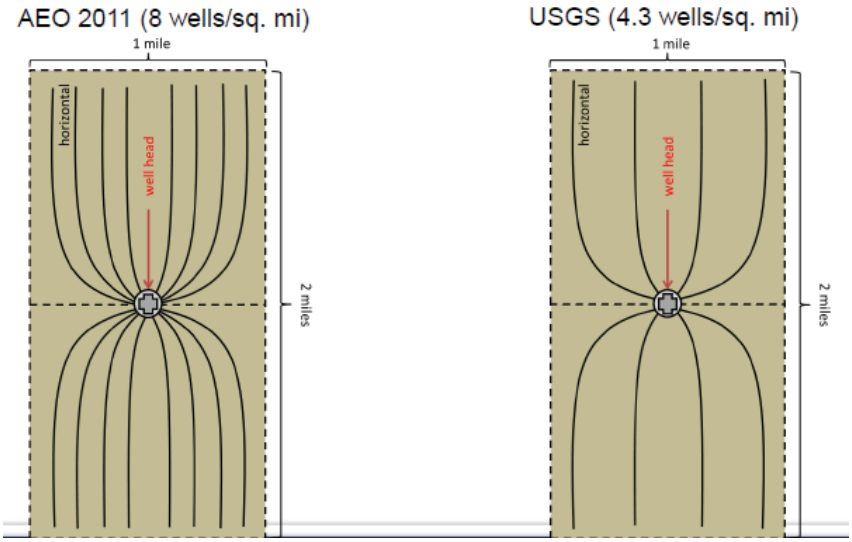

Figure 4. Example of different classification systems of gas production by EIA and USGSS: density of wells. Source: Krupnick, 2012.

Efficiency of hydraulic fracturing

Stimulation of the well increasing low permeability of the reservoir, lies in hydraulic fracturing and the formation of a grid of fractures. A low-viscosity fluid is injected to the well under a high pressure with higher rate that it is expected to flow. The hydraulic resistivity related to the flow in the rock formation increases, the pressure in the well grows above the fracturing pressure making the rock matrix break up and form a fracture or a network of fractures. Most commonly a vertical fracture is formed in two opposite directions, perpendicular to the well axis (Valko, 2009). *Wings* of the fractures are usually symmetrical if the fracturing is performed in the sandstones. In the *shale gas*/CBM reservoirs a system of fractures can be formed in the existing natural tiny fractures.

The important factor stimulating origin of fracture formation is the presence of silica or carbonates in the clayey rocks. The fracture can be protected against its closing by *proppant*. Some literature analysis reveals that the efficiency of the simulation can be increased by another distribution of fractures, formed by orthogonal positioning of natural and artificial fractures. Fracturing od shale gas is usually performed with the use of slickwater-type fracturing fluid (classic fracturing fluids are composed of four types of fluid: water-based, foam, hydrocarbons and recently also propane (LPG) (Shale Gas Primer, 2009; WEO SP, 2012). *Slickwater* covers water with drag reducing agents – substances for the increase of pumping velocity above

9 m^3/min. The pumping rate of such a solution may be even 15 m^3/min. It is assumed in the process that friction is maximally lowered, usually with the use of polyacrylic gels. The biocides, surfactants and inhibitors of mineral precipitation are also elements of slickwater. The biocides fight against living organisms, which may limit the flow. Methanol and naphtalene can be used as biocides. Hydrochloric acid and ethylene glycol can be used as scale inhibitors. Butanol and ethylene glycol, monobutyl ether are used as surfactants. Substitutes of these chemicals also can be used.

All those additives make on the whole about 1% of the slickwater. The present substances are commonly used in households and kitchen (*green additives*).

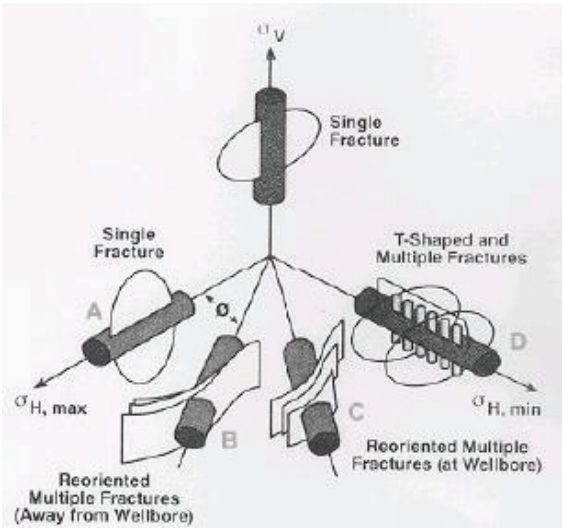

Figure 5a. Formation of fractures in vertical and horizontal well, depending on the distribution of stresses and location of the well. Source: Valkó, 2009.

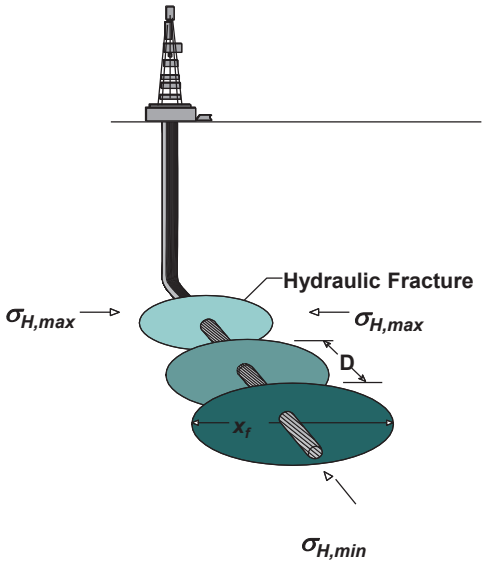

Figure 7b. Example formation of fractures perpendicular to the well axis. Source: Valkó, 2009.

The *slickwater* technology usually makes use of a greater quantity of water than the mixture, i.e. from 4 000 m^3 to 20,000 m^3 for fracturing in one well. This quantity will be lowered with the introduction of new technologies (King, 2012). Other chemical compositions used in the past were, e.g.: benzene, chromium. Those components are toxic and it was feared that they could potentially contaminate the water. At present they are hardly ever used in the fracturing operations on behalf of friendly chemistry (*green additives*), known from chemicals used in food industry (King, 2012; Shale Gas Primer, 2009).

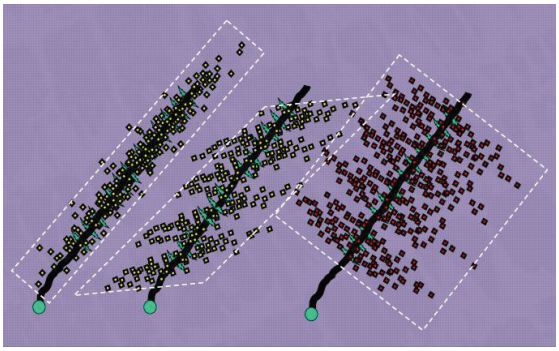

Figure 6. Grid of fractures around horizontal wells. Source: Mayerhofer et al., 2008.

Along with the fracturing fluid, the *proppant* is injected, i.e. backfilling, granulated sand or ceramic granules preventing against closing of the fracture wings. The main technological problem is transportation and maintaining *proppant* within the formed fracture, also above the area of maximum obtuseness.

Gas flow in shale rocks and fractures

Gas flows in shales through a system of nanopores connected with micropores. Gas desorption and diffusion in kerogen take place to the surface of contact with nanopores. The surface of desorption from nanopores is inversely proportional to the diameter of the nanopores d:

$$\left(S \sim \frac{4}{d}\right).$$

The scale of the phenomena accompanying shale gas exploitation can be classified in the following way:

- macro scale → gas flow to well;
- mezzo scale → flow in microspores, bigger pores and microfractures;
- micro scale → flow in nanopores with constant diffusion coefficient;
- nano scale → gas desorption from nanopore walls;
- molecular scale → gas diffusion in organic source matter (kerogen).

Each preceding type of flow or gas transport disturbs the thermodynamic equilibrium resulting in a successive flow. The flow in micropores and pores

is described by the Navier-Stokes equation, and more precisely by the Darcy's Law being also a variation of the equation of motion. In nanopores we have gas flow with *a slide* on nanopore walls and molecular flow. These are completely different boundary conditions than those in Navier-Stokes problems, i.e. velocity of fluid particles on the walls is not equal to zero. The Knudsen number decides about the type of flow:

$$K_n = \frac{\lambda}{d} \quad (4)$$

and:

λ – is defined as a mean free way of gaseous molecules (determined from Boltzman's statistics) – reversely proportional to gas pressure;

d – diameter of nanopores

For Kn < 0.001 we have *continuum* fluid flow applicable to the Darcy's Law, d from 1 to 50 μm. For Kn: 0.001 < Kn < 1 the flow with *a slip*, d from 10 to 300 nm (1 nm = 10^{-9}m).

It can also be noted that methane flow in the coal beds is to a certain extent similar to the gas flow in shales, which also partly contain adsorbed gas.

The negative aspect of fracturing and other potential environmental hazards associated with shale gas exploitation

Most of media-generated information describing the usage of chemicals is based on data from the first operations performed in the year 2002 to 2007 (Shale Gas Primer, 2009). Meanwhile, the World keeps changing, also thanks to the activity of pro-ecologists fighting against nuclear energy (after the catastrophe in Chernobyl and Fukushima), coal-based energy (high CO_2 emission), coal degassing energy, etc. At present the environmental hazards are much lower than 5 to 10 years ago (King, 2012).

The basic documented cases encountered during drilling and gas production from unconventional sources in the USA are listed below in a table (MIT, 2011). From among 43 cases statistically analysed in 2006-2010, about 50% were contaminations of groundwater (gas migration to water), being a result of drilling operations. Such events may take place as a consequence of insufficiently protected columns cutting off groundwater fluxes and natural gas migration to the wells. Most of the observed cases in the report were related to coal-bed methane. Another environmental hazard was connected with leakages and contamination of oil products on the surface in the drilling site. No case of direct contamination of groundwater was observed in the process of fracturing (a case so called *Pavillon* in Wyoming is still being analysed by EPA (EPA, 2011). Such incidents reveal that in the process of drilling and gas exploitation some problems with the integrity of the protection system, especially in the case of shallow gas reservoirs, i.e. below 500 m bts, can be expected. The geological conditions in Poland are different; gas shales are deposited in deeper horizons, which may imply that such problems are just of theoretical character. The supervision of drilling operations by the State Mining Authority and General Department of Environmental Protection seems to be sufficient in this case.

Table 4. List of incidents related to exploitation of unconventional gas from classic reservoirs in 2006-2010 in the USA. Source: MIT, 2011.

Event	Number	%
Gas flow to groundwater	20	47%
Contamination of drilling site	14	33%
Problem with discharge of post-fracturing waste water	4	9%
Problems related to water intaking for fracturing	2	4%
Air pollution	1	2%
Gaseous eruptions in well	2	4%

The discussed cases should be juxtaposed with an immense number of gas wells drilled in the USA – tens of thousands each year. As a result we see that the influence of this type of environmental incidents is generally small. Obviously attention should be always paid to all environmental impacts as they may indirectly, to some minimal extent affect human health.

Hypothetical and real hazards associated with development of exploitation industry

Is exploitation of gas from these reservoirs also environmentally hazardous? Will economic conditions of gas exploitation, transport and sales be attractive to the investors? Will the economic, social and political atmosphere be favorable? What are the feasible directions and rate of development of this sector? These are the most important questions asked by investors and potential gas users in the energy sector. Basically, five main stages of construing unconventional gas sector can be distinguished (fig. 9):

1. Geological and geophysical exploration, test drillings. Geological risk. Resources.
2. Pilot drilling, profitability analysis of drilling, working out economic scenarios.
3. Making infrastructure, market analyses, long-term strategy of transportation and gas distribution.
4. Commercial drilling, starting up commercial production, creating new gas market.

Geological exploration

Geological recognition is a complex and long-lasting investigation process. One of its most important elements is the so-called *zero geological*

risk (see fig. 10). As the geological risk is determined in the course of gas prospecting operations as certainty/uncertainty of gas/hydrocarbon presence, it is usually the shales for which *certainty* is noted in the sedimentary basin analysis. No such certainty exists for *tight* gas reservoirs, which constitute a considerable resource potential, but which more difficult to spot, recognize and manage. Additional information about state of recognition of Polish shale gas resources PIG (2012) & EIA (2011).

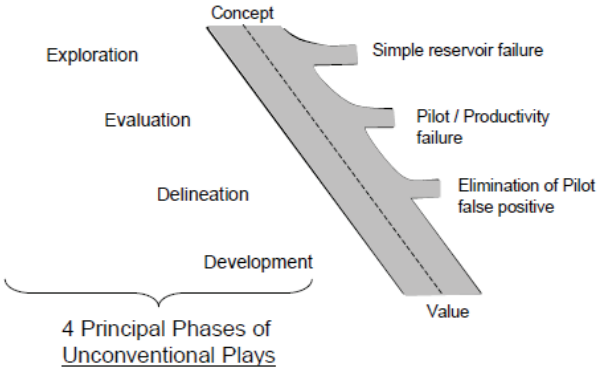

Figure 7. Main stages of development of gas engineering sector related to with gas production from unconventional sources. Source: Haskett, 2005.

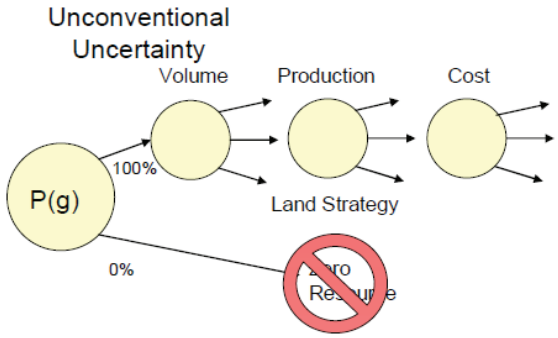

Figure 8. Risk and uncertainty related the formation exploitation and formation of gas market based on unconventional sources (zero geological risk).

Shale gas resources have not been clearly determined. They may differ in magnitude because of the available data, assumed methodology and simplifications. In March 2012 the Polish Geological Institute announced its results (PIG, 2012). They are much lower than the ones given so far. Even lower values were obtained by the USGS (2012). In 2009 the company Wood Mackenzie (Wood Mackenzie, 2009) estimated exploitable (beyond-balance) resources for 1400 billion m^3, whereas the Advanced Research Institute for 3000 billion m^3. According to the report from the US Energy Information Agency (EIA, 2011) performed by the Advanced Research Institute, the resources amount to 5300 billion m^3. Using the evaluation classic method, the company NSAI, with its seat in Houston (main auditor: C.H. (Scott) Rees III), predicted gas in place (within six concessions of company 3Legs Resources PLC – for Lane Energy Poland) for 5.1 to 5.5 billion m^3. NSAI assumed other, lower TOC values in its reports (accepted by exploitation companies). If the recovery factor remains at a level of 15 to 20%, the production in the concession area may be ca. 760-860 billion m^3 if the project is profitable (3Legs, 2011). Lane Energy does not give its figures for recoverable as the company has not started its exploitation yet.

Shale gas production potential and pilot exploration of unconventional sources

No pilot exploitation stage has been implemented in Poland yet. A few companies announced that they would start up production in two years' time, but this has to be treated with caution. Why? No serious company starts its activity without thorough economic analyses. Presently this is not possible because of the state of the art. The success in shale oil production is conditioned by technical possibilities in the context of applied technology of drilling, fracturing and petrophysical properties of rocks (65%), operating costs of gas production (15%) and performing the well (15%).

Can the pilot stage of gas development be omitted in Poland? Certainly not. This, however, will be a high economic risk activity, which can afford only companies which have their *energy safety* objective. The risk connected with such activities should be accepted by the company's main shareholders.

No pilot project of gas exploitation has been implemented in Poland yet and quite possible that they will certainly vary from the American ones. Only after making a sufficient number of pilot (exploitation) wells, e.g. 20 to 25 the economic feasibility of production in the entire basin can be determined. The most important is evaluation of average recoverable per one horizontal well (EUR); in the USA they are 30 to 140 mcm depending on geology and technology applied to the wells. The total estimated gas production from one well (EUR) is very important. The American experience reveals that a vertical well may yield maximum 60 to 70 mcm of gas over the total period of exploitation (King, 2012), and as much as 140 mcm from a horizontal one.

No possible assumptions are known as far as the length of the horizontal section, fracturing procedures in a new horizontal section or distance between wells go, which means that the *stimulated* zone of the well, i.e. volume of reservoir with artificially increased permeability cannot be determined. At present the volume of the stimulated zone increases gradually as new technologies are implemented. The American data prompt a conclusion that 35 to 45% of gas in place can be produced, which can soon be increased even to 55% with simultaneous reduction of the environmental impact (King, 2012). The relation between new technologies and the cost of gas production still remains

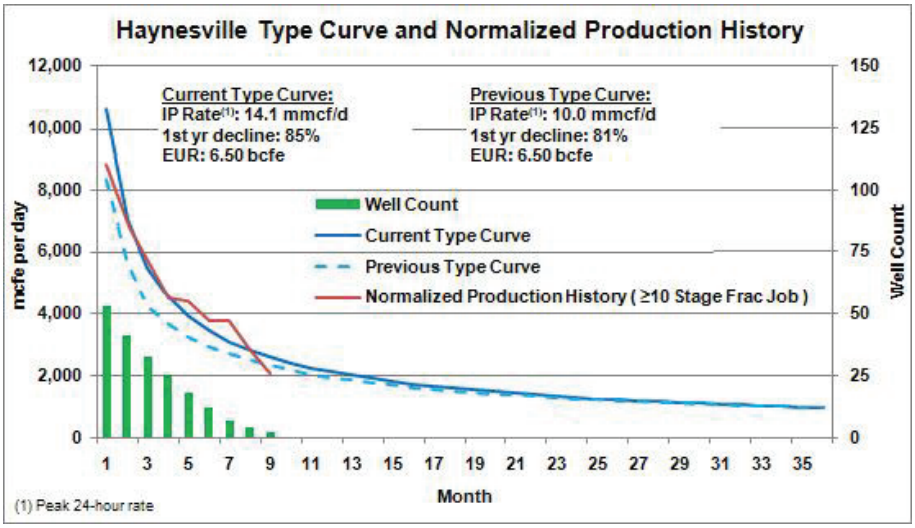

Figure 9. Influence of fracturing technology and exemplary decline curve of production at Haynesville gas field. Source: Chesapeake, 2009.

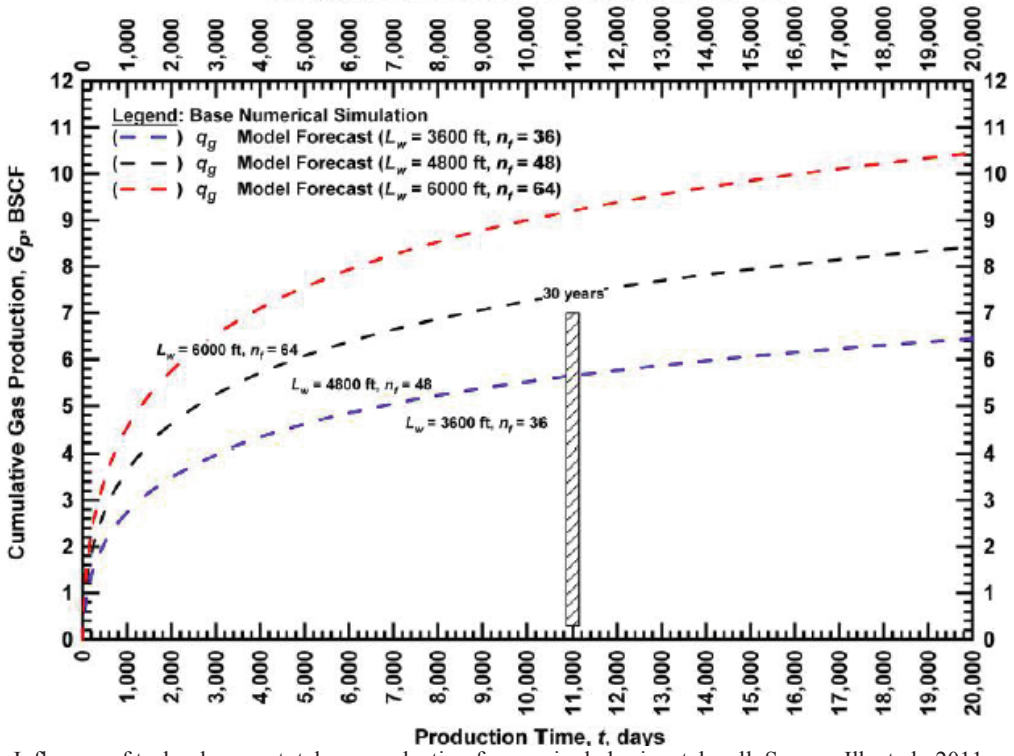

Figure 10. Influence of technology on total gas production from a single horizontal well. Source: Ilk et al., 2011.

unclear. The characteristic decline curves for one well at gas field Heynesville are shown in fig. 11, and the influence of fracturing technology on cumulative gas production in a well in fig. 12 (Ilk et. al., 2011).

The economic success will be conditioned by optimization of costs of drilling and increasing efficiency of fracturing. According to the author, these two elements need to be solved first. Some failures can be expected when developing the field: bad fracturing, drilling break-downs, unfavourable geological setting, etc. Depending on business, political, social and geological conditions a few different scenarios can be seen by the year 2025. Four basic ones can be distinguished among them: optimistic, sustained (classic), sustained (pessimistic) and entirely pessimistic. Assumptions for those four scenarios are as follows:

1. Optimistic (rather unrealistic) scenario – simplified procedures, inflow of capital, accelerated investment for infrastructure, no objections, good simulation results, good exploitation parameters, low cost of drilling, fully accessible technologies, own research programs, reduced taxes (low production tax), the high profitability of investments.
2. Sustained (classic) scenario – delays related to environmental procedures, mediocre success in

Table 5. Example of development of shale gas exploitation for predefined number of drillings (from 150 to 290 wells yearly) (in mcm). The last slot gives the total annual gas production (in mcm). The analysis based on selected production profiles at the field Marcellus. Scenario No. 3a: sustained (pessimistic). Source: Chesapeake, 2009.

Number of wells drilled each year	Assessed (exemplary) gas exploitation in years (mcm)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
150	2114	1010	800	678	619	582	570	542	514	489
200	0	2818	1347	1067	904	825	775	760	722	686
250	0	0	3523	1684	1333	1129	1031	969	950	903
260	0	0	0	3664	1751	1387	1175	1072	1008	988
270	0	0	0	0	3805	1819	1440	1220	1113	1047
270	0	0	0	0	0	3805	1819	1440	1220	1113
290	0	0	0	0	0	0	4087	1953	1547	1310
200	0	0	0	0	0	0	0	2818	1347	1067
200	0	0	0	0	0	0	0	0	2818	1347
200	0	0	0	0	0	0	0	0	0	2818
Total production (mcm)	2114	3829	5670	7092	8411	9546	10896	10774	11240	11767

Table 6. Example of development of annual shale gas production for predefined number of drillings (from 60 to 240 wells) (in mcm). The last slot gives the total annual gas production (in mcm). The analysis based on selected production profiles at the field Marcellus. Scenario No. 3a: sustained (pessimistic) – very slow drilling rate (Chesapeake, 2009).

Number of wells drilled each year	Gas exploitation (mcm) – successive years from the beginning of									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
60	845	404	320	271	247	233	228	217	206	195
80	0	1127	539	427	361	330	310	304	289	274
100	0	0	1409	674	533	452	412	388	380	361
120	0	0	0	1691	808	640	542	495	465	456
140	0	0	0	0	1973	943	747	632	577	543
160	0	0	0	0	0	2255	1078	853	723	660
180	0	0	0	0	0	0	2536	1213	960	813
200	0	0	0	0	0	0	0	2818	1347	1067
220	0	0	0	0	0	0	0	0	3100	1482
240	0	0	0	0	0	0	0	0	0	3382
Production in every year (mcm)	845	1531	2268	3062	3923	4852	5854	6920	8047	9233
Total gas production (mcm)	845	2377	4645	7707	11631	16483	22336	29256	37303	46536

Table 7. Probable/assessable periods for proper gas production. Source: Authors' own work.

Scenario	Recognition of basins	Making pilot production	Decision about production start-up	Obtaining annual gas production of 10 billion Sm^3	Possible cost of gas production (USD/thousand Sm^3)
Optimistic scenario	2012-2015	2013-2016?	2015/16?	2021/2023?	<210?
Sustained scenario no. 1	2012-2016	2014-2018?	2018?	2023/2026?	<260?
Sustained scenario no. 2 (pessimistic)	2012-2017	2014-2019?	2019?	2026/2032?	<300?
Pessimistic scenario	2012-2017	2015?	?	?	?

stimulation of wells, no support for home research programs, mediocre profitability (mean initial efficiency) of production, lowering of Russian gas prices.

3. Sustained (pessimistic) scenario – delayed environmental procedures, delays in making infrastructure, competitive prices of Russian gas.
4. The pessimistic scenario – withdrawal of the most important investors from Poland, no capital support for Polish companies, ecological obstacles blocking gas exploitation in Europe, maximum lowering of Russian gas prices.

Depending on the conditions, the development of particular scenarios will determine the start-up of commercial exploitation of shale reservoirs now or in the coming decade (tab. 7).

Conclusions

1. Geological setting which has not been fully recognized may hinder proceeding to the commercial stage of production without in-between stage of making pilot centre's where the efficiency of stimulation or cost of drilling and gas production can be optimized.

2. Restrictive environmental regulations, great number of protected areas and objects, negative opinions of local administration, bad organized logistics of supplies, hindered access to water resources may considerably lower the rate of industrial development.
3. New ecological technological solutions applied mainly in the USA show that technologies may be adjusted to local geological in Europe and Asia.
4. Challenges for technological development: high cost (cost and number of wells, the magnitude of the mine); infrastructure needed for gas transport and distribution, which should be made earlier when the commercial gas production is still uncertain; cost of the proper technologies.
5. The rate of industrial development will be also conditioned by the uncertain level of natural gas prices and possible instabilities in the market (type of contracts) – development of gas industry based on unconventional sources waits for strong support on the part of political, business and local authorities.
6. No additional taxes can be now levied on industry owing to considerable uncertainty in the conditions of production. In the initial period tax preferences should be introduced for companies in this sector, analogous to the USA in the 1990's.

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Renewable Energy and Socio-economic Development in the European Union

Energia odnawialna i rozwój społeczno-ekonomiczny Unii Europejskiej

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Abstract
The main objectives of the manuscript are the monitoring and measurement of economic and social development, as well as assessment of renewable energy development in EU countries from the perspective of sustainable development. EU STRATEGY 2020 has basic objectives related to energy development, which implies significant changes in overall development. Energy exploitation represents significant factor of economic, environmental and social development in separate countries, as in EU as a whole. The article will present sample methodology for energy strategy assessment, through analysis of basic economic, social and environmental indicators in EU27 countries. This research includes *inter alia* analysis of energy production in the EU27 countries, energy import dependency, quantity of pollution as result of energy production and consumption, and human development index (HDI). The countries with the greatest values of Total GDP (eg. Germany, France, United Kingdom and Italy) are positioned in the first ten countries in the total emission of CO_2, SO_x and NO_x. The leading countries in the values of GDP *per capita* (eg. Luxemburg, Denmark, Sweden and Netherlands) have the middle values of pollution as result of energy production and consumption, except Luxemburg which is at the leading place. The relation between energy export and energy import in EU27 region reflects energy dependency in EU27 region and represents essential energy related problem. The country with the best export-import ratio is Denmark.

Key words: energy strategy, EU27, measurement, monitoring, RES production

Streszczenie
W artykule dokonano oceny wpływu rozwoju energetyki opartej na odnawialnych źródłach energii (OZE) na systemy ekonomiczny i społeczny, prowadząc dyskusję z perspektywy koncepcji rozwoju zrównoważonego. Strategia rozwoju UE do 2020 r. wyznaczyła cele odnoszące się do sektora energetycznego, których realizacja oznacza także zmiany na płaszczyźnie ogólnorozwojowej. Pozyskiwanie energii to jeden z najbardziej istotnych czynników rozwoju zrównoważonego tak w kontekście poszczególnych krajów, jak i całej Unii Europejskiej.
W artykule przedstawiono przykładową metodologię oceny strategii energetycznych, uwzględniającą analizę podstawowych wskaźników ekonomicznych, społecznych i środowiskowych odnoszących się do 27 krajów UE. Przeprowadzone badania uwzględniają m.in. produkcję energii, poziom zależności od importu energii, poziom zanieczyszczenia środowiska, będący rezultatem produkcji energii i jej konsumpcji, a także wskaźnik rozwoju społecznego (HDI – Human Development Index). Kraje z największymi wartościami całkowitego PKB (Niemcy, Francja, Wielka Brytania, Włochy) należą zarazem do grupy dziesięciu krajów w największym stopniu odpowiedzialnych za emisje CO_2, SO_x i NO_x. Kraje o największych wartościach PKP *per capita* (Luksemburg, Dania, Szwecja, Holandia) charakteryzuje średnia emisja zanieczyszczeń pochodzących z produkcji i konsumpcji energii, z wyjątkiem Luksemburga, który znalazł się wśród liderów. Stosunek eksportu energii do jej importu

w krajach UE27 odzwierciedla zależność energetyczną krajów UE27, będącą szczególnym wyzwaniem dla rozwoju sektora energetycznego. Obecnie krajem o najlepszej relacji exportu do importu energii jest w Europie Dania.

Słowa kluczowe: strategia energetyczna, EU27, pomiar, monitoring, produkcja OZE

Introduction

Renewable sources of energy are in line with an overall strategy of sustainable development. They help reduce the dependence of energy imports, or do not create a dependence of energy imports, thereby ensuring a sustainable security of supply (Udo, Pawlowski, 2011). Furthermore renewable energy sources can help improve the competitiveness of industries at least in the long run and have a positive impact on regional development and employment. Renewable energy technologies are suitable for off-grid services, serving those in remote areas of the world without having to build or extend expensive and complicated grid infrastructure.

The European renewable energy industry has already reached an annual turnover of €10 billion and employs 200,000 people. Europe is the global leader and the front runner in renewable energy technologies. The use of renewable has a considerable impact on the investments made in the energy sector (Michalowski, 2011). Renewable energy replaces imported fuels, with beneficial effects on the balance of payments. Although per unit of installed capacity renewable energy technology is more capital intensive, taking in account the avoided external costs, investing in renewable turns out to be cheaper for society than businesses investments in conventional energy. Renewable energy technologies are often of a smaller scale than big fossil fuel and nuclear projects, they can be brought on-line quickly and with lower risks. And finally, deployment of renewable creates more employment, compared to other energy technologies (Munitlak, Ivanović et al., 2009).

The basic indicators of sustainable development represent a very useful and quality way formeasuring and monitoring the state of sustainable development, as in every country individually so as in the regions and globally as a whole (Radojicic et al., 2011). Values of the indicators of all four subsystems in observed countries are within expectation (Golušin, Munitlak, Ivanović, 2009). Also the current level of development of every country separately is taken into account and in accordance to that it is defined the current position of any country in respect to its international requests (Golušin et al., 2011).

Sustainable development is essentially about improving quality of life in a way that can be sustained, economically and environmentally, over the long term supported by the institutional structure of the country. For this reason, sustainable development addresses four major dimensions: social, economic, environmental and institutional. The indicators are divided into three dimensions: social, economic and environmental; institutional questions are largely considered to be responses and not readily quantified as indicators. Although a sound institutional structure is essential for an efficient and reliable energy system, indicators to reflect this institutional dimension are still being developed and may be incorporated into the EISD (Energy Indicators for Sustainable Development) at a later stage. Availability of energy has a direct impact on poverty, employment opportunities, education, demographic transition, indoor pollution and health, and has gender- and age-related implications. In rich countries, energy for lighting, heating and cooking is available at the flip of a switch. The energy is clean, safe, reliable and affordable. Until recently, sustainable development was perceived as an essentially environmental issue, concerning the integration of environmental concerns into economic decision-making.

In the European Union, renewable have already reached a significant share of the total energy production. Germany, for example, has doubled its renewable output in the past five years to 8% of total electricity production (Hoedl, 2011). Denmark now gets 18 % of its electricity from wind power alone, and has created an industry that has more jobs than the electricity sector itself. Spain has leapt from virtually nothing a few years ago to become the second biggest wind power country in Europe with 6,000 MW of capacity. Countries such as Finland, Sweden and Austria have supported the development of very successful modern biomass power and heating industries through fiscal policies, sustained R&D support and synergistic forestry and industrial policies. As well as saving significant CO_2 emissions, equipment from all three countries is now exported world-wide (Akella et al., 2009).

Renewables offer sustainable development world-wide

Energy is central to concerns about sustainable development and poverty reduction. It affects practically all aspects of social and economic development, including livelihoods, water, agriculture, population, health, education, job creation, and gender-related issues. In developing countries, *per capita* energy consumption is one sixth of the energy consumption in the industrialized countries. The majority of citizens of the least developed countries (LDC) have no access to electricity at all. In total

there are more than 2 billion people on earth living without electricity supply. At the same time, current patterns of energy production and consumption have direct negative impacts on the environment and natural resources at the local, regional and global levels. Energy demand in developing countries is growing rapidly. In order to meet this demand and at the same time to achieve sustainable development objectives on a global scale, conventional approaches to energy must be reoriented toward energy systems based on renewable energy and energy efficiency, which will make it possible to address social, economic, and environmental concerns simultaneously (Kronenberg, 2011). Due to their decentralized character, renewables offer quick solutions without investments in large scale energy supply structures and networks (Peric and Duran, 2010).

As part of the *Kyoto protocol*, the Clean Development Mechanism (CDM) aims to encourage sustainable development projects in developing countries funded by industrialized countries. In line with the European strategy for global sustainability, the European Union is committed to fostering the market growth of renewable energy sources in developing countries (Duran, 2011).

Another area of government involvement in fossil-fuel production is investment in research and development (R&D). In 2008, the IEA reports that total government expenditure on R&D related to fossil fuels amounted to almost US$ 1.7 billion. Included under this category of expenditure is R&D related to enhanced oil and gas production; unconventional oil and gas production; refining, transport and storage of oil and gas; oil, gas and coal combustion; and oil, coal and gas conversion. G-20 member economies account for the bulk of this expenditure. Also included in this category is expenditure on the capture and storage of carbon emissions from combustion, which has increased steadily in recent years. Carbon, capture and storage (CCS) facilitates consumption of combustible fuels, including fossil fuels, but is intended to reduce release to the atmosphere of CO_2 emissions associated with such combustion. Should subsidies' phase-out be justified on the ground of climate change mitigation, the provisions, including the principles of equity and common but differentiated responsibilities of the UNFCCC, should apply.

Effective monitoring and reporting

Monitoring, transparency and reporting will be essential elements in progressively developing an effective European energy policy. The Commission proposes to establish an Office of the Energy Observatory within the Directorate General for Energy and Transport. This Office should undertake core functions regarding Europe's energy demand and supply, notably increasing transparency regarding the future investment needs in the EU for electricity and gas infrastructure and generation facilities and, via benchmarking and the exchange of best practice, the success of Member States in ensuring that their energy mix evolves in a manner that contributes effectively to the EU's energy goals. The Commission will set out the specific responsibilities of the Observatory and propose in 2007 a legal base for financing its activities. In doing so it will examine and streamline existing energy related information and reporting obligations upon the Commission and Member States.

Economic and social development

During the economic downturn of 2000 to 2003, the share of total investment in GDP fell to a low of 19.4 %, due to the slower development of business investment. Since 2003, total investment spending has been steadily rising at a higher rate than GDP as a consequence of expanded business spending fuelled by favorable economic conditions, resulting in an investment rate of 21.3 % in 2007. This amount is 0.7 percentage points higher than in the previous cyclical peak of 2000. As the share of public investment in GDP has remained stable since 2000 at around 2.4 %, it is mainly business investment which has made the difference in influencing total investment. Not surprisingly, in the light of the current economic crisis and because investment spending is typically a strongly cyclical and volatile component of GDP growth, forecasts for the future show a considerable cutback in total investment. In order to anti cyclically compensate for the foreseeable decline in business investment, cohesion policy, which is aimed at strengthening public investment, especially in the economically least developed region, has been re-emphasised in the *European Economic Recovery Plan*. The envisaged measures are intended to stimulate private investment and consumption by restoring business and consumer confidence in the economy.

Reducing regional disparities within countries is an important goal of the EU and an objective of the *EU Sustainable Development Strategy*, which aims for *a high level of social and territorial cohesion at EU level and in the Member States as well as respect for cultural diversity*. The Agenda 2000 reform of the Structural Funds focuses on three priority objectives, of which Objective 1 promotes the catching-up of the economies of regions whose development is lagging behind. This convergence objective addresses NUTS2 regions whose GDP *per capita* is less than 75 % of the Community average. Comparing developments in regional disparities in NUTS2 and NUTS3 level it can be concluded that while disparities decreased in the former they increased in the latter. Therefore, although the cohesion policy of the EU is delivering results, the trends are less favourable for smaller regions.

Figure 1. Dispersion of regional GDP per inhabitant (%). Source: Eurostat (tsdec220).

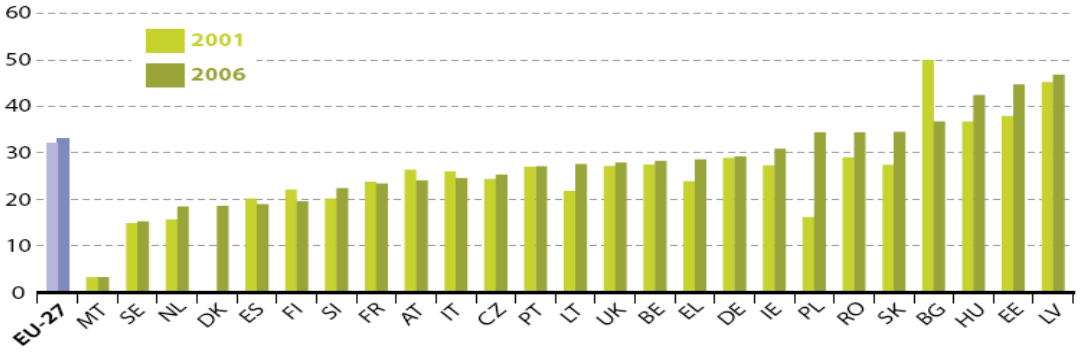
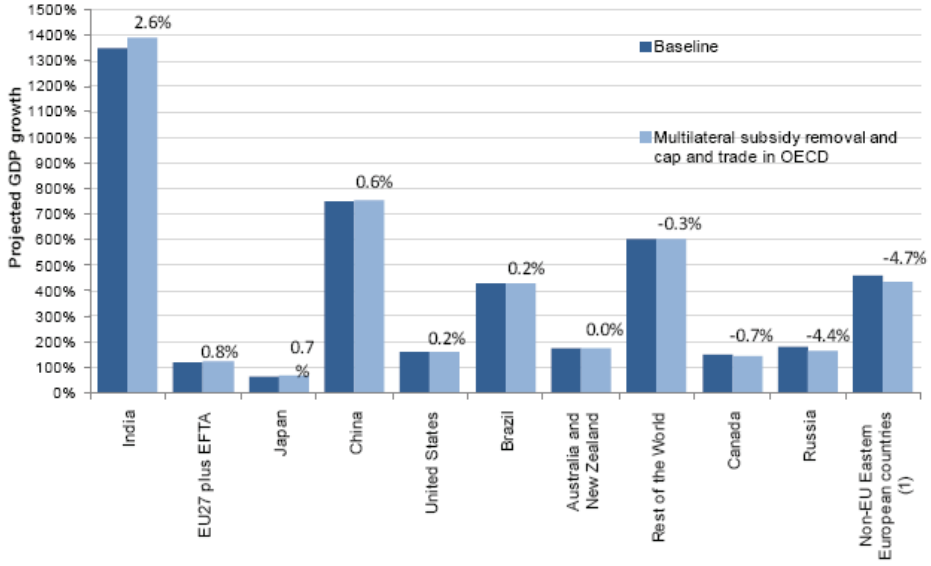


Figure 2. Long term impact on GDP of a multilateral phasing out of fossil-fuel subsidies by regions in 2050 (percentage changes indicate GDP change in 2050 relative to the baseline). Source: OECD ENV-linkages model based on IEA subsidies data, OECD, 2010.



As we can see in the Figure 2, international fossil-fuel price declines, induced by phasing out of consumer subsidies, would induce terms-of-trade changes that would favor fossil-fuel importing countries at the expense of fossil-fuel producers. While a multilateral removal of fossil-fuel subsidies would bring some real income gains at the world level, these gains would be unevenly distributed across countries. For a number of countries, phasing-out fossil fuel subsidies would lead to a real increase in GDP relative to the baseline, both from efficiency gains associated with the removal of the subsidies and from an improvement in terms of trade. Some oil-importing OECD countries will also report real income gains by around 1% as their terms-of-trade improve. Most fossil-fuel producing countries are projected to incur real income losses that are substantial in some cases, such as for Russia and the non-EU Eastern European countries.

Another very important source of alternative and clean energy is solar energy in the form of light and heat. Solar energy industry is growing rapidly, and estimates are that it will have an important role in the future, which surely reverberate positively on the future value of shares of companies in that domain.

However, in the way of greater use of renewable energy sources, there are a number of obstacles. Specifically, the procedures for investment are long and complex, insufficient regulations, and standards are only partially defined. A special obstacle is the price of electricity that is not economic, or energy from renewable sources would not be competitive due to regulated low electricity prices. One more open question is how the distribution network could not support the connection of capacity from renewable energy sources without investing and how it would be reflected in the price of electricity. When we talk about renewable energy, always raises the question of stability of supply from such sources of energy, which, as is the case with the wind and sun, cannot provide a uniform supply throughout the year. Production of electricity from renewable energy sources is more expensive than energy production from fossil fuels and therefore introduce incentives for investment in the plant.

The Human Development Index (HDI) is a composite statistic used to rank countries by level of *human development*, taken as a synonym of the older term *standards of living* or *quality of life*, and distinguish *very high human development*, *high human development*, *medium human development*, and *low human development* countries. It is a standard means of measuring well-being, especially child welfare devised and launched by Pakistani economist Mahbub ul Haq in 1990. The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education, and standards of living. It is used to distinguish whether the country is a developed, a developing or an underdeveloped country, and also to measure the impact of economic policies on quality of life. There are also HDI for states, cities, villages, etc.

This index is the mean of the normalised dimension sub-indices which are calculated through the formula and is calculated in the same way as the UNDP HDI: The indicators considered for the regional HDI are: years of healthy life expectancy, net adjusted disposable household income *per capita* (as an index of EU-27 average) and low and high education attainment for people aged 25–64 (% of population 25-64 with low and % with high education attainment).

The HDI measures the average achievements in a country in three basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth.
- Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrolment ratio (with one-third weight).
- A decent standard of living, as measured by Gross Domestic Product *per capita* (Purchasing Parity Power in $US).

Each year, countries are ranked according to these measures. HDI is considered by many to be an excellent tool for measuring development, since both economic and social indicators are covered. The Human Development Index can have a value between 0 and 1. The nearer it is to 1, the higher the level of human development. Countries and regions have classified into three categories:

Low human development: <0,499;
Medium human development: from 0,500 to 0,799;
High human development:> 0,800.

Methodology of the research

Main problem of the research is that production of energy from RES is one of the five energy related pillars of EU STRATEGY 2020. Process of transition in indicated direction is connected with several very important issues which can determine intensity and effectivity of its realisation. Energy is essential resource for economic development. Every change in energy supply influence on economic growth and *vice versa.* Furthermore, production of energy from RES requires substantial investments.

Main objectives of the research are:

- Analysis of basic parameters related to energy development in EU27 region.
- Determination of difficulties connected to production of energy from RES.

Finally, input data includes:

- economy related indicators,
- social related indicators,
- energy dependence,
- energy related pollution.

Results of the research

The results of the paperwork should be the cross-reference analysis of basic indicators and parameters related to energy development in EU27 and determination of renewable energy production limitations and its impact on socio-economic development. Were the EU to succeed in meeting the specific objectives proposed regarding energy efficiency and renewables, this would put it on track to meet the 2020 greenhouse gas reduction of 20 %, and provide a springboard to achieve dramatic reductions by 2050 objectives. Determined action now will mean progress towards stabilizing our import dependence, timely investment, new jobs and a technological lead for Europe in low carbon technologies**.** The EU would have set the pace for a new global industrial revolution.

This analysis of energy production in the EU27 countries includes basic economic and social indicators, energy import dependency, quantity of pollution as result of energy production and consumption. As a final outcome of this paperwork we tried to discover the possible connections between socio-economic and environmental indicators.

In Table 1. we can see relations between basic economic indicators (GDP Total, Population, *GDP per capita*), environmental indicator (RES – total energy production) and main social indicator (Human Development index – HDI). The countries with the highest HDI are Netherlands, Ireland, Germany and Sweden, also, these countries are in the group of countries with the highest GDP *per capita*. The similar relation is between the group of countries with the lowest HDI (Bulgaria, Romania, Latvia, Lithuania, Cyprus, Portugal, Hungary) and lowest GDP *per capita*, which has the same group of countries.

The indicators need to be read in the context of each country's economy and energy resources. An economy that is dominated by primary extraction and processing will have relatively high energy use per unit of gross domestic product (GDP) no matter how efficient it is. This does not mean that the

Table 1. Basic socio-economic indicators in EU27 region – 2010. Source: Eurostat, 2010.

Country	**GDP total**	**Population**	**GDP *per capita***	**RES – total energy production**	**HDI – Human Development Index**
Unit	EUR	number of inhabitants	EUR/pc	%	
Austria	284	8 404 252	37 891,90	22	0.885
Belgium	353	10 951 665	36 055,71	2,9	0.886
Bulgaria	36	7 504 868	5 434,10	6	0.771
Czech Republic	145	10 532 770	15 700,26	4,4	0,841
Denmark	234	5 560 628	47 269,06	15,9	0.895
Germany	2 499	81 751 602	33 429,71	6,1	0.905
Estonia	15	1 340 194	12 665,21	10	0.835
Ireland	156	4 480 858	36 401,40	2,6	0.908
Greece	230	11 325 897	12 914,81	6,9	0,855
Spain	1 063	46 152 926	24 982,35	7,7	0,863
France	1 933	65 075 373	33 313,24	7,8	0.884
Italy	1549	60 626 442	27 795,48	8,1	0,874
Cyprus	17	804 435	23 585,49	1,7	0,810
Latvia	18	2 229 641	9 173,32	30,4	0.805
Lithuania	27	3 244 601	9 896,42	9,6	0.810
Luxembourg	42	511 840	91 738,31	1,5	0,852
Hungary	98	9 985 722	11 110,18	5	0.816
Malta	6	417 617	16 545,46	-	0.832
Netherlands	591	16 655 799	38 570,24	3,9	0,910
Poland	354	38 200 037	10 479,42	5,2	0.813
Portugal	173	10 636 979	17 030,37	17,3	0.809
Romania	122	21 413 815	6 501,79	10,9	0.781
Slovenia	36	2 050 189	19 461,62	10,1	0.884
Slovakia	66	5 435 273	13 421,46	-	0.834
Finland	180	5 375 276	37 581,32	22,5	0,882
Sweden	347	9 415 570	45 836,17	29,6	0.904
United Kingdom	1697	62 435 709	29 714,10	2,1	0,849
TOTAL	**12 271**	**502 519 978**	**1 794 488**	**250,2**	

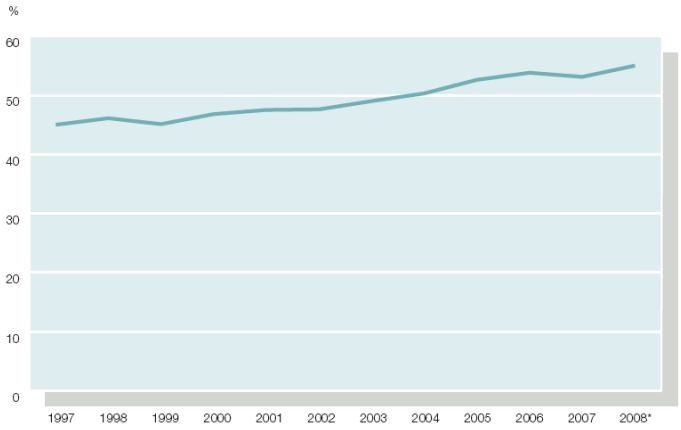
country should abandon development of its resource base.

Addressing energy security is one of the major objectives in the sustainable development criteria of many countries. Interruptions of energy supply can cause serious financial and economic losses. To support the goals of sustainable development, energy must be available at all times, in sufficient quantities and at affordable prices. Secure energy supplies are essential to maintaining economic activity and to providing reliable energy services to society. The monitoring of trends of net energy imports and the availability of appropriate stocks of critical fuels are important for assessing energy security.

In Table 2, according to Eurostat, we can see that the country with the great energy import is Germany, and the country with the best export-import ratio is Denmark. When we add data for GDP *per capita*, from Table 1, to this comparison, Denmark is still one of the leading countries.

Energy dependency in EU27 region is essential energy related problem. In average, EU region imports 50% of energy needed for its development. Simple presentation of energy dependency in EU27 region is showed at Figure 3.

Figure 3. EU-27 Import Dependency (1997-2008). Source: *EREC – European Renewable Energy Council, RE-thinking 2050, A 100% Renewable Energy Vision for the European Union,* Belgium, 2010, based on Eurostat, *2008 based on Eurostat's 2009 *monitoring report of the EU sustainable development strategy.*



Third important group of indicators is pollution related to energy exploitation. Air pollution is created mostly as result of energy exploitation. Basic indictors are presented in Table 3.

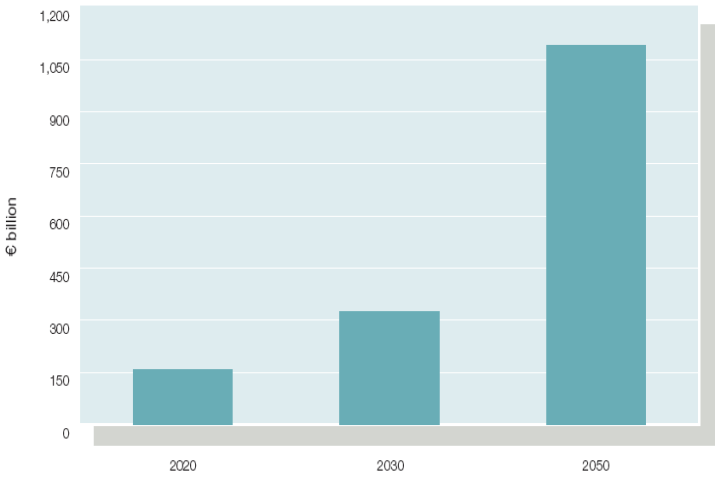
Table 2. Energy export-import in EU27 region: 2010. Source: Eurostat, 2010.

Country	Energy export		Energy import	
Unit	ktoe	EUR	ktoe	EUR
Austria	7 621	3 687 153	2 3350	16 960 566 542
Belgium	25 224	1 714 728	51 450	18 310 858 105
Bulgaria	3 875	760 066	10 590	2 950 209 982
Czech Republic	9 608	3 650 354	11 590	4 423 556 590
Denmark	18 222	3 418 218	-5 490	-2 412 453 602
Germany	37 123	16 413 165	210 840	101 665 869 688
Estonia	821	1 258 339	1 880	366 028 269
Ireland	972	-	14 120	5 124 898 909
Greece	9 128	242 352	24 700	24 831 045 528
Spain	14 298	212 681	123 340	40 162 571 776
France	29 998	9 539 700	137 550	56 993 699 181
Italy	27 459	226 679	159 500	65 824 100 295
Cyprus	-	-	2 870	4 027 608 560
Latvia	986	1 124 934	3 040	1 231 823 878
Lithuania	7 780	409 221	5 780	1 586 194 433
Luxembourg	233	136 168	4 540	1 999 229 654
Hungary	3 015	1 602 523	16 590	6 418 720 317
Malta	9	-	1 790	3 476 683 830
Netherlands	137 418	1 057 432	38 780	15 551 642 698
Poland	12 830	2 442 793	25 060	9 794 860 540
Portugal	2 615	508 002	21 850	8 453 688 752
Romania	4 555	592 401	12 820	1 962 263 586
Slovenia	1 285	1 176 780	3 680	1 744 863 385
Slovakia	4 742	1 992 719	12 470	5 282 761 800
Finland	7 094	140 043	20 470	6 631 967 729
Sweden	13 034	4 321 105	18 960	8 234 170 484
United Kingdom	83 632	450 549	45 000	18 697 433 808
TOTAL	**463 577**	**59 259 305**	**988 350**	**430 294 864 717**

When we consider pollution as result of energy production and consumption (Table 3), the countries that have the most total emission of CO_2, SO_x and NO_x are leaded by Poland, Bulgaria and Romania. At the other hand, Luxemburg, Latvia, Malta and Slovenia are the countries with the least total emission of CO_2, SO_x and NO_x. If we link pollution as a result of energy production and consumption with GDP for each single country, we can see some kind of direct proportionality between these values. For example, Malta, Latvia and Slovenia have lower values of Total GDP and also have the least total emission of CO_2, SO_x and NO_x. But, if we compare Total GDP of Poland, Bulgaria and Romania and the scale of pollution as result of energy production and consumption, we can't see the same direct proportionality. The countries with the greatest values of Total GDP are Germany, France, United Kingdom and Italy, and they are positioned in the first ten countries in the total emission of CO_2, SO_x and NO_x. When we look at the values of GDP *per capita* the leading countries are Luxemburg, Denmark, Sweden and Netherlands. These countries are in the middle of the Table 3, except Luxemburg which is at the leading place. As a cumulative conclusion from these compared values, we can say that there are some influential connections between them.

In the end, analysis of positive effects of RES development in EU region has been performed. Positive effects are numerous, but manuscript shows one of the most important – avoided fuel costs. Results are presented at Figure 4.

Figure 4. Avoided Fuel Costs from RES Deployment (2020-2030-2050). Source: *EREC – European Renewable Energy Council, RE-thinking 2050, A 100% Renewable Energy Vision for the European Union,* Belgium, 2010.

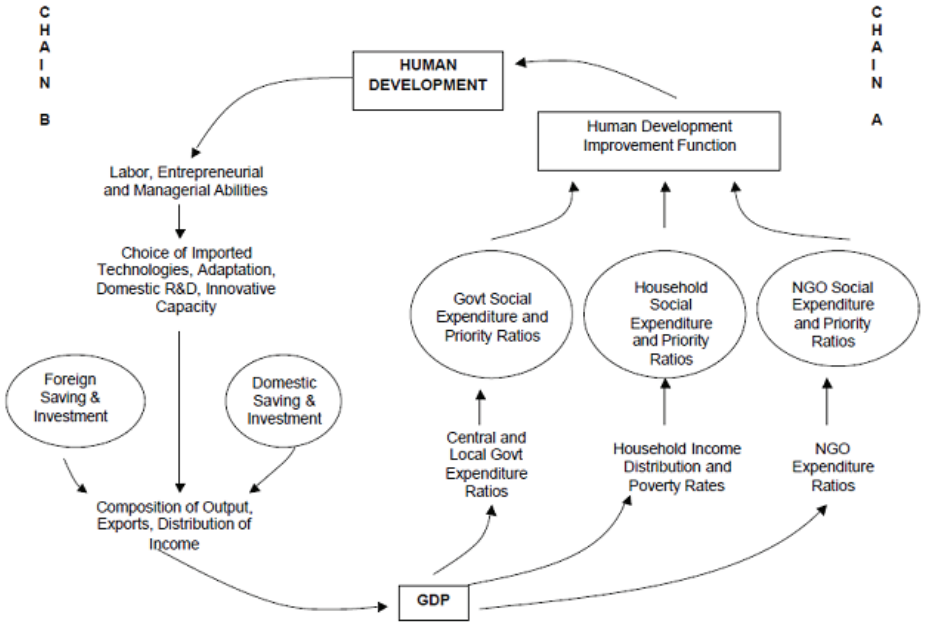


According to the European Renewable Energy Council, by 2020, the EU can reduce its annual

Table 3. Pollution as result of energy production and consumption. Source: Eurostat, 2010.

	Total CO_2 emission	**CO_2 intensity**	**Total emission of SOx**	**Total emission of NOx**
Unit	Thousand metric tons	kg CO_2 per PPP $ of GDP	Thousand metric tons	Thousand metric tons
Austria	67 726	0,204	20,58413473	187,322
Belgium	104 880	0,266	76,42876767	213,277
Bulgaria	50 539	0,476	657,9339171	164,881
Czech Republic	116 996	0,434	173,4742117	251,351
Denmark	46 025	0,212	14,79123492	131,784
Germany	786 660	0,258	448,3687849	1 369,698
Estonia	18 291	0,627	54,81249911	29,006
Ireland	43 604	0,230	32,69978484	90,275
Greece	97 814	0,289	427,3120607	375,275
Spain	329 286	0,218	430,4716906	1 055,692
France	376 986	0,173	302,8963755	1 116,730
Italy	445 119	0,224	230,5306981	981,058
Cyprus	8 555	0,346	17,11091676	19,478
Latvia	7 591	0,185	4,075609219	28,577
Lithuania	15 130	0,230	36,07739433	64,844
Luxembourg	10 502	0,240	3,112868502	18,995
Hungary	54 638	0,263	79,73297436	166,894
Malta	2 560	0,251	7,444581613	8,125
Netherlands	173 750	0,246	38,05322733	276,013
Poland	316 066	0,459	861,3113696	819,539
Portugal	56 310	0,212	76,20394359	238,608
Romania	94 660	0,300	459,8676341	247,262
Slovenia	17 158	0,290	11,52567815	45,157
Slovakia	37 557	0,298	64,08355541	85,639
Finland	56 512	0,281	59,23863937	152,669
Sweden	49 050	0,135	29,84433912	149,425
United Kingdom	522 856	0,231	397,4811288	1 086,183
TOTAL	**3 906 821**	**7,578**	**5015,468020124**	**9 373,757**

Figure 5. Schematic diagram with economic and social indicators links. Source: Boozer, M., Ranis, G., Stewart, F., Suri, T., *Paths to Success: the Relationship Between Human Development and Economic Growth,* Economic Growth Center, Yale University, 2003.



fossil fuel demand by over 290 Mtoe, reaching almost 500 Mtoe by 2030 and more than 1,000 Mtoe by 2050. Hence, renewable energy will avoid fossil fuel costs of about € 1,090 billion (or more than € 1 trillion) in 2050 (Figure 4). The calculation is based on an exchange rate of $ 1.35/€.

Figure 5 provides the schematic diagram of the various links in Chain A that connects Economic Growth to Human Development and Chain B that connects Human Development to Economic Growth. Chain A shows how GDP is allocated to governments and households and how these agents in turn decide how much of their resources are spent on items that are likely to promote HD, such as basic education, water, food, primary health care, etc. It also includes resources allocated by households or governments to NGOs promoting HD. While EG is thus an important element in improving HD, the relationship is not automatic but depends on the distribution of income and the propensities of households and governments to prioritize HD in their expenditures. The HD outcome also depends on how efficiently these inputs are deployed, which is represented by the Human Development Improvement Function. HD levels largely determine the quality of labor and the population's innovative capacity, and Chain B shows how this consequently feeds back into promoting EG, in combination with foreign and domestic investment, technology, and the policy environment, among other factors. HD is thus an important element in promoting EG, but the translation into growth is again not automatic, depending on many other elements. In principle, each country has its own Chain A and Chain B, with links of varying strength, depending on the country's initial conditions, the changing environment and policy decisions.

Conclusions

Public opinion alone cannot overcome barriers to growth for renewable energies. Heavy administrative approvals procedures, existing market structures with a dominant position of the incumbent industries, a widely diffused underestimation of the potential of renewables and a lack of incentives are some of the factors that slow down the growth of renewable energies. If reliable framework conditions and a favourable climate for investment are created, then renewables can quickly increase their contributions. While most renewable fuels are free, renewable energy projects have high up-front costs, and a number of factors combine to make many renewable energies appear to be more expensive than conventional energy. Distortions resulting from unequal tax burdens and existing subsidies, and the failure to internalize all costs and benefits of conventional energy production and use, create high barriers to renewable energy. Additional barriers include the cost of the renewable energy technologies themselves, the lack of access to affordable credit, the costs of connecting with the grid, and transmission charges, which often penalize intermittent energy sources. In many countries, electric utilities maintain monopoly rights to produce, transmit and distribute electricity. High costs or a lack of standards for connection and transmission discourage renewable energy projects. In addition, lack of information about available renewable energy resources and about the current state of renewable energy technologies, or negative past experiences with old technologies, and a lack of understanding about the benefits associated with renewable energy all act as barriers to their use. Each of these factors works to increase the perceived risks – technical and financial – of investing in renewable energy.

Since 2005 alternative energy sector is becoming part of popular and consumer culture. The social dimension of sustainable development is concerned primarily with poverty reduction, social investment and the building of safe and caring communities. In addition to clear goals, sustainable development provides guidance to possible means. A wide range of resources should be harnessed in the achievement of these objectives. Complex problems are best tackled through multisectoral solutions. It should be stressed, however, that these proposals are an interpretation of the social dimension of sustainable development. These proposals represent one view as seen as through a three-dimensional lens. Even less attention has so far been paid to the linkages between the social and the environmental dimensions. Nevertheless, it can be argued that the essence of sustainable development lies precisely at the interfaces and trade-offs between the often conflicting objectives of economic and social development, and environmental protection.

The application of indirect storage options and energy carriers are expected to complement solutions provided by direct storage. Some indirect storage options are the storage of heat or cold, displacing the need for electrical power at peak moments. In countries where drinking water is produced through desalination, the storage of this water works indirectly as an energy storage. It is essential to adapt electricity grids using more intelligent management systems that can deal with a large variety of renewable energy generators. Protection systems must evolve according to these new network needs, allowing bi-directional electrical flows, at the same pace as the application level of distributed generation and renewables increases. Rather than attempting to match power generation to consumer demand, the philosophy of load management takes action to vary the load (i.e. the demand) to match the power available (the supply). When as-

sessing the possible use of load control, energy user's attitudes should be taken into consideration. Users will need to accept a tariff structure that distinguishes between periods of peak and off-peak and learn to control their use of electricity to avoid peak periods. Better software should be developed to forecast both the load and the renewable power available. The development of an adaptable advanced control system is necessary to achieve optimal utilisation of different kinds of renewable energy sources and to maintain a high degree of reliability and security. The deployment of such an advanced control system would greatly mitigate any negative effects arising from the intermittence of renewable energy sources, and thus ensure the stability of the electrical system.

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In Search of the Present Economy and Society Modernisation Concept (An Attempt to Explain the Main Problems)

W poszukiwaniu koncepcji współczesnej modernizacji gospodarki i społeczeństwa (próba eksplikacji głównych problemów)

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Abstract
The concept of modernisation is the most important concept of social sciences. Modernisation refers to evolutionary transformations of a traditional society into a modern one. The following stages of modernisation process can be distinguished: evolutionary modernisation, technocratic modernisation (based on comprehensive possibilities to implement new technologies into economy and society), and reflexive modernisation. The concept of technocratic modernisation idealizes the role of engineering and automation, and presently also of the computerisation of society. The reflexive modernisation, on the contrary, emphasizes critical evaluation of the present modernisation advancements; there are problems that have not been solved by the technocratic modernisation. The discourse on technocratic modernisation and reflexive modernisation is of great importance for Poland. In this country technocratic modernisation is still dominant, as there have been only modest successes in implementing sustainable development. However, the future of Poland depends on development of reflexive modernisation throughout all the socio-economic domains.

Key words: reflexive modernisation, technocratic modernisation, evolutionary modernisation; sustainable development; demand economy, supply economy, sustainable development economy

Streszczenie
Koncepcja modernizacji należy do najważniejszych koncepcji nauk społecznych. Modernizacja oznacza ciąg zmian ewolucyjnych społeczeństwa tradycyjnego w społeczeństwo nowoczesne. Można wymienić następujące fazy procesu modernizacji: modernizację ewolucyjną, modernizację technokratyczną (opartą na wszechstronnej możliwości wprowadzenia nowoczesnych technik i technologii do gospodarki i społeczeństwa) oraz modernizację refleksyjną. Koncepcja modernizacji technokratycznej absolutyzuje znaczenie mechanizacji i automatyzacji, a obecnie informatyzacji społeczeństwa. Natomiast modernizacja refleksyjna podkreśla krytyczną ocenę dotychczasowych osiągnięć modernizacji. Nie zostały one rozwiązane w ramach modernizacji technokratycznej. Spór wokół modernizacji technokratycznej i refleksyjnej ma duże znaczenie dla Polski. W Polsce dominuje nadal modernizacja technokratyczna, o czym świadczą nikłe sukcesy w zakresie wprowadzenia koncepcji zrównoważonego rozwoju. Przyszłość Polski zależy jednak od rozwoju modernizacji refleksyjnej we wszystkich zakresach gospodarki i społeczeństwa.

Słowa kluczowe: modernizacja modernizacja refleksyjna, modernizacja technokratyczna, ewolucyjna, zrównoważony rozwój, ekonomia popytowa, ekonomia podażowa, ekonomia zrównoważonego rozwoju

Introduction

The concept of modernisation is one of the most important concepts in social sciences as well as in economics and political sciences. Modernisation refers to a specific sequence of transformations from a traditional society into a modern society. The latter are represented by Western European countries, the USA, or Japan, while the former are perfectly exampled by the industrially underdeveloped Third World countries (the peripheries of the world-system, according to I. Wallerstein's theory, 1974, 1980, 1988). The concept of sustainable development should be examined in relation to modernisation issues, but only in relation to reflexive modernisation. Otherwise, it is difficult to place it in the contemporary social and ecological thought.

Nowadays, three kinds (phases) of modernisation can be distinguished. Following P. Wehling (1991), these are: evolutionary modernisation (dominant in the 20th century, based on hegemony of the idea of progress), technocratic modernisation, and reflexive modernisation (also called ecological modernisation). This paper is an attempt to indicate the basic challenges to reflexive modernisation in the present state of the global economy and the requirements of sustainable development.

Basic modernisation models

Already in the early 20th century, G. Simmel (1918) identified disappearance of traditional social relations, urbanisation, and individualisation as features of modernity (*Moderne*). Modernisation refers to disappearance of social bonds at a local community level and of the traditional ways of farming and living, which additionally is related to a lack of bonds with the surrounding environment and the belief in the possibility of subordinating and controlling nature.

According to P. Gross, the so-called *enjoying life multi-option societies* are dominant at present (Gross, 1994, p. 3). They are based on the modernisation triad: disappearance of traditional forms of social life, an increase in the number of choice options, and increasing individualisation. The market economy, being a competitive economy, permanently stimulates and forces new differences and needs. Transnational concerns together with their huge supplier and customer chains have become the main centres of modernisation.

In social sciences, modernisation is treated as a general formula for measuring social development; simultaneously it is considered to be the universal measure to overcome social, economic, and ecological crises. The present theories regard Western societies, which are highly developed in terms of technological advances, as modern ones. Moreover, the collapse of the centrally-planned real-socialism economy and its transformation into the market economy are interpreted as delayed modernisation following the Western patterns. The situation in Central and Eastern Europe as well as democratic trends in most developing countries, particularly technological development of the so-called *small Eastern Asia tigers*, are believed to confirm scientific advantages of modernisation theories.

However, modernisation theories frequently ignore the social dynamics of industrial and capitalistic societies, defining their development in the general terms of modernity or global trends, which are similar in all societies. The above naturalistic as well as normative assumptions on the exclusive rationality of the Western societies discourage social criticism of the present situation in economically developed countries (Wehling, 1991). Therefore, according to H. Schnädelbach (1989), modernity can be considered to be a social myth. He understands the idea of social myth as rendering social processes and phenomena into simple social notions, such as modernity.

A specific normative pattern of modernisation in social sciences has become hegemonic since the work of T. Parsons, though it was initiated by M. Weber (Schnädelbach, 1989, p. 25). Their theoretical concepts are kind of non-reflective generalisations of the previous rationality criteria of the Western development model. In T. Parsons' theory of social evolution, which was compared to the process of adaptation in biological evolution, the previous tendency to identify modernisation with the *status quo* of the Western developed countries, was challenged. Despite attempts to create the universal paradigm of social evolution, the idea of T. Parsons closely related to the post-war Western societies, has remained prevalent. It is based on the assumed harmonic view of modern industrial Western societies, the so-called *evolutionary modernisation* (Szczepański, 1999, p. 268).

The hegemony of modernisation is presently widely accepted in social sciences as well as in social life. However, the explanation of the notions of modernity or modernisation is mostly restricted to the Western rationalism. Modernisation seems to be an intended rationalisation, which in particular areas of activity serves as *disenchantment of the world,* or – in terms of the modern social sciences – *functionally differentiated social system,* or *detraditionalization of lifeworld* (Habermas, 1988, p. 234). Modernisation is usually treated as a process of changes based on its own logic, which itself does not need justification; in many modernisation theories, the modern cult of novelty is related to social evolutionism.

Modern societies are dominated by economy aimed at profit maximisation, technocratic policy, as well as by science and technology focused on the control of nature (Kośmicki, 2004, 2005); the latter provide the knowledge and means for economic and political bodies to manipulate the environmental determinants. In industrially developed societies, the

interests and rationality pattern exchanges between economy, science, and politics are increasingly interrelated. They determine the basic structure of social modernisation, while other structures and actions are under the overwhelming pressure of changes.

The 80s of the 20th century mark the beginning of the second wave of modernisation theories. According to them, crises were only side effects of modernisation and they could be overcome by continuing modernisation of modern societies. Three main variants of this process were identified, namely: technocratic, ecological, and reflexive modernisation (Wehling, 1991).

According to the above, the following three kinds or phases of the modernisation process are distinguished:

- evolutionary modernisation – based on overall development of technology, economy and science (accepted since the beginning of modern times);
- technocratic modernisation – the present modernisation phase based mostly on the computerization of society and corporate property domination (large concerns);
- reflexive modernisation – criticism of modernisation achievements, emphasising ecological and social problems resulting from the present progress of modernisation.

Present societies of both economically developed and developing countries are usually defined as *world risk societies* (Beck, 2002); the production of social wealth is connected with socially produced risk. In risk societies, technical catastrophes are commonplace; Ch. Perrow (1989) coined the term *normal accidents* to describe accidents resulting from the use of so called highly advanced technologies. Therefore, nowadays *a genuine and systematically intensifying contradiction arises between the profit and property interests that advance the industrialization process and its frequently threatening consequences, which endanger and expropriate possessions and profits (not to mention the possession and profit of life)* (Beck, 2002, p. 10). Apart from numerous regional and local threats, there are many manifestations of the global ecological crisis.

So far, the global economy has not come up with adequate mechanisms of social and political control. Thus, it is developing spontaneously, which results in many ecological, social, and health threats, leading to a global risk society. The present globalisation is economically determined; and economic competition has many negative economic, socio-cultural, and ecological effects. U. Beck claims that *the imperceptibility of hazards, their dependence on knowledge, their transnational character, 'ecological expropriation', the switch from normalcy do absurdity etc. – reads like a flat description of the present after Chernobyl* (translation from the German version of Preface by Heise, 2008, p. 191). In the high-tech modernity, social production of wealth is correlated with socially produced risk. Following U. Beck, it can be said that *in the modernisation process, more and more destructive forces are being unleashed, forces before which the human imagination stands in awe* (Beck, 1992, p. 20).

The contradictions between risk avoidance and economic or consumption interests are present in all dimensions of social activity. Moreover, the former, sooner or later will affect those who benefit from the latter. The present modernisation activities damage the environment as well as the health of consumers: *cooking and eating are becoming a kind of implicit food chemistry, a kind of witch's cauldron in reverse, meant to minimize harmful effects. Here quite extensive knowledge is required in order to use 'nutritional engineering' to play a little private trick on the overproduction of pollutants and toxins in the chemical and agricultural industries* (Beck, 1992, p. 35).

The development of the present industrial society increases a risk of various catastrophes happening on a previously unimaginable scale. This refers to everyday destruction of the environment, which leads to the extinction of species and forest damage, as well as to major technological disasters, such as Chernobyl, Bhopal, Soveso, Sandoz, or recently Fukushima[1]. The methods of examining the contemporary technological systems used so far, provoke fair criticism, particularly of social scientists.

There are often unexpected failures of the contemporary complex technological systems resulting in normal accidents which are the risk factor of high technology. Some technological systems are inevitably bound to unexpected catastrophes. T. Perrow (1989) devised a very clear and transparent set of characteristics of vulnerability to disasters and accidents, coupled with the classification of failure levels and their effects. The key notions of his theory are complexity and coupling (Perrow, 1989, p. 27). The more complex the technological system

[1] On 12 March 2011 following electrical supply interruption and the cooling system crash, the Fukushima reactor core began to overheat causing meltdown of three of the six reactors. The problems resulted from the tsunami following the earthquake on 11 March 2011. Japanese officials of the Nuclear and Industrial Safety Agency (NISA) classified the total amount of released radioactive contamination – on the International Nuclear Event Scale – as a highest level 7 event (*major accident*). The total amount of released radioactive contamination in Fukushima was assessed at about 1760 tons, while in Chernobyl it was 180 tons! The consumption of vegetables as well as rice cultivation from the Fukushima region has been restricted; and the radioactive iodine has also been found in drinking water in Tokyo. Mitigation of the aftereffects of the earthquake, the tsunami and the crash of the nuclear plant will take the next few decades (Hamm, 2011, p. 378).

and the more tightly coupled its components, the more vulnerable to unexpected failures and accidents it is. When high complexity and tight coupling are immanent properties of a technological system, then failures of its components are unavoidable, and so, in a way, normal. The combination of the above properties is most characteristic for technological systems of nuclear weapons, nuclear plants, bioengineering, marine transport, chemical industry (particularly petrochemical one), aircraft and airways systems, and tankers.

High complexity of interactions and tightly coupled technological processes lead to situations which have been unknown so far. Nevertheless, the idea of evolutionary modernisation in social and technical terms is ubiquitous. This is caused, among other things, by a narrow approach to a scientific and technological progress as well as stressing the necessity for continuing modernisation (Altvater, 2006, p. 5).

Main reasons of the technocratic modernisation continuity

The contemporary development of new forms of capitalism, particularly globalisation, can be defined by axis time (Jaspers, 2006). Generally speaking, globalisation means that all countries, despite their differences, gradually create a planetary socio-economic and ecological unity. Globalisation refers to the expansion of social interdependence of economic activities beyond national borders to gradually take on the global character. Economic globalisation is a process that increasingly tightens the markets and production of different countries. Moreover, globalisation is not external to the market economy. On the contrary, it is caused by basic mechanisms of this economy, particularly competition. The importance of globalisation processes is confirmed by the data for the last quarter of the 20th century (1975-2000) provided by the German Federal Bank: the real production of the global economy increased by 140 %, and global trade by as much as 320% (Nuscheler, 2004, p. 55); moreover, the capital flows increased almost thirtyfold. Financial markets are no longer predominantly related to the real economy and to the trade and service financing, but they are literally focused on unrestricted pursuit of speculative profits. These are the main causes of financial and economic crises.

The main drivers of globalization are the following contemporary socio-economic processes: own dynamics of markets and emergence of transnational firms (transnational corporations), new technologies leading to the development of global production networks, development of international financial markets (mostly independent from national and real markets), great revolution in communication and management (transition to the information society), political regulations necessary for the continuing globalisation (set out mostly by the International Monetary Fund, the World Trade Organization, the World Bank, OECD, G8, or G20).

However, it is necessary to base globalisation on political regulations focused on the socialisation of the contemporary global capitalism; this is the only globalisation which will benefit the majority of society. According to this concept, the development of global governance and knowledge-based society ensures globalisation aiming at the long-term survival of humanity and biosphere on the globalized planet. In E. Altvater's view, *the world market is the site of economic reproduction of the global capital relations, as well as of the political organization of hegemony. An opening to the world is thus synonymous with economic integration into the global process of economic reproduction and a historically determined system of hegemony* (Altvater, 1993, p. 81).

The world market represents not only an economic challenge, but most of all, it is a political project where the most important large transnational corporations and industrial countries supporting them (mostly the US, the EU countries, Japan, or BRICS countries[2]), as well as the international organisations formed by these countries, are of a key importance. The present economy takes on new scientific and technological properties as a result of international modernisation and technological competition between large firms, and modernisation strategies of the most important world-market oriented countries.

The advocates of the technocratic modernisation, following the neo-liberal economic principles, tend to view globalisation only in the context of positive economic development prospects such as: higher economic development potentials (higher incomes) positively related to the international division of labour; the increase of global labour efficiency and the efficiency of using natural resources; worldwide standardization of financial policy, and of economic, ecological, or socio-cultural standards. The negative results of the dominating globalisation are usually defined as temporary development problems that excuse the furtherance of deregulation, privatization, and liberalisation of the economy. However, the continuation of these processes usually means destruction of the previous production capabilities, usually at the expense of local, regional, and national manufacturers and communities; and it produces negative economic, social and ecological effects.

Nowadays, the accumulation of capital takes various forms: different forms of classical primitive

[2] An informal group of developing countries consisting of Brazil, Russia, India, China, and the Republic of South Africa. These countries want to strengthen their position in the world, particularly in the world of monetary institutions and in the UN.

accumulation (expropriation of small manufacturers); new forms of expanding capitalist property and production relations (mostly achieved by privatisation of public services, infrastructure, and pensions and social security systems); ubiquitous frauds and plunder (mostly in large concerns or financial institutions); concentration, appropriation and taking over economic values that have different social background (are produced by other firms or regions); patenting and expanding of property rights onto the environment and knowledge. Therefore, the global ecological crisis is related to direct threats to life and reproduction conditions of specific social groups, whole regions, or even countries and continents.

The global financial and economic crisis is a persuasive evidence for the instability of contemporary phase of financial accumulation. However, it is the present financial system that determines the dynamics of capital accumulation. The political and economic centralisation of financial markets has contributed to the creation of *a Wall Street-Treasury-International Monetary Fund complex, which has huge financial power in the world* (Zeller, 2004, p. 17). The present accumulation pattern of the US – based on the domination of financial capital – contributed to the creation of the *world factory* in China and India.

According to M. Massarat (2004), parliamentary democracy and the present party state have reached the limit of their governing capabilities. The non-governmental organisations (NGOs) and new social movements (anti-globalization and movement of the indignant, in particular) provide an answer to the contemporary social crisis. In the present democracy based on political parties, election promises are broken and the political power is exercised by powerful interest groups through successful lobbing. The contemporary democratic countries face many problems, including: the power syndrome and focus on the present, complexity and competences dilemmas, ethical compromise and egocentricity dilemmas.

The desire to retain power forces political delegates of parliamentary democracy into short-term thinking focused mostly on securing current interests. Consequently, only the actions that increase the number of popular votes and help to retain power in the next parliamentary term, are undertaken. Furthermore, modern societies are becoming increasingly complex and less transparent, while parliaments often show limited expertise. This lack of competence gives rise to the extensive power of experts (*expertocracy*), which turns democratic political process into its opposite, inviting lobbying and omnipotent corruption.

The contemporary democracy is constantly forced to work out new compromises. The necessity to reach compromises between social strata and classes, as well as between wage labour and capital has led to the externalisation of costs and conflicts in the present model of mass consumption. However, in developed countries such compromises resulted in the externalisation of social conflicts and ecological burdens at the expense of other regions and nations, as well as future generations, the environment, and vulnerable social groups.

The high standards of democracy are only ensured if it exists regardless of external influences and can overcome serious ecological and social crises. Yet, contemporary democracies are reluctant to accept the general public will and comply with it. The societies in the globalizing world are based on a loose ethical basis, which reduces the sovereign to the community on its own territory and the general public choice to the short-term electoral and economic interests. Such societies are almost predestined to externalise their economic, social, and ecological conflicts in time and space, particularly at the expense of future generations. They still exist because of the broad social consensus for natural resource plunder, and externalisation of the costs of the present life standards.

Contemporary democracies based on the coercive externalization are externalisation democracies, which makes militarisation and ever-increasing military spending necessary. The globalisation of economy facilitates the externalisation of the costs onto distant areas of our planet as well as onto future generations. Accordingly, this allows development of technocratic modernisation which ignores the negative economic and social effects of globalisation. With respect to the technological civilisation, A. Kuzior emphasises that *in the ethics of technology, the concepts of the results-oriented ethics are predominant; therefore, the category of responsibility is very important* (Kuzior, 2006, p. 69). Many other considerations concerning this issue leave no doubt that it is necessary to include ethical postulates in the new state of the global society development; they should include individual and social responsibilities for the present as well as future generations (Pieńkowski 2011, 2012; Pawłowski, 2009; Ikerd, 2008 and many others).

The sustainable development concept as a challenge for reflexive modernisation

The concept of sustainable development was first formulated in the Brundtland Report of the United Nations World Commission on Environment and Development released in 1987. Sustainable development is defined there as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:*

- *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*

- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs* (WCED, 1987, p. 43).

The Brundtland Report ties economic and ecological goals with social ones; namely with a just distribution of natural resources, or at least the possibilities for a just distribution. The formula of sustainable development consists of the following elements: ecological durability, economic development, and intra- and intergenerational social justice, which combined together ensure sustainable and just development. Such concept is related to the reflexive modernisation.

The aim of the Report was to propose long-term action strategies for achieving sustainable development. To realise this aim, it is necessary to follow recommendations, or strategic requirements: prevent population growth and develop human resources not utilised so far, satisfy basic human needs, secure food supply, prevent destruction of biological diversity and of natural ecosystems, decrease energy consumption, increase industrial production which makes use of technologies protecting natural resources and the environment, impede urbanisation and encourage development of small towns, which are tightly connected with the surrounding environment. The concept of sustainable development was then widely popularized by the *World Summit* in Rio de Janeiro in 1992. Since that time it has become very popular in the social awareness, and even widely incorporated into politics and economy.

The concept defined in the Report inspired a series of discussions on the theoretical and practical issues. The central political and scientific task is focused on the attempt of proper operationalization and concretisation of the concept. The sustainability will finally form different formulas for production and labour, which will be based on fundamentally changed values and styles of action (Altvater, 2006)[3].

In recent years, very specific government rules for the benefit of sustainable development have been accepted, namely: (1) the rate of consumption of renewable natural resources should not exceed the rate of their recovery; (2) the rate of consumption of non-renewable natural resource should not exceed the recovery rate of renewable natural resources; (3) the rate of emissions should not exceed the natural capacity for their absorption. Most research on sustainable development or a sustainable economy is concerned with the above ideas; such approach is particularly characteristic for socio-economic and ecological disputes.

[3] Absence of sustainable development in the present economy has also been criticised by – among others – N. Roubini & S. Mihm (2010), or H. Ch. Binswanger (2010).

However, sustainable development needs to be considered at three fundamental dimensions: ecological, economic, and socio-cultural. The following goals of sustainable development should be realised to provide a decent life for people, while preserving the existing environmental capabilities (Rogall, 2009):

- **ecological goals:** (1) protection of the Earth's atmosphere, (2) protection of the environment (including land and species), (3) protection of natural resources (resource consumption < the rate of their recovery), (4) human health protection (including protection against noise and harmful substances), (5) mobility within the environmental space capabilities;
- **economic goals:** (1) full employment and acceptable job standards, (2) wages and economic growth within the environmental space capabilities, (3) stabilization of foreign affairs and development work, (4) price stability, (5) sustainable national budget capable to cover reasonable amount of collective goods;
- **socio-cultural goals:** (1) social security, (2) democracy and legal regulations, (3) internal and external security (peace), (4) social integration and just life opportunities (including gender equality), (5) quality of life and health conditions.

A. Pawłowski (2009) proposes to analyse the concept of sustainable development from the perspective of two additional levels. The first level is the foundation for others – it is an ethical reflection on human responsibility for the environment, determining any human activity. Level II covers already mentioned ecological, social and economic issues. Level III is an analysis technical, legal and political issues and is as important as level II, but covers more detailed problem areas.

Thus, the concept of sustainable development sets out multidimensional conditions for reflexive modernisation; it avoids setting one-sided economic goals, providing a set of sustainably interrelated economic, ecological, and socio-cultural objectives, instead. These objectives must take into account the capacity of environmental space to prevent the collapse of present ecological systems.

Global ecological, economic, and financial crises confirm the breakdown of fundamentals of the present capitalism. L. C. Thurow, analysing the history of capitalism, stated: *the financial crises of the 1920s and the 'Great Depression' of the 1930s had brought capitalism to the edge of extinction. The capitalism that now seems irresistible could, with just few missteps have vanished* (Thurow,

1997, p. 5) [4]. A global ecological catastrophe would result in the collapse of the present civilisation, which is usually defined as scientific and technological one, as well as in the destruction of the biosphere in its current form. Because of crises, catastrophes, and threats that occur in the present global society, the growing *social awareness of threats, crises, catastrophes, as well as development chances and opportunities can be helpful, as it can create new decision contexts, facilitate creation of new structures and institutions, help in global consensus building (not only the one based on protests and contestation of anti- and alter-globalists)* (Zacher, 2008, p. 66).

A fundamental change in economy and economic policy is needed to protect the humanity and the biosphere against global threats. It is also necessary to abandon neo-liberal supply economics and Keynesian demand economics.. These two schools of economics failed in solving the problem of ecological limitations, or basic social and economic problems. In this light, a programme of economy modernisation based on sustainable development economics becomes a necessity. According to Ch. Felber, *the present form of economy, the capitalistic market economy created a dangerous multifaceted crisis of the present day*: *financial bubbles*, *unemployment, distribution, climate change, energy, poverty, consumption, downsizing democracy, loss in values and loss of meaning* (Felber, 2010, p. 14). Such programme would comprise basic dimensions of sustainability and the fundamental goals of economic policy consistent with the requirements of sustainable development. The comparison of the three concepts of economics and related economic policies is presented in Table 1.

Conclusion

The following phases of modernisation can be distinguished: evolutionary modernisation (dominant in the 20th century, based on the hegemony of progress), technocratic modernisation (based on all-around implementation of modern technologies into economy and society), and reflexive modernisation.

The technocratic modernisation absolutizes the importance of mechanisation and automation, and computerisation of today's society. The reflexive modernisation, on the contrary, emphasises criticism of the previous modernisation achievements, which have led to socio-ecological problems; the technocratic modernisation has not solved these problems yet. The technocratic modernisation includes the following elements: the concept of nature control, unsustainable economic and social development, the domination of financial economy over the real economy, ecological crisis, and lack of solutions to unemployment problems. The reflexive modernisation, on the other hand, is based on the ecological paradigm, sustainable development, domination of real economy over the financial one, development of knowledge society, and global socio-economic governance.

Table 1. Comparison of supply, demand, and sustainable development economics. Based on the lectures of H. Rogall at Hochschule für Wirtschaft und Recht in Berlin. See also Rogall, 2011.

Economic approaches		
Supply economics	Demand economics	Sustainable development economics
Approach: continuous economic growth by reducing costs and increasing incentives	Approach: continuous economic growth through anti-cyclical demand control by the state	Approach: selective growth, division of labour, financing jobs by reducing subsidies, international minimum standards
Reduction of public spending	Public programs for generating demand (credit and loan systems)	Greening of the financial system and modernisation of economy
Reduction of individual costs	Lowering the interest rate (monetary policy)	Reducing the unemployment rate, comprehensive ecological and social modernisation
Increasing social benefits by tax system and tax cuts	Increasing incomes of the less well-off	Shortening of the work-time, division of labour, new lifestyles
Abandonment of social transfers and employment in the public sphere	Expanding social transfers and employment in the public sphere	Work for the common good (Scandinavian model), developing the education system, reducing subsidies
Deregulation	Additional investments	Higher environmental and social standards, selective growth
Danger of poverty, lack of ecological solution to the problem	National debt, lack of ecological solution to the problem	Realising the goals of sustainable development triangle (social, economic, and ecological systems)

The dispute over these two theories of modernisation is fundamental for the future of Poland. Advocates of the technocratic modernisation postulate rapid development of highly industrialised agriculture and nuclear energy. By contrast, supporters of

[4] Ch. Felber (2010) postulated common welfare economics instead of economics which benefits only a small group of people.

the reflexive modernisation favour development of ecological or integrated agriculture, power production that makes use of renewable energy sources, energy saving as well as the more effective use of non-renewable energy sources which are less harmful for the environment (for example, natural gas or petroleum).

Table 2. Basic characteristics of modernisation theories. Source: Authors' own work.

Technocratic modernisation	Reflexive modernisation
Concept of nature control	Ecological paradigm
Unsustainable socio-economic development	Sustainable development
Domination of financial economy and vulnerability to financial and economic crises	Domination of real economy over the virtual one (financial)
Ecological crisis and unsolved unemployment problems, externalisation of development costs	Knowledge society and global governance, rejection of externalisation
Neoclassical economics	Sustainable development economics

The implementation of sustainable development in Poland has not been very successful so far (Żylicz, 2001), which only confirms the domination of technocratic modernisation. Furthermore, the necessity to rely on the development of nuclear energy and to introduce GMOs in agriculture has been recognised recently. All this points out to the need for fundamental changes in the present modernisation. This is all the more difficult due to actions known as *greenwashing*[5], used by technocratic modernisation advocates (social manipulation, as well as misinformation, particularly in their promotional actions). Presently, there is a dispute on the future of socio-economic development: technocratic versus reflexive modernisation. However, only the latter can successfully realise the concept of sustainable development in which economic development is related to socio-economic conditions.

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[5] In the sense of deceiving consumers or citizens by using ecological arguments.

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PROBLEMY EKOROZWOJU – PROBLEMS OF SUSTAINABLE DEVELOPMENT
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The Implementation of Sustainable Development vs. Environmental Attitudes in International Comparative Studies

Wprowadzanie rozwoju zrównoważonego a postawy wobec środowiska naturalnego w międzynarodowych badaniach porównawczych

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Abstract
Praktyczna realizacja rozwoju zrównoważonego zależy nie tylko od przyjmowanych strategii, ale także od codziennych wyborów dokonywanych przez każdego człowieka. To, jak się zachowujemy, co kupujemy, czy też z czego skłonni jesteśmy zrezygnować – przekłada się na zmiany globalnego zużycia surowców i nośników energii. Dlatego badanie postaw ludzkich i czynników je warunkujących jest istotnym wskaźnikiem realnych możliwości wprowadzania rozwoju zrównoważonego.
W badaniach postawiono następujące dwie główne hipotezy: (1) deklaracje zachowań proekologicznych, zachowania proekologiczne oraz obawy związane z zagrożeniami ekologicznymi są zależne od cech społeczno-demograficznych (płci, wieku, wykształcenia, statusu zawodowego, orientacji politycznej i wielkości miejscowości zamieszkania), (2) deklaracje zachowań proekologicznych, zachowania proekologiczne oraz obawy związane z zagrożeniami ekologicznymi są zróżnicowane międzynarodowo. Hipotezy przetestowano na danych ISSP Environment III z 2010 r. Pierwsza z postawionych hipotez została w przeważającym zakresie potwierdzona (tylko płeć okazała się nie mieć wpływu na poziom deklaracji zachowań proekologicznych). W pełni potwierdzona została druga hipoteza. Krajami o najwyższych wskaźnikach zarówno deklaracji, jak też zachowań proekologicznych są: Szwajcaria, Korea Południowa, Tajwan, Dania i Niemcy. W tej klasyfikacji ostatnie miejsca zajmują zaś: Łotwa, Bułgaria, Rosja, Słowacja i Izrael. Wysoki poziom zagrożenia ekologicznego występuje najczęściej wśród mieszkańców Chile, Turcji, Argentyny, Chorwacji i Rosji.

Słowa kluczowe: środowisko naturalne, postawy, ISSP

Abstract
The practical implementation of sustainable development depends not only on the strategies adopted, but also on everyday choices made by each individual. How we behave, what we buy, or what we are willing to sacrifice – all this translates into changes in the global consumption of natural resources and energy. Therefore, the study of human attitudes and behaviour, and of the factors that determine them, is an important indicator of the real possibilities for implementing sustainable development.
Two main hypotheses were put forward in the research: (1) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors (gender, age, education, employment status, political orientation, and size of place of residence, (2) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns differ between countries. The hypotheses were tested on the data from the ISSP Environment III, 2010. The first hypothesis was

largely confirmed (only gender proved to have no impact on the declared pro-environmental behaviour). The second hypothesis was fully confirmed. Countries with the highest indicators of both declarations and pro-environmental behaviour include: Switzerland, South Korea, Taiwan, Denmark, and Germany. On the other hand, Latvia, Bulgaria, Russia, Slovakia, and Israel rank at the bottom of this classification. A high level of concern about environmental threats is most common among residents of Chile, Turkey, Argentina, Croatia, and Russia.

Key words: environment, attitudes, ISSP

Introduction

Sustainable development is development that *meets the needs of the present without compromising the abilities of future generations to meet their own needs* (WCED, 1987). This concept is strongly promoted in the United Nations documents, European Union legislation, and it is the constitutional norm in Poland. This is an optimistic, *green* vision of our civilization's future (Fiut, 2012; Pawłowski, 2011). The implementation of this vision is determined not only by accuracy of the adopted strategies and possibilities of applying them. The essence of sustainable development is our obligation to assume responsibility for future generations, which means the necessity to take care of the environment and its resources (Kras, 2011; Papuziński, 2011). The implementation of sustainable development is hindered, or simply made impossible, by ever-increasing energy and resource consumption, mostly related to the production of consumer goods (Borys, 2011). It is consumers, however, that make the final decisions which of those goods will be purchased. Are they – and to what extent – willing to make sacrifices for the benefit of future generations?

These questions can be answered on the basis of the research into attitudes. The necessity of such research is obvious from a perspective of sustainable development, as its objectives cannot be fully realised if people do not display the right attitudes and behaviour towards others and the environment. Such research is usually conducted on populations of different sizes, from a local to a national level. It is rare, however, that cross-national research that is not limited to a comparison of two or several countries (usually neighbouring ones), but involves a large scale international comparative studies, is undertaken. ISSP Environment is exactly this type of a research programme. Additionally, it enables to observe the dynamics of changes, as the research is repeated in a few year cycles.

Methodology

The International Social Survey Program is a long-term international research program carried out annually in participating countries. It is aimed at regular measurement of variables covering a broad scope of social life. ISSP surveys are repeated every few years, which enables the observation of changes in the measured phenomena. One of ISSP modules is the ISSP Environment, which was implemented three times – in 1993 (with Poland's participation), and in 2000 and 2010 (without Poland)[1]. ISSP questionnaire surveys are carried out on random samples, and make use of both interview techniques and survey techniques.

Table 1. Sample structure countries included in the study. Source: own analysis based on ISSP Environment 2010.

Country	Frequency	Percentage
Argentina	1130	2,7
Austria	1019	2,4
Belgium	1142	2,7
Bulgaria	1003	2,4
Canada	985	2,3
Chile	1436	3,4
Taiwan	2209	5,3
Croatia	1210	2,9
Czech Republic	1428	3,4
Denmark	1305	3,1
Finland	1211	2,9
Germany	1407	3,4
Israel	1216	2,9
Japan	1307	3,1
South Korea	1576	3,8
Latvia	1000	2,4
Mexico	1637	3,9
New Zealand	1172	2,8
Norway	1382	3,3
Philippines	1200	2,9
Russia	1619	3,9
Slovakia	1159	2,8
Slovenia	1082	2,6
South Africa	3112	7,4
Spain	2560	6,1
Sweden	1181	2,8
Switzerland	1212	2,9
Turkey	1665	4,0
United Kingdom	928	2,2
United States	1430	3,4
Total	41923	100,0%

[1] ISSP was initiated as a bilateral cooperation of the German ALLBUS program (Allgemeinen Bevolkerungsumfragen der Socialwissenschaften), and the American GSS (General Social Survey). Later the program was joined by the British BSA (British Social Attitudes Survey), and the Australian National University, represented by the Research School of Social Sciences. Currently ISSP covers 45 countries. More information and a questionnaire form can be found on the ISSP website: http://www.issp.org.

The data from the International Social Survey Programme 2010: Environment III was made available in June 2012, and it contains 339 variables, characterizing 30 countries[2]. The total sample size is almost 42 thousand observations, on average 1200 in each country (tab. 1).
The sample includes 22,613 women and 19,067 men, the average age of respondents is about 47 years old (tab. 2).

Table 2. Sample structure: gender and age of respondents. Source: own analysis based on ISSP Environment 2010.

Gender	Average age	N	Standard deviation
Male	46,30	19067	17,412
Female	46,86	22613	17,454
Total	46,60	41680	17,437

An important question arises: to what extent can these results be generalized? For what population can the sample obtained be regarded as representative (or more precisely, of a high degree of representativeness)? Certainly, it is not representative of the global population, or even of the continental one. In the sample, African countries are represented only by inhabitants of South Africa; China and India are not taken into account in Asia, and no Arab countries are represented (with the exception of the Arab population of Israel). The majority of respondents come from Europe and only North America is fully represented[3]. What is common for the countries studied is the possibility to carry out such research there. Needless to say, social surveys (as a fully sovereign research method not limited in terms of publicising the results) are conducted in democratic countries (or, at least those that want to be regarded as democratic)[4]. Another question is whether it is possible to generalize the research results if the sample does not include countries such as Australia or India. Despite these shortcomings, it seems that this direction of a possible generalization is more justified than any others. Let us assume, therefore, that the obtained sample shows at least a satisfactory level of representativeness of the democratic world's population. Taking into account the role that the democratic countries play on our planet (in terms of economy, finance, media attention, and the military), it can be stated that we obtained a considerable sample of the global population[5].

Hypotheses and indicators

Two main hypotheses were put forward in the research: (1) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors (gender, age, education[6], employment status, political orientation, and size of place of residence), (2) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns differ between countries.
In order to verify these hypotheses, it was necessary to construct indicators of attitudes[7] towards the natural environment, which would include: declarations of environmentally friendly behaviour, pro-environmental behaviour, and concerns about environmental threats. The selection of indicators was somewhat arbitrary, as it is the case in many other studies. However, as Stefan Nowak writes, *out of a range of indicators, we can often choose the one that suits us best from the standpoint of maximizing*

[2] In the original national data set, there are more research units, but for the purposes of this analysis, some of them have been combined: the eastern and western parts of Germany, and the Jewish and Arab parts of Israel.
[3] These remarks are not meant to be a criticism of ISSP. On the contrary, undertaking such research and organisational effort deserves credit. This is just to draw attention to the question to what extent the research results can be generalised.
[4] This can be a subject of a broader discussion, and some questionable cases can be pointed out. It does not change the general rule, though. The importance of social surveys for democracy was aptly described by Elmo Roper (who co-founded, together with George Gallup, The Roper Center for Public Opinion Research): *Public opinion polls have a natural appeal in a democratic society. While many political figures claim to speak for the people, when they are done well, public opinion polls let the people speak for themselves,* http://www.ropercenter.uconn.edu/center/roper_history.html#UJKF2lKIR 8E.
[5] Obviously, these are not all the issues related to the sample representativeness. It remains to be answered how representative national samples are in relation to their populations, and if we can unreservedly accept disproportion between them (e.g. the sample size from the United States is the same as that of the Czech Republic).
[6] Due to different and incomparable education systems in different countries, length of education (in years) is adopted as a measurement of education.
[7] According to S. Nowak, an attitude is a relatively permanent structure composed of three elements: emotional and evaluative, cognitive, and behavioural. The emotional and evaluative element assumes fundamental significance, as it is a necessary component constituting the attitude. It corresponds to one's opinions and thoughts, particularly those assessing the object of the attitude. The second, cognitive component refers to positive, negative, and neutral feelings towards the object of the attitude. Finally, the behavioural component determines the predisposition for positive or negative action towards the object of the attitude, as well as the observed behaviour towards the object of the attitude (Nowak, 1973). Complete attitudes include all three components. However, there are also incomplete attitudes in which one (or even two) elements are missing (except for the emotional and evaluative element). In the research described here, the emotional and evaluative component is represented by concerns and anxieties about environmental threats, the behavioural component – by pro-environmental behaviour and willingness to act in an environmentally responsible way, that is declarations of pro-environmental behaviour. The cognitive element is not considered here.

a particular type of indicator (Nowak, 1985). In empirical studies, indicators and their *indicata* are seldom equivalent and the indicators' ranges are most often narrower than their theoretical counterparts. In the case of the indicators used in these analyses, we are dealing with the situation *when some phenomenon is treated as an indicator of a set of phenomena, a kind of syndrome understood in such a way that an indicator is one of its elements* (Nowak, 1985).

The data set of the International Social Survey Programme 2010: Environment III included several variables that were considered to be potentially suitable for the construction of indicators. If each variable was used separately, it would not provide as much information as combining them together in the form of indexes. The formation of indexes as measurement tools in social sciences is the effect of reflection on the nature of studied empirical reality which is so complex that it often hinders its exploration with the use of a single indicator. It is often difficult to conduct a reliable research into complex reality with a single and simple research tool. Therefore, we need to look at the studied objects from a broader perspective, taking into account at least a few important aspects. According to Stefan Nowak (Nowak, 1985), *employing a whole set (battery) of indicators to identify a homogeneous indicatum helps to raise its adequacy, as a rule. Batteries and indexes are usually more precise than single indicators, treated individually.*

The ISSP 2010: Environment questionnaire included the following questions: (1) To what extent would you accept much higher prices in order to protect natural environment? (2) To what extent would you agree to pay higher taxes in order to protect natural environment? (3) To what extent would you agree to lower your living standards in order to protect natural environment. The scale of answers to each of these questions was the same, reading: (1) definitely yes, (2) rather yes, (3) neither yes, nor no, (4) rather no, (5) definitely no, (8) it is hard to say[8]. Questions formed in this way may be used to construct an index – a new variable, which is a synthesis of components. This is done by summing up the results ascribed to particular values of variables (Frankford–Nachmias, Nachmias, 2001)[9]. For the purpose of this analysis, this new variable constructed on the basis of the three questions given above was named *declarations of pro-environmental behavior*[10]. Since from the methodological point of view, it is unacceptable to allow total freedom in selecting index elements, an important question arises: is such index reliable (methodologically speaking), i.e. is it justified to adopt the three above-mentioned questions as the basis of a synthetic indicator? One of the most frequent ways to study the reliability of scales and indexes is the estimation of internal consistency which is based on the calculation and interpretation of Cronbach's alpha, and simulation of variations of Cronbach's alpha when particular points of the index are removed. Cronbach's alpha also shows to what extent a given set of variables describes the construct hidden in them. Cronbach's alpha assumes values from 0 to 1[11]. The greater the alpha, the more reliable the scale or index (Rydzewski, 2010).

Other questions, interesting from a sustainability point of view, concerned pro-environmental behaviour. The questionnaire included the following questions: (1) How often do you make a special effort to separately store waste glass, metal, plastic, paper, etc. as recycled materials? (2) How often do you make a special effort to buy fruit and vegetables grown without the use of crop protection chemicals? (3) How often do you relinquish travel by car in order to protect natural environment? (4) How often do you save electricity or fuel out of environmental concern? (5) How often do you save water out of environmental concern? (6) How often do you avoid buying certain products in order to protect natural environment? Possible answers to each of the questions were: (1) always, (2) often, (3) sometimes, (4) never. Corrective answers were also possible, e.g. I do not have/drive a car, etc. Regardless of the informative value of individual questions, an attempt has been made to create an indicator, which could be called *the pro-environmental behaviour indicator*.

The last of the constructed indicators can be labelled *concerns about environmental threats*. The questions referred to the extent to which respondents consider the following phenomena to be dangerous to natural environment: (1) air pollution from cars, (2) pollution of the environment by industry, (3) pesticides and chemicals used in agriculture, (4) pollution of surface water, (5) global warming (6) genetically modified foods, (7) nuclear power plants. Possible answers were: (1) extremely

[8] Obviously, a corrective answer, for example *is hard to say*, does not belong to the scale, but it is conventionally added to all questions about opinion.

[9] Indexes are often considered identical to scales, as they have much in common. However, from the methodological perspective, it seems important to make a distinction between indexes and scales.

[10] The development of such an index includes two stages: first – recoding of original variables (according to the scheme: positive answers (1, 2) recoded to 0, other answers (neutral and negative) recoded to 1; second – creating a new variable (points obtained by respondents answering all three questions are added up and averaged). Therefore, the new variable can assume values from 0 to 1, where 1 is the maximum declared willingness for sacrifice for the benefit of the environment, and 0 – the lowest declared willingness for sacrifice for the benefit of the environment.

[11] Cronbach's alpha may also assume negative values, but only if the points of the scale are not positively correlated with one another (a positive correlation between points of the scale is one of the assumptions of the model).

dangerous, (2) very dangerous, (3) dangerous to some extent , (4) not too dangerous, (5) not dangerous at all – and *do not know*[12].

All constructed indicators are characterized by high values of Cronbach's alpha coefficient, which range between 0.71-0.77 (tab. 3). Simulation of the effect that removing individual elements of the indicators has on the overall alpha value, shows that the use of all elements constituting these indicators is validated (elimination of any one component does not increase the alpha value for the corresponding indicator). This constitutes a strong argument for the use of such indicators in further research (tab. 4). The indicators described here were used in two ways: the original quantitative variables were included in the regression models (as dependent variables), and the categorized ones (into typologies: low level, moderate level, and high level) were used in bivariate tables.

Table 3. Statistics on the indicators' reliability. Source: own analysis based on ISSP Environment 2010.

Indicators	Reliability	
	Cronbach's alpha	Position number
Declarations of pro-environmental behaviour	0,758	3
Pro-environmental behaviour	0,716	6
Concerns about environmental threats	0,769	7

Table 4. Statistics on the indicators' reliability after removing an item. Source: own analysis based on ISSP Environment 2010.

Cronbach's alpha after removing an item						
Declarations						
D1		D2		D3		
,623		,637		,754		
Behaviour						
Z1	Z2	Z3	Z4	Z5	Z6	
,715	,695	,681	,645	,666	,655	
Concerns						
O1	O2	O3	O4	O5	O6	O7
,739	,731	,730	,737	,736	,745	,761

Declarations of pro-environmental behaviour

The indicator shows the range of sacrifices (higher prices, higher taxes, lower standard of living) that the respondent would be willing to make in order to help to protect the environment. The CATREG optimal scaling (regression for qualitative data) shows that the willingness for sacrifice for the benefit of the environment increases along with level of education[13]. Education is the strongest influencing factor in this set of variables. It is followed by employment status (people who are employed, students, trainees, and pupils are more likely to make sacrifices for the benefit of natural environment; on the other hand, people who are unfit for work, the unemployed, pensioners and home-makers are less likely to do so (tabs. 5 and 6). Declarations of pro-environmental behaviour are also related to political orientation (people with stronger left-wing views tend to display more willingness to sacrifice for the benefit of natural environment), and to age (declarations of pro-environmental behaviour become stronger with age). Size of place of residence has the weakest, yet significant, influence on the willingness to make sacrifices to protect the environment: people living in large cities and in the suburbs, or on the outskirts of cities are more likely to declare their readiness to sacrifice for the environment than people living in mid-sized and small towns, and those living in rural areas or farmers (tab. 7).

Generally speaking (and slightly simplifying), pro-environmental declarations are most often made by people who are educated, live in large cities or in the suburbs, work or study, and support left-wing politics. Those people are more often older than younger. The configuration of variables may lead to the conclusion that there is a connection between expressing pro-environmental declarations and income or, broadly speaking, the economic situation. Most of the factors taken into account (with the exception of political orientation, and partly age) are related to income. People who are better educated, live in big cities, and work, usually have higher incomes than those less educated, living in rural areas, and out of work. It also seems quite logical to presume the link between economic fac-

[12] In the construction of each indicator, the same recoding scheme was used: the first two responses were recoded to 1, the remaining ones to 0, corrective answers were treated as missing data. Then, the codes for all variables were summed up and averaged by dividing the result by the number of variables. With this procedure, the value of each indicator ranges between 0 and 1. The constructed variables have the quantitative level of measurement.

[13] It is possible to observe how influential each variable is by comparing the standardized beta coefficients. In the analyses described in the article, the higher the beta value, the stronger the positive association between the given factor and the given dependent variable (e.g. declarations of pro-environmental behaviour). Negative beta values indicate the inverse relationship. In the case of non-quantitative and non-dichotomous variables (such as employment status, size of place of residence), after the correlation between them and the dependent variable has been established, an additional analysis of the mean values is necessary to show the kind of this correlation. Interpretation of the effect of gender depends on the recoding scheme. In this set: 1 – male, 2 – female, so a positive beta means that being a woman is more strongly associated with higher value of the given dependent variable than being a man.

Table 5. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	**R-squared**	**Adjusted R-squared**	**Prediction error**	**F**	**Significance**
,214	,046	,045	,954	37,615	,000

Table 6. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

Coefficients					
	Standardized coefficients		df	F	Significance
	Beta	Estimation of the standard error			
Gender	,012	,007	1	3,070	,080
Age	,043	,010	1	19,566	,000
Years of education	,179	,008	10	511,693	,000
Employment status	,075	,009	6	70,534	,000
Political orientation	-,069	,007	1	94,823	,000
Size of place of residence	,026	,007	4	13,417	,000
Dependent variable: declarations of pro-environmental behaviour					

Table 7. Mean values of declarations of pro-environmental behaviour by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,3229	21541	Big city	,3122	12073
Unemployed	,2489	2810	Suburbs or outskirts of big city	,3436	5304
Learning or studying	,3433	2369	Mid-sized or small town	,2957	9919
Trainee	,3198	123	Village	,2753	10088
Unable to work	,2351	794	Farm	,2743	1909
Retired or pensioner	,2499	6825			
Home-maker	,2806	3511			
Total	,2998	37973	Total	,3010	39293

tor and readiness to sacrifice for the environment[14]. A high level of declared pro-environmental behaviour (over 25%) is recorded in Switzerland, South Korea, and Denmark – as well as in Taiwan, the United States, and Mexico (over 20%). On the other hand, countries such as Latvia, Croatia, and the Czech Republic are characterised by low levels (over 75%), and over 70% in Bulgaria (tab. 8).

Pro-environmental behaviour

The pro-environmental behaviour indicator included behaviours such as segregating waste, buying health food, avoiding buying certain products, reducing exhaust gas emission, saving energy and water – assuming that they were propelled by environmental concern.

The regression model shows that the pro-environmental behaviour indicator is dependent on all the independent variables included in it. The variables with the strongest impact include (decreasing in relevance): age, years of education, size of place of residence, gender, political orientation, employment status (tabs. 9 and 10).

The frequency of pro-environmental behaviour increases with age and education, it correlates with more left-wing political orientation, and it is higher among women than among men. Pensioners, homemakers, people unfit for work and trainees are more likely to engage in pro-environmental behaviour. A slightly weaker pro-environmental behaviour indicator characterises people who are employed, and it is the weakest among pupils, students and the unemployed. People who live in the suburbs and outskirts of big cities are most likely to display pro-environmental behaviour. Residents of medium-sized cities, small towns and villages are less likely to do so, and residents of big cities and farmers are the least likely to adopt such behavior (tab. 11).

There are some discrepancies between declarations of pro-environmental behaviour and pro-environmental behaviour, for example pupils or students are characterised by high levels of declared pro-environmental behaviour, but low levels of displayed pro-environmental behaviour. This is also true about inhabitants of large cities and (to a slightly lesser extent) people who work. By contrast, pensioners are characterized by a low level of

[14] The ISSP data set includes variables referring to the respondents' incomes, but they are not directly comparable. Applying the procedure of ranging incomes seems too risky, as well. Low income ranges in wealthier countries do not mean the same as in poorer countries (for example, crossing the poverty threshold), especially taking into account the possibility of satisfying basic needs, and to a lesser extent, a sense of being at the bottom of the *social ladder*. For these reasons, the variable of *income* was not used in the analysis. This would be possible if the research was limited to one country or a group of countries similar in terms of gross domestic product per capita, purchasing power, the scope of economic stratification, etc.

Table 8. Declarations of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country		Declarations of pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Argentina	N	701	244	129	1074
	%	65,3%	22,7%	12,0%	100,0%
Austria	N	405	436	112	953
	%	42,5%	45,8%	11,8%	100,0%
Belgium	N	566	365	137	1068
	%	53,0%	34,2%	12,8%	100,0%
Bulgaria	N	699	189	89	977
	%	71,5%	19,3%	9,1%	100,0%
Canada	N	418	343	180	941
	%	44,4%	36,5%	19,1%	100,0%
Chile	N	748	413	192	1353
	%	55,3%	30,5%	14,2%	100,0%
Taiwan	N	541	1187	464	2192
	%	24,7%	54,2%	21,2%	100,0%
Croatia	N	928	165	67	1160
	%	**80,0%**	14,2%	5,8%	100,0%
Czech Republic	N	1066	217	98	1381
	%	77,2%	15,7%	7,1%	100,0%
Denmark	N	511	388	312	1211
	%	42,2%	32,0%	**25,8%**	100,0%
Finland	N	607	385	152	1144
	%	53,1%	33,7%	13,3%	100,0%
Germany	N	610	434	202	1246
	%	49,0%	34,8%	16,2%	100,0%
Israel	N	624	385	164	1173
	%	53,2%	32,8%	14,0%	100,0%
Japan	N	608	481	155	1244
	%	48,9%	38,7%	12,5%	100,0%
South Korea	N	453	630	467	1550
	%	29,2%	40,6%	**30,1%**	100,0%
Latvia	N	792	94	32	918
	%	**86,3%**	10,2%	3,5%	100,0%
Mexico	N	651	529	306	1486
	%	43,8%	35,6%	20,6%	100,0%
New Zealand	N	560	351	192	1103
	%	50,8%	31,8%	17,4%	100,0%
Norway	N	657	412	225	1294
	%	50,8%	31,8%	17,4%	100,0%
Philippines	N	547	453	181	1181
	%	46,3%	38,4%	15,3%	100,0%
Russia	N	973	389	89	1451
	%	67,1%	26,8%	6,1%	100,0%
Slovakia	N	683	297	74	1054
	%	64,8%	28,2%	7,0%	100,0%
Slovenia	N	553	322	115	990
	%	55,9%	32,5%	11,6%	100,0%
South Africa	N	1734	681	447	2862
	%	60,6%	23,8%	15,6%	100,0%
Spain	N	1446	650	341	2437
	%	59,3%	26,7%	14,0%	100,0%
Sweden	N	529	414	176	1119
	%	47,3%	37,0%	15,7%	100,0%
Switzerland	N	298	520	381	1199
	%	24,9%	43,4%	**31,8%**	100,0%
Turkey	N	1039	312	190	1541
	%	67,4%	20,2%	12,3%	100,0%
United Kingdom	N	554	198	113	865
	%	64,0%	22,9%	13,1%	100,0%
United States	N	559	482	278	1319
	%	42,4%	36,5%	21,1%	100,0%
Total	N	21060	12366	6060	39486
	%	53,3%	31,3%	15,3%	100,0%

Kruskal-Wallis H = 3353.240, df = 29, p <0.0005. Values over 75% (low level) and over 25% (high level) are in bold.

Table 9. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	**R-squared**	**Adjusted R-squared**	**Prediction error**	**F**	**Significance**
,198	,039	,038	,961	25,244	,000

Table 10. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

Coefficients					
	Standardized coefficients		df	F	Significance
	Beta	Estimation of the standard error			
Gender	,064	,008	1	61,680	,000
Age	,138	,012	1	136,947	,000
Years of education	,080	,009	10	83,637	,000
Employment status	,044	,009	6	25,731	,000
Political orientation	-,050	,008	1	39,991	,000
Size of place of residence	,074	,008	4	78,831	,000
Dependent Variable: pro-environmental behaviour					

Table 11. Mean values of declarations of pro-environmental behaviour by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,4091	17428	Big city	,3875	8339
Unemployed	,3633	1771	Suburbs or outskirts of big city	,4406	4204
Learning or studying	,3534	1625	Mid-sized or small town	,4237	7665
Trainee	,4211	95	Village	,4266	7471
Unable to work	,4240	487	Farm	,3965	1416
Retired or pensioner	,4725	4535			
Home-maker	,4298	2148			
Total	,4151	28089	Total	,3875	29095

declared pro-environmental behaviour, but high level of displayed pro-environmental behaviour.

Switzerland and Germany (with 50.1%, each), and Austria (with 45.4%) rank top as far as pro-environmental behaviour indicator is concerned. They are followed by Canada (38.5%), Japan (37.9%), Denmark (31.9%), Argentina (30.8%), and others. Countries where low levels of pro-environmental behaviour were recorded most frequently include: South Africa (80.5%), Israel (80.2%), and Bulgaria (79.5%) (tab. 12).

If we compare the levels of declarations and levels of pro-environmental behaviour, we can observe a correlation between them in half of the cases[15]. In 23% the levels of declaration exceed the levels of behaviour, and in 26.7% the levels of pro-environmental behaviour are higher than those declared[16] (tab. 13).

The closest correspondence between declarations and behaviour occurs for the lower values of both indicators (33.5%), and only less than 8% of the observations display high values of declarations and behaviour. The table below shows the ranking of individual countries according to the percentage of high levels of both declarations and pro-environmental behaviour. Switzerland with almost 10% share of corresponding high values of both indicators tops the list. It is followed by South Korea (7.7%) and Taiwan (7.1%), and then by Denmark (6.9%), and Germany (6.2%). In the top five there are three European countries and two countries of South-east Asia. Latvia and Bulgaria (with 0.3% each), and Russia (0.4%), as well as Slovakia, Israel, and Chile (0.7%) rank at the bottom of the list (tab. 14).

Concerns about environmental threats

Concerns about environmental threats may relate to different aspects. This research focuses on the threats resulting from pollution of surface waters, air pollution caused by cars, industrial pollution, the use of pesticides and chemicals in agriculture, the effects of global warming, consumption of genetically modified foods, and operation of nuclear power plants.

The sense of environmental threat is influenced by all social and demographic variables which were used in earlier analyses. The awareness of environmental threat is stronger among people of young age, with left-wing political views, living in larger cities (with the exception of residents of the suburbs or outskirts of large cities, which are characterised by a lower awareness of threat than those living in

[15] It cannot be forgotten that each of these indicators is based on a different set of questions. This is necessary, however, since repeating sets of questions leads to a common error of contaminating questions.

[16] Percentage values in the table: behaviour corresponding to the declarations is on the diagonal, above the diagonal – declaration levels are higher than displayed behaviour levels, under the diagonal – behaviour levels are higher than declaration levels.

Table 12. Declarations of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country		Pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Argentina	N	134	64	88	286
	%	46,9%	22,4%	**30,8%**	100,0%
Austria	N	184	135	265	584
	%	31,5%	23,1%	**45,4%**	100,0%
Belgium	N	182	245	175	602
	%	30,2%	40,7%	**29,1%**	100,0%
Bulgaria	N	190	32	17	239
	%	**79,5%**	13,4%	7,1%	100,0%
Canada	N	226	148	234	608
	%	37,2%	24,3%	**38,5%**	100,0%
Chile	N	334	55	73	462
	%	72,3%	11,9%	15,8%	100,0%
Taiwan	N	572	327	347	1246
	%	45,9%	26,2%	**27,8%**	100,0%
Croatia	N	456	80	140	676
	%	67,5%	11,8%	20,7%	100,0%
Czech Republic	N	425	158	148	731
	%	58,1%	21,6%	20,2%	100,0%
Denmark	N	291	201	230	722
	%	40,3%	27,8%	**31,9%**	100,0%
Finland	N	303	159	180	642
	%	47,2%	24,8%	**28,0%**	100,0%
Germany	N	185	204	390	779
	%	23,7%	26,2%	**50,1%**	100,0%
Israel	N	495	86	36	617
	%	**80,2%**	13,9%	5,8%	100,0%
Japan	N	237	154	239	630
	%	37,6%	24,4%	**37,9%**	100,0%
South Korea	N	445	252	262	959
	%	46,4%	26,3%	**27,3%**	100,0%
Latvia	N	205	74	19	298
	%	68,8%	24,8%	6,4%	100,0%
Mexico	N	453	149	257	859
	%	52,7%	17,3%	**29,9%**	100,0%
New Zealand	N	422	172	160	754
	%	56,0%	22,8%	21,2%	100,0%
Norway	N	542	197	105	844
	%	64,2%	23,3%	12,4%	100,0%
Philippines	N	130	89	100	319
	%	40,8%	27,9%	**31,3%**	100,0%
Russia	N	267	60	40	367
	%	72,8%	16,3%	10,9%	100,0%
Slovakia	N	307	93	76	476
	%	64,5%	19,5%	16,0%	100,0%
Slovenia	N	253	180	143	576
	%	43,9%	31,2%	24,8%	100,0%
South Africa	N	1090	155	109	1354
	%	**80,5%**	11,4%	8,1%	100,0%
Spain	N	640	369	204	1213
	%	52,8%	30,4%	16,8%	100,0%
Sweden	N	373	162	117	652
	%	57,2%	24,8%	17,9%	100,0%
Switzerland	N	175	169	346	690
	%	25,4%	24,5%	**50,1%**	100,0%
Turkey	N	326	135	180	641
	%	50,9%	21,1%	28,1%	100,0%
United Kingdom	N	276	98	124	498
	%	55,4%	19,7%	24,9%	100,0%
United States	N	537	200	165	902
	%	59,5%	22,2%	18,3%	100,0%
Total	N	10655	4602	4969	20226
	%	52,7%	22,8%	24,6%	100,0%

Kruskal-Wallis H = 2108.081, df = 29, $p < 0.0005$. Values over 75% (low level) and over 25% (high level) are in bold.

Table 13 Levels of declared pro-environmental behaviour by levels of displayed pro-environmental behaviour. Source: own analysis based on ISSP Environment 2010

Pro-environmental behaviour		Declarations of pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Low level	N	6441	2623	995	10059
	%	33,5%	13,6%	5,2%	52,3%
Moderate level	N	1889	1703	810	4402
	%	9,8%	8,9%	4,2%	22,9%
High level	N	1408	1837	1528	4773
	%	7,3%	9,6%	7,9%	24,8%
Total	N	9738	6163	3333	19234
	%	50,6%	32,0%	17,3%	100,0%

Gamma=0.442, p<0,0005

Table 14. High level of declarations of pro-environmental behaviour and high level of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country	Frequency
Switzerland	9,9
South Korea	7,7
Taiwan	7,1
Denmark	6,9
Germany	6,2
United States	4,8
Mexico	4,7
Canada	4,6
Turkey	4,3
Finland	3,8
Austria	3,7
Japan	3,5
New Zealand	3,4
Belgium	3,3
Spain	3,3
South Africa	3,2
Norway	2,9
Sweden	2,5
United Kingdom	2,4
Czech Republic	2,3
Philippines	2,0
Slovenia	1,8
Argentina	1,3
Croatia	1,3
Chile	,7
Israel	,7
Slovakia	,7
Russia	,4
Bulgaria	,3
Latvia	,3

rural areas) (tabs. 15 and 16).These variables are ordered in a decreasing importance. The least important variables include gender (women feel more concerned) and employment status (people working at home, and the unemployed are more concerned about threats, while those unable to work and pensioners are the least concerned) (tab. 18).

Residents of Chile (83,8%) and Turkey (78,3%), as well as those of Argentina (73,3%), Croatia (67%), Russia (71%), and Mexico (70,8%) are most frequently highly concerned about threats to the environment. On the other hand, such concern is lower in countries such as: the UK (51.9%), Norway (48.8%), Belgium (45.3%), Denmark (45.3%), and New Zealand (37.9%) (tab. 17). The top five countries with a high awareness of environmental threat include non-European countries, or Eurasian countries (Turkey and Russia), and the top five countries with a low level of this indicator include mostly European countries (except for New Zealand, but Sweden and Finland are only slightly behind it).

Correlations between environmental concerns, pro-environmental behaviour, and declarations of pro-environmental behaviour were also studied (tab. 19). The analysis shows that such correlations exist. It has also been observed that correlations between concerns about environmental threats and pro-environmental behaviour are stronger than correlations between environmental concerns and declarations of pro-environmental behaviour. It should be borne in mind that the indicator of pro-environmental behaviour is slightly more associated with actions aimed at saving natural resources

Table 15. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	R-squared	Adjusted R-squared	Prediction error	F	Significance
,253	,064	,063	,936	57,914	,000

Table 16. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

Coefficients					
	Standardized coefficients		df	F	Significance
	Beta	Estimation of the standard error			
Gender	,088	,007	1	155,293	,000
Age	-,117	,010	1	144,172	,000
Years of education	-,111	,008	9	197,745	,000
Employment status	,053	,007	6	51,400	,000
Political orientation	-,116	,007	1	250,657	,000
Size of place of residence	,114	,007	4	278,229	,000
Dependent Variable: concerns about environmental threats					

Table 17. Concerns about environmental threats by country. Source: own analysis based on ISSP Environment 2010.

Country		Concerns about environmental threats			Total
		Low level	Moderate level	High level	
Argentina	N	104	193	833	1130
	%	9,2%	17,1%	73,7%	100,0%
Austria	N	155	286	578	1019
	%	15,2%	28,1%	56,7%	100,0%
Belgium	N	511	346	270	1127
	%	**45,3%**	30,7%	24,0%	100,0%
Bulgaria	N	153	251	598	1002
	%	15,3%	25,0%	59,7%	100,0%
Canada	N	261	274	435	970
	%	**26,9%**	28,2%	44,8%	100,0%
Chile	N	86	146	1197	1429
	%	6,0%	10,2%	**83,8%**	100,0%
Taiwan	N	308	629	1272	2209
	%	13,9%	28,5%	57,6%	100,0%
Croatia	N	182	216	809	1207
	%	15,1%	17,9%	67,0%	100,0%
Czech Republic	N	391	464	573	1428
	%	**27,4%**	32,5%	40,1%	100,0%
Denmark	N	510	348	400	1258
	%	**40,5%**	27,7%	31,8%	100,0%
Finland	N	440	376	359	1175
	%	**37,4%**	32,0%	30,6%	100,0%
Germany	N	203	374	767	1344
	%	15,1%	27,8%	57,1%	100,0%
Israel	N	133	282	510	925
	%	14,4%	30,5%	55,1%	100,0%
Japan	N	347	399	536	1282
	%	**27,1%**	31,1%	41,8%	100,0%
South Korea	N	407	392	777	1576
	%	**25,8%**	24,9%	49,3%	100,0%
Latvia	N	315	311	374	1000
	%	**31,5%**	31,1%	37,4%	100,0%
Mexico	N	185	249	1051	1485
	%	12,5%	16,8%	70,8%	100,0%
New Zealand	N	430	313	391	1134
	%	**37,9%**	27,6%	34,5%	100,0%
Norway	N	650	393	289	1332
	%	**48,8%**	29,5%	21,7%	100,0%
Philippines	N	163	300	736	1199
	%	13,6%	25,0%	61,4%	100,0%
Russia	N	184	285	1150	1619
	%	11,4%	17,6%	71,0%	100,0%
Slovakia	N	200	291	649	1140
	%	17,5%	25,5%	56,9%	100,0%
Slovenia	N	171	296	615	1082
	%	15,8%	27,4%	56,8%	100,0%
South Africa	N	626	896	1525	3047
	%	20,5%	29,4%	50,0%	100,0%
Spain	N	320	553	1653	2526
	%	12,7%	21,9%	65,4%	100,0%
Sweden	N	436	333	395	1164
	%	**37,5%**	28,6%	33,9%	100,0%
Switzerland	N	311	403	481	1195
	%	**26,0%**	33,7%	40,3%	100,0%
Turkey	N	164	198	1303	1665
	%	9,8%	11,9%	**78,3%**	100,0%
United Kingdom	N	474	236	203	913
	%	**51,9%**	25,8%	22,2%	100,0%
United States	N	505	408	508	1421
	%	**35,5%**	28,7%	35,7%	100,0%
Total	N	9325	10441	21237	41003
	%	22,7%	25,5%	51,8%	100,0%

Kruskal-Wallis H = 5012.985, df = 29, $p < 0.0005$. Values over 25% (low level) and over 75% (high level) are in bold.

Table 18. Mean values of environmental concern by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,6189	22013	Big city	,6579	12440
Unemployed	,6339	2943	Suburbs or outskirts of big city	,5885	5519
Learning or studying	,6101	2492	Mid-sized or small town	,6112	10332
Trainee	,5907	126	Village	,6039	10504
Unable to work	,5630	847	Farm	,5271	2020
Retired or pensioner	,5768	7285			
Home-maker	,6940	3698			
Total	,6175	39404	Total	,6163	40815

Table 19. Correlations between environmental concerns, declarations of pro-environmental behaviour, and pro-environmental behaviour. Source: own analysis based on ISSP Environment 2010.

Spearman's rho				
		Levels of declared pro-environmental behaviour	**Levels of pro-environmental behaviour**	**Levels of concern about environmental threats**
Levels of declared pro-environmental behaviour	Correlation coefficient	1,000	,315**	,119**
	Significance	.	,000	,000
	N	39486	19234	38795
Levels of pro-environmental behaviour	Correlation coefficient	,315**	1,000	,202**
	Significance	,000	.	,000
	N	19234	20226	19700
Levels of concern about environmental threats	Correlation coefficient	,119**	,202**	1,000
	Significance	,000	,000	.
	N	38795	19700	41003
**. Correlation is (mutually) significant at 0.01.				

and one's financial resources than the indicator of declarations of environmentally friendly behaviour, which is associated with the necessity to incur costs. Therefore, it can be concluded that concerns about environmental threats stimulate our actions and behaviour, or prevent us from certain behaviour slightly more than the readiness to bear costs in order to protect natural environment. This, of course, does not mean that there is no correlation between our awareness of threats and declarations of pro-environmental behaviour (mainly of a financial nature). Such a correlation exists. It is weaker, though, than the one described earlier.

Coclusions

The first of the hypotheses proposed in the research was largely confirmed: declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors, such as age, education, employment status, political orientation, and size of place of residence. Gender proved to have no influence on the declarations of pro-environmental behaviour, but it influences the other two indicators. The second hypothesis was fully confirmed: declarations of pro-environmental behaviour, displayed pro-ecological behaviour, and environmental concerns differ from country to country. Countries with the highest indicators of both declarations and pro-environmental behavior include: Switzerland, South Korea, Taiwan, Denmark, and Germany. On the other hand, Latvia, Bulgaria, Russia, Slovakia, and Israel rank at the bottom of this classification. Residents of Chile, Turkey, Argentina, Croatia and Russia display high concerns about environmental threats.

Furthermore, concerns about environmental threats influence pro-environmental behaviour and declarations of pro-environmental behaviour. This influence is slightly stronger for pro-environmental behaviour.

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Challenges for the Adoption of the Sustainable Development Perspective in Polish Evaluation Studies

Problemy z uwzględnieniem perspektywy zrównoważonego rozwoju w polskich badaniach ewaluacyjnych

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Abstract
This paper aims to examine the extent to which the sustainable development (SD) perspective is integrated into Polish major evaluation projects and to discern the challenges for incorporating the SD approach in evaluation research and practice in general. It will also try to identify the methodological challenges related to the SD evaluation procedures in Poland. The paper will overview these issues on the basis of a complete database of evaluation reports concerning EU structural funds implementation in Poland as well as selected evaluation reports and expert opinions commissioned by the Polish Ministry for Regional Development. The adoption of the SD perspective in Polish evaluation studies is still virtually inexistent, despite some positive trends in the field of building the evaluation culture, which are supported by the requirements imposed by the European Union.

Key words: sustainable development, evaluation, Strategic Environmental Assessment, Poland, European Union

Streszczenie
Celem pracy jest określenie w jakim stopniu perspektywa rozwoju zrównoważonego jest obecna w głównych polskich projektach ewaluacyjnych, a także jakie problemy występują na drodze do szerszego wprowadzania rozwoju zrównoważonego w takich badaniach. Szczególną uwagę poświęcono kwestiom metodycznym. Podstawą do przeprowadzonej w pracy analizy jest pełna baza badań ewaluacyjnych odnoszących się do wykorzystywania w Polsce funduszy strukturalnych UE, a także wybrane raporty ewaluacyjne i opinie eksperckie przygotowane przez Ministerstwo Rozwoju Regionalnego. Przeprowadzona dyskusja wykazuje, że perspektywa rozwoju zrównoważonego w polskich badaniach ewaluacyjnych jest jeszcze słabo zarysowana, pomimo wspierania takich projektów przez UE.

Słowa kluczowe: Rozwój zrównoważony, ewaluacja, Polska, ocena oddziaływania na środowisko, Unia Europejska

Introduction

Sustainable development has been defined as such development *that meets the needs of the present without compromising the ability of future generations to meet their own needs* (WCED, 1987; Etkins et al., 2008). Three generally recognized dimensions of sustainable development have been devised: ecological, social and economic. However, the basis for them is moral reflection regarding humankind's responsibility for its environment and for the future generations. According to Artur Pawłowski (2008), we should also include technical, legal, and political dimensions.

The EASY-ECO project carried out under the aegis of the Research Institute for Managing Sustainability at the Vienna University of Economics and Business Administration attempted to identify the

usage, markets and institutionalization of sustainable development evaluations across countries. From a number of country studies performed under the project, some important lessons were learnt including:

1. Evaluation activities in the areas of structural funds and agricultural and rural development funds are often triggered by requirements formulated by international actors (e.g. the European Commission, United Nations agencies, such as the World Bank, or United Nations Development Programme, as well as national development aid agencies).
2. The EU legislation is a driver for the environmental impact assessment (EIA) and strategic environmental assessment (SEA) procedures.
3. National Sustainable Development Strategies, rooted in the Rio process, serve as common point of reference across Europe and often had a role in driving for SD evaluations (they often introduce mechanisms that oblige sectoral policies to undergo evaluations in order to better perform under the criteria of sustainable development).
4. Implementation of Local Agenda 21 (LA21) projects has become a major driving force for the development of SD evaluations at the subnational level (Martinuzzi, 2002).

Most importantly, however, this research led to a belief that the culture of evaluation and the degree of institutionalization of evaluation differed strongly from country to country.

An absence of a wider public debate on the issue of sustainable development in Poland in the early 1990s does not mean that no efforts were undertaken in this direction. On the contrary, principles of sustainable development were gradually, yet decisively, implemented through reforms of public administration, which significantly changed Poland's socio-political system (Kostrzewa, Piasecki, 2009). Needless to say, the main driving force towards a greater inclusion of the principles of sustainable development in Poland's public policy was the decentralization reform of the public administration system, which was passed in 1998. Along with the internal reform of its administrative division in the late 1990s, Poland also embarked on intensive preparations for the EU accession. Not surprisingly, the concept of sustainable development, although not always mentioned directly, was further transplanted into Poland's public policy with the country's adoption of the EU regional policy (Reichardt, 2010).

The concept of evaluation came to Poland in the mid-1990s and is strongly associated with the country's compliance with the EU accession requirements. With minimal research experience in evaluation prior to 1989, Poland embarked on a journey towards building its own evaluation culture starting in the mid-1990s. The initial phase of the journey was marked by such endeavours as defining theoretical concepts and finding adequate Polish equivalents for existing terms used in reference to evaluation research. Undoubtedly, the popularization of evaluation was a result of the participation of Polish public agencies and researchers in the EU-sponsored programs, first PHARE and other pre-accession funds, later structural and agricultural policies (Bryła, 2007) and their increased contacts with international evaluation policies (also through bilateral and multilateral development agencies such as the USAID and the World Bank). As a result of these contacts, Poland started producing its first home-grown evaluation specialists, mainly recruited from academic centres and universities but also private companies engaged in social research (Reichardt, 2010).

Challenges for sustainable development evaluation research and practice

Sustainable development policy raises new challenges for evaluation. These challenges include the practical concern not to introduce a paralysis in policy-making by waiting to understand all possible direct and indirect effects, and the principal methodological challenge of comparing and weighting (explicitly or implicitly) disparate effects which may be expressed in different units. There is also the challenge of evaluating impacts, and their relation to policies, at different levels (global, international, national, regional and local) and at different spatial scales (Ekins et al., 2008). Internationally, evaluation capacity-building activities have mushroomed as demands have increased for government-funded programs to demonstrate that they are effective and efficient (Naccarella et al., 2007). The number of sustainable development evaluation methods has proliferated recently. However, they are often time consuming and expensive to conduct, making reiteration, a crucial part of assessing progress, an unappealing and difficult task. Making the results comprehensible and meaningful to the public is also challenging, yet essential if evaluations are to be translated into policy and action (Becker, 2004). Evaluations have become compulsory in many policy areas at various levels of governance. They are often placed within the context of the political decision-making cycle. They relate to the design of public policies, the ongoing monitoring, and the assessments of impacts and efficiency. This also holds for evaluation studies and actions related to SD. Evaluations have to become an integral part of a *sustainability management system,* which consists of agreed goals, operationalisation of concepts, implementation, and feedback. SD evaluation is thus not an isolated task to measure the effectiveness and impact of individual actions, but an organised feedback process for decision-makers in politics, business and society (Störmer and Schubert,

2007). Some clear challenges have been identified in developing sustainability indicators. First, there has been a lack of clear and simple frameworks for presenting the indicators. Second, developers of indicators have often failed to engage those who are intended to ultimately benefit from the indicators in the process. Third, many existing indicators remain unknown to the potential users due to failures to make them accessible (Hildén and Rosenström, 2008). Radojicić et al. (2012) have proposed a new approach that integrates many SD indicators into one, called I-distance.

Peter Hardi and André Martinuzzi (2007) have identified four major challenges for sustainable development evaluation research and practice:

1. The integration of the economic, social and environmental dimensions of SD requires complex assessment concepts, which need to encompass non-monetary and qualitative aspects, as well. Trade-offs between these dimensions have to be addressed.
2. The wide temporal and geographical horizon of SD requires integrated system models and reliable monitoring data. Time lags of interventions and system reactions, long-term risks and system dynamics must be taken into account.
3. Evaluations should be understood as a mutual learning process. SD evaluations constitute a key factor for institutional innovations and the establishment of an adequate institutional culture.
4. Stakeholder involvement is necessary in SD evaluations. Therefore, successful evaluators need not only sound scientific knowledge, but also complementary skills, demanded by the systemic and participative evaluation concepts.

The complexity of SD means that it is often difficult to evaluate and communicate the concept effectively. One standard method to reduce complexity and improve communication, while maintaining scientific objectivity, is to use selected indicators. Doody et al. (2009) proposed to utilize the Q-method for discourse analysis. The method sought to combine public opinion with technical expertise to create a list of technically robust indicators that would be relevant to the public. The strengths and constraints of various evaluation methods in SD projects with an emphasis on participatory evaluation have been analyzed by Rusdy Hartungi (2010). Frans Hermans and Luuk Knippenberg (2006) arrived at two main principles that might guide assessments for sustainable development, namely resilience and justice, and proposed the application of this framework within sustainability assessment processes based upon Participatory Integrated Assessment.

Paul Ekins et al. (2008) have introduced the concept and framework of a new model of regional sustainable development evaluation called the four-capital model, based on the analysis of the manufactured capital, natural capital, human capital, and social capital. All the different kinds of capital can only be identified as such from the flows of benefits to which they give rise. Where these benefits can be given a money value, then the value of the capital stock from which they derive is simply the net present value of the benefit flow over time. The benefits are no less real if they cannot be so valued, but obviously in this case the capital stock that gives rise to them will need to be described, and perhaps quantified, in a different way. There are many examples of benefits, and therefore of capital stocks (especially social and natural), to which it is difficult or impossible to give a monetary value. Different types of capital can of course also be combined to create new flows of benefits. An important question arises whether it is the total stock of capital that must be maintained, with substitution allowed between various parts of it, or whether certain components of capital are non-substitutable, i.e. they contribute to welfare in a unique way that cannot be replicated by another capital component.

SD is an extremely complex process, which makes it difficult to define specific goals. According to Störmer and Schubert (2007), it is preferable to understand this concept as postulating an evolutionary process. Social learning in the direction of more sustainability stimulated by public policy is indispensable. There are four basic strategies for the orientation of such learning processes: 1) reflection and dialogue to promote awareness of ecological, economic and social impacts of any policies and actions; 2) participation of citizens to strengthen the civil society and the readiness to get involved in politics; 3) conflict resolution and compromise in the direction of equity in resource endowment and social power; and 4) social innovation to create potentials facilitating the transition to SD. Sustainable development evaluation is not an isolated task to measure the effectiveness and impact of individual projects, but an organized feedback process for decision-makers in politics, business, and society. This should lead to enhanced accountability, transparency, and democracy. SD evaluations constitute a part of a *sustainability management system*. The integration between various policy areas postulated in the SD concept impedes the classical sectoral approaches and procedures in the public sector. The extent to which innovative ideas of cooperation are implemented is an important indicator of progress towards SD requirements. Two fundamental areas of SD evaluation can be distinguished:

1. Formulation and implementation of policies, programs, and projects, dominated by the requirement to establish objectives, set up an appropriate institution and organization, and ensure guidance of the relevant system and power for implementation.
2. Effects and impacts, the analysis of which must include the non-intended effects.

SD evaluations support rational decision-making, constitute an element in social learning processes and provide a vehicle for decision-makers to legitimize their actions.

According to Martinuzzi, Schubert and Störmer (2007), the following three areas of discussion concerning the incorporation of the SD approach into evaluation research can be distinguished:

1. The strategic level: evaluation as decision-making support (including such issues as evaluation culture building and stakeholder involvement).
2. The program and project level: evaluation as performance assessment.
3. The institutional level: evaluation as learning for institutional transition (incl. governance and participatory evaluation approaches).

Investigation of the database of Polish evaluation studies

Despite an enormous progress in the development of the evaluation culture in Poland since our accession to the EU, the integration of the SD perspective seems still insufficient. In a database of all evaluation projects concerning the structural funds implementation in Poland, there are 410 records (Baza..., 2010). Each record concerns a separate evaluation project. There is a link to each report, which may be downloaded. We consider this as an important tool of transparency and a considerable improvement in the policy-making processes. Secondly, there is an indication whether this is an ex ante, ongoing or ex post evaluation. There are also data on the programme to which a given evaluation applies, time horizon, year of the study, commissioning and executing institutions.

However, the most interesting to us is the classification according to the predominant context of the study (table 1).

Table 1. The distribution of Polish evaluation studies according to their predominant context. Source: own calculations based: on Baza..., 2010.

The predominant evaluation perspective	Number of evaluation studies	%
1) regional and territorial development	85	20.7
2) good governance	131	32.0
3) human resources development	76	18.5
4) socio-economic development	21	5.1
5) innovativeness of the economy	51	12.4
6) environment	14	3.4
7) development and modernization of infrastructure	32	7.8
Total	410	100.0

This point includes the following categories: 1) regional and territorial development, 2) good governance, 3) human resources development, 4) impact of the National Cohesion Strategy on socio-economic development, 5) innovativeness of the economy, 6) environment, 7) development and modernization of infrastructure. In quantitative terms, the most common types of Polish evaluation studies include those oriented at good governance, regional and territorial development, and human resources development. The number of studies focussing on the ecological aspects of the adopted strategies and programmes is rather low.

It is worth noting that the term *sustainable development* is missing in this catalogue of evaluation perspectives. The evaluation reports are categorised according to the strategic thematic areas. They stem from the *Evaluation Plan of the National Strategic Reference Framework*, though it happens to be difficult to attribute certain multi-faceted evaluation studies to a given category. The classification is therefore based on the predominant evaluation context. Let us define briefly the logic of each type of evaluation studies distinguished in the database:

Ad. 1: Evaluation studies focused primarily on the territorial dimension of implementation of the *National Development Plan* (NDP) and the *National Strategic Reference Framework* (NSRF). They are aimed at assessing the impact of the programmes on regional and spatial development of the country and their contribution to regional, territorial, and social cohesion in Poland.

Ad. 2: Evaluation studies oriented at the impact of the adopted strategies on building public administration capacity and on the implementation of the good governance principle in the institutional system of public administration as well as on its ability to carry out tasks in the field of public policies efficiently and effectively. The processes of policy implementation are subject to evaluation, with an emphasis on the quality of coordination and cooperation of the involved institutions and their capacity of programming, implementing, monitoring, and evaluating development measures.

Ad. 3: Evaluations that aim to assess human resources development and the income of NDP and NSRF on improving the quality of human capital. Particular attention is paid to the impact on improvement of the education level of the society and of the quality of education on the reduction of unemployment level, increasing the employment level and promoting entrepreneurship.

Ad. 4: Evaluation studies that aim to provide a comprehensive assessment of the impact of NDP and NSRF on the Polish economy. They focus on the analysis of the influence on economic growth acceleration, employment growth as well as socio-economic and territorial cohesion. One of the major instruments of such studies is the macroeconomic assessment carried out with the use of econometric modelling.

Ad. 5: Evaluation studies concerning the effectiveness, efficiency, relevance, utility and sustainability

(in the sense of permanence) of instruments of NDP and NSRF and their consequences for the development of innovativeness of enterprises and the whole economy. They assess the economic and financial instruments adopted within enterprises and measures oriented at the development of the institutional business environment supporting competitiveness and innovativeness. Essential aspects of such evaluation studies concern issues related to the Research and Development processes and development of the information society.

Ad. 6: Strategic Environmental Assessments. They are specific in focusing on the potential impact of programmes, projects, or measures on the natural environment. The SEA of the NSRF will be discussed in more detail below.

Ad. 7: Evaluation studies that assess the impact of the development and modernisation of the technical and social infrastructure within the NDP and NSRF on the socio-economic development of Poland, in particular on enhancing the attractiveness of the country for investors. Such evaluations assess intervention in the field of transport, environmental, informational, social and energy infrastructure, including the impacts of projects co-financed by the EU funds on the natural environment.

Therefore, the approach adopted in the classification reflects the general lack of the sustainable development context in Polish evaluation studies. They tend to focus only on separate aspects of SD, and an integrated approach seems to be missing. Certain aspects of the SEA procedure may be considered as an element of integration of the SD assumptionss (Haładyj, 2006), but there were no evaluation studies in the database that could be described as fully-fledged SD evaluations.

Apart from this quantitative analysis, we tried to identify the presence of the SD perspective in the Polish evaluation studies by examining the kind of language used in their titles. It turned out that the term *sustainable development* was virtually inexistent in the titles of evaluation studies included in the database.

One exception was a few studies related to the Operational Programme for Fisheries, but only because the official name of the programme included this term.

A second notable exception was the *Manual of Good Practices for Sustainable Development*, which was worked out to facilitate implementation of the Regional Operational Program for Zachodniopomorskie Voivodeship for the years 2007-2013 (*Poradnik*... 2008). The main objective of the Manual was to identify which practices for sustainable development will better contribute to coordination and stimulation of development processes in the region, taking into account economic, environmental and social aspects and bearing in mind that they should pose the least threat to the environment, not hamper the economic growth and not increase the poverty margin. The Manual contains examples of good practices in particular categories of projects of *Regional Operational Program for Zachodniopomorskie Voivodeship* and shows how to build regional potential for using these funds for promotion of sustainable development. However, it has to be admitted that it is not an evaluation study, though it is included in the database.

Therefore, this second procedure of examining the titles of evaluation studies confirmed our conclusion drawn on the basis of the analysis of the predominant perspective as defined in the database.

Strategic Environmental Assessment of the National Strategic Reference Framework

The Strategic Environmental Assessment (SEA) of the draft *Polish National Strategic Reference Framework* (NSRF) for 2007-2013 was commissioned by the Ministry of Regional Development and performed by a team of experts from the Environment Protection Institute (Błaszczyk *et al.*, 2006: 4-12). The forecast aimed to identify environmental impact categories and to verify the conformity of the NSRF with current requirements and needs in the field of environment and sustainable development (explicitly mentioned in the analysed document) as well as to propose solutions susceptible of eliminating or reducing any deficiencies of the strategy. NSRF is a strategic programming document developed on the basis of the *National Development Strategy for 2007-2015*, focussing on the implementation of the EU cohesion policy by Poland. NSRF concerns measures undertaken by the Polish government to foster sustainable economic development, competitiveness growth and higher employment. Moreover, NSRF serves to ensure effective and efficient support for regions lagging behind and social groups endangered by exclusion and to help restructure problem industries and regions.

The SEA was made using the objective-led appraisal method. This method is recommended in the EU *Handbook on SEA for Cohesion Policy 2007-2013* and it had been tested in Poland in the Framework Strategic Environmental Impact Assessment of the *National Development Plan for 2004-2006*. This method aims to incorporate ecological aspects into the structure of the document subject to assessment. The policy and methods of taking into account environment protection goals and objectives are analysed.

Strategic assessments are performed for documents characterised by a very high degree of generality, making use of such categories as: goals, principles, priorities and types of measures to be taken. They become more concrete only in more detailed programmes of a lower level, and especially in individual projects. Therefore, the analysed factor having an impact on the environment may consist of

features/parameters of the whole economy and society on a given, usually substantial, area (sometimes features of selected economic domains or social groups) as well as a plan aiming to change these features/parameters and their possible effects. The element susceptible to the impact of economy and society in such assessments is the environment of the whole country or region, which due to its immense territorial coverage, is likely to be highly diversified. Under these circumstances, any forecast (strategic assessment) is faced with the dilemma of serious shortages of information, as both the factors influencing the environment and the elements of the environment which are influenced are not defined very precisely. Therefore, knowledge gaps and fields of uncertainty largely stem from the specificity of the SEA of strategic documents.

Having adopted the methodology of an objective-led appraisal, the evaluation team worked out the following plan to prepare the SEA:

1) To analyse the contents of the NSRF, including its principal goals and links to other documents.
2) To define the fundamental, crucial for NSRF and up-to-date ecological problems and objectives concerning the environmental situation in Poland, Europe, and world-wide, based on an analysis of the most important Polish and international strategic documents in this field, formulating the diagnosis of the ecological situation and main goals and priority actions for the future.
3) To define – on the basis of the above analysis – environmental issues and objectives, which should constitute assessment criteria, taking into account the initial research questions provided by the institution commissioning the SEA.
4) To analyse the completeness and relevance of the diagnosis and of the SWOT analysis.
5) To analyse the internal coherence of the document together with the adopted indicators for assessing its implementation, as there is no doubt that the coherence, clarity and lack of ambivalence of the NSRF will largely determine the efficiency of its implementation process, including the ecological impacts.
6) To forecast potential trends of changes in the field of environment in Poland in the counterfactual situation of not implementing the evaluated strategy (zero option).
7) To assess the environmental impacts of goals, assumptions and directions for action adopted in the NSRF, in particular to analyse their relationship with the adopted assessment criteria, to identify ecological issues left out from the analysed document (especially the diagnosis) and to identify the direction, strength and character of the correlations.
1) To prepare the preliminary version of the final SEA report and submit it to the commissioning institution.
2) To take into consideration received comments.

The main part of the SEA was performed with the use of a relationship matrix linking the assessment criteria with the NSRF objectives. A 7-point scale (from +3 to -3) was adopted. On the basis of the relationship matrix as well as reading reflections and team discussions, the evaluation team prepared a description of identified potential influences of the NSRF on the environment, taking into consideration shortages of the diagnosis and adopted indicators of implementation.

The following uncertainties (difficulties, knowledge gaps) linked either to the specificity of strategic assessments or to the contents of the analysed document were identified by the SEA team:

1. The analysed version of the NSRF contains very few indicators of reaching its objectives. Their selection method and target values do not guarantee an adequate incorporation of environment protection aspects.
2. The evaluated document was subject to frequent modifications, extensions and changes during the short period (about 2 months) when the SEA was being prepared, which made it difficult to carry out a systematic analysis of its content.
3. The analysed document does not show clearly enough the logical causal flow between the presented diagnosis, analysis of strengths and weaknesses and the proposed development strategy, which prevented an appropriate assessment of their environmental impacts.
4. The document lacks clear information on the zero option (the hypothetical situation in which the NSRF would not be implemented at all), although the described development scenario referred to this alternative.
5. Due to time limits imposed on the authors of the SEA, they had to use the set of criteria elaborated for the needs of the evaluation of the *National Development Plan 2004-2006*, only with necessary adaptations.
6. The time constraint reduced significantly the possibility of consultations in the process of the SEA preparation.
7. The simultaneous preparation of Operational Programmes while the final version of the NSRF was still unavailable may result in certain inconsistencies between these documents.
8. There was a lack of reference in the document under study to tasks and measures to be implemented in the same period as the NSRF, but in the framework of other strategies, programmes and projects concerning the whole country. In particular, there was no information which weaknesses will be addressed by other documents and to what an extent their imple-

mentation will support the measures undertaken according to the NSRF.

The evaluation team estimated that the potential influence of the NSRF implementation on the environment is:

1. Highly ambiguous – beside positive impacts, multiple negative effects are possible, and it is impossible to say which impacts will prevail in concrete cases, even if the general outcome seems to be rather beneficial.
2. Subject to a high level of uncertainty – taken into consideration the lack of sufficiently precise information, it was necessary to make certain assumptions, which may turn out wrong.

The SEA criticised the NSRF for:

1. excluding environmental issues from the strategic goal of the NSRF;
2. not referring to these issues (e.g. ecological awareness, negative environmental side-effects of certain actions, preferences for environmentally-friendly activities etc.) in the description of detailed objectives;
3. not mentioning certain essential environmental problems in the diagnosis and SWOT analysis;
4. insufficient differentiation of the directions of planned activities depending on different development predispositions of Polish regions (the predominant approach was universalistic with indicators referring to EU averages of data for EU-15);
5. problems with internal coherence of the NSRF document;
6. focusing on *end-of-pipe* solutions (i.e. curing symptoms or effects), and not on preventing problems and eliminating or limiting their causes.

The evaluation team complained that environment in the NSRF tends to be treated in a very traditional way as:

1. A sectoral and not horizontal issue, which would require concerted actions in all spheres of life (not only infrastructure, but also micro- and macroeconomics, education, public administration, civil society etc.).
2. A difficulty/barrier to development, and not as one of the factors contributing to development (no less important and valuable than human capital, financial resources, fixed assets, technology and research potential).
3. An element which requires special care and protection because of legal constraints, especially international commitments of Poland, and not because of the fact that it is a rational approach in the well understood interest of the present and future generations.

The evaluators stated in the SEA that sustainable development issues were practically absent from the NSRF, as both the strategic goal and horizontal detailed objectives did not refer directly to the environment or to the SD.

Challenges identified by the National Evaluation Unit

The National Evaluation Unit situated in the Polish Ministry for Regional Development identified the following challenges facing the evaluation process in Poland:

1. Providing arguments for the discussion on the future shape of the cohesion policy.
2. Making use of the evaluation tool in the process of preparation and implementation of national policies not related to the EU.
3. The coordination of the cohesion policy evaluation with the Common Agricultural Policy evaluation processes.
4. A stronger connection between evaluation and programme management.
5. The use of evaluations to allocate the reserve of execution.
6. Dissemination of evaluations at a lower level of governance, including at the project level.
7. A rapid development of the potential to commission and absorb evaluations at the regional level.
8. Further developments in the methodology of evaluation studies.
9. The use of meta-evaluations to provide a comprehensive assessment of the cohesion policy implementation.
10. Carrying out of ex post evaluations for the former programming period.
11. Evaluation of issues related to territorial cohesion.
12. More active participation of academic circles in the growing market for evaluation services; 13) a wider use of evaluation results (Bienias *et al.,* 2008: 63-67).

Therefore, this list of challenges also lacks the term *sustainable development*.

Ad. 1: The discussion on the future cohesion policy has already commenced. It may be expected that there will be more and more critical voices on the part of net contributors to the EU budget. They will concern effectiveness and efficiency of programmes co-financed by the EU structural funds. There is a serious threat of reducing future support from the EU budget. Therefore, the Polish National Evaluation Unit believes that the task of evaluation is to provide solid arguments in favour of the implemented policies. At the same time, certain weaknesses of the current policies must be disclosed by the evaluations in order to build arguments on the future assumptions of the post-2013 EU cohesion policy. The interest of Poland includes stronger orientation of the EU policy on development. That is why evaluations should emphasise not only positive effects of the structural actions for Poland, but also for the *old* EU-15. This is especially relevant due to the observed shift in the paradigm of the support from cohesion and equalisation of

opportunities towards development and competitiveness. It is worth noting that Poland – because of the scale of EU funds engaged – may be treated as a kind of laboratory for the whole EU cohesion policy. That is why quality of programmes implemented in Poland will impact heavily on the prospective scale and shape of the EU cohesion policy.

Ad. 2: There is a widely recognised weakness of Polish administration in the field of strategic programming. Draft strategies and programmes often lack such fundamental elements as budgets, quantified objectives, specified implementation system, monitoring and evaluation requirements. It is absolutely crucial to transfer best practices resulting from the implementation of EU programmes to other public policies undertaken in Poland. This positive spill-over of structural funds on national policies is a frequently underestimated benefit of the EU cohesion policy in the new Member States. This kind of transfer constitutes nevertheless a great challenge, especially in the field of evaluation, as it is one of the most innovative and demanding tools used to improve the quality of governance. What is essential is consequence in building an appropriate potential inside the public administration as well as persuading the decision-makers to make use of this instrument in their respective areas of competence. Legislative measures to make evaluations obligatory would be welcome.

Ad. 3: One of the conditions of effectiveness of measures undertaken in the field of the Common Agricultural Policy and the cohesion policy is their synergy and complementarity. The close relationship of the CAP with the regional policy gives rise to the need for co-ordinating the evaluation processes of the aforementioned policies. The National Evaluation Unit, which is situated at the Ministry of Regional Development, aims to co-operate with its counterpart in the Ministry of Agriculture and Rural Development.

Ad. 4: The length of the EU financial perspective – 7 years plus 2 additional years for implementation according to the n+2 principle – encourages changes in operational programmes as an indispensable instrument of management. A lack of proposed modifications could be considered as a certain deficiency in public management skills due to the dynamics of the socio-economic situation, taking into account the recent financial and economic crisis in Europe as well as other factors. We must bear in mind that it is the role of evaluations to provide justification for modification proposals within the operational programmes. Otherwise, the European Commission may refuse to modify the documents. Taking into consideration the time requirements of evaluation studies, it is necessary to incorporate evaluations in the current process of public intervention management. Evaluation should serve to diagnose potential changes in the programming documents and to adjust the programmes to real and dynamic needs.

Ad. 5: Poland, as one of few member states, decided to maintain a performance reserve. It was set at the level of 3% of funds dedicated to the Convergence Objective. It will be allocated after evaluating the performance of implementation of operational programmes. Its role is to strengthen the most effective and efficient priority axes. What is crucial is that its allocation should depend on evaluation studies, and not only on the financial aspects and simple absorption capacities. The assessment, should be based as much as possible on real effectiveness and efficiency of the intervention as well as the quality of implementation of the programmes.

Ad. 6: A great challenge for the evaluation process is a decentralization of the system stimulating the development of evaluation culture at lower levels of implementation, including at the level of individual projects. Although there is no formal requirement to carry out evaluation studies at the project level, such behaviours should be promoted as an important tool of managing the EU structural funds. It is particularly relevant for big infrastructural projects, as they determine the success of the programme.

Ad. 7: Polish administration bodies operating at the regional level in the form of self-governments have been made responsible for the management of regional operational programmes as well as certain measures within the national operational programme Human Capital. Therefore, the marshal offices (regional self-governments) need to order and use evaluation studies for this kind of programmes. Their previous experience in this filed had been rather limited, so it is crucial to create an appropriate potential of the evaluation units at the regional level. The Ministry of Regional Development supports these officials by trainings in the field of evaluation.

Ad. 8: The reliability and quality of evaluation studies is one of the key factors determining their effective use. Obtaining reliable study results constitutes a real challenge, especially if the net effect of the cohesion policy needs to be singled out. More rigorous measurement methods need to be adopted, including a wider use of control groups. High credibility of the evaluation study results is also very important from the perspective of discussions on the future cohesion policy. One of the recommended solutions is a more common use of macroeconomic models, which enable a holistic assessment of impacts of the cohesion policy. Preferably, there should be several independent macroeconomic models concerning the same problem, as it was the case with the EU *4th Cohesion Report*.

Ad. 9: The number of available evaluation studies continues to grow, and its dynamics will increase in the near future. At the level of the *National Devel-*

opment Programme/National Strategic Reference Frameworks, so many evaluation studies have been conducted to date that it is more and more possible to use an instrument called meta-evaluation. We define it as using the results of previous evaluation studies for the purpose of conducting a current evaluation study. More comprehensive and representative conclusions can be drawn thanks to meta-evaluation techniques.

Ad. 10: Although it is the European Commission that is responsible for ex-post evaluation of the 2004-2006 programming period, it is advisable to commission these studies at the national level, as well. It would enable to adjust the scope of the studies to the needs of Polish administration in order to better allocate the performance reserve and the quality of implementation of the structural funds in the current programming period. Such a move would also have its political implications. Thanks to it, Poland would be perceived in the EU-15 (and especially by the net contributors to the EU budget) not only as the greatest beneficiary of the EU policies, but also as an actor caring about their effectiveness and efficiency.

Ad. 11: The concept of territorial cohesion has been introduced as one of the dimensions of the cohesion policy, alongside social and economic dimensions. Territorial impact assessment has recently gained attention as a tool to improve the coherence of sector policies with territorial cohesion objectives (Golobic & Marot, 2011). European experiences in the field of evaluating the territorial dimension are limited. We lack widely accepted indicators and methods in this domain. One of the notable exceptions is the ESPON research programme. It has been running since 2002. Its aim is to equip politicians and practitioners with systematic, up-to-date and comparable knowledge on trends in territorial development of Europe and on the impact of implemented policies on regions and rural areas.

Ad. 12: The quantity of available funds for evaluation studies grows very quickly in Poland. In the programming period 2004-2006, it was about 15 million PLN (1 PLN = *circa* ¼ EUR) at the disposal of the National Evaluation Unit and all the managing institutions. For the financial perspective 2007-2013, these funds amount to almost 190 million PLN. Therefore, the funding available for evaluation studies has increased six-fold (without adjustment for the length of the period). The number of commissioned evaluation studies rises even faster, as at the regional level, these are mainly small and medium-sized studies. This process must be followed by the evaluation market, taking into account the expectations for better quality of evaluation as well. In Poland, the most active actors on the evaluation market are consulting companies. The involvement of universities and research institutes is rather limited compared to other European countries. A more active participation of higher education institutions and research institutes in the process of conducting evaluation studies could on the one hand increase the supply of such services and on the other – improve their quality. Especially lower-value commissions may be addressed to this kind of institutions, as the outdated administrative structure of most universities often fails to overcome the cumbersome tender procedures for bigger projects. There have been several cases when universities participating in tenders for evaluation studies were rejected because of failing to fulfil the formal requirements, in spite of good quality substance of their proposals.

Ad. 13: Extending the use of evaluation study results and improving their usefulness constitute major challenges facing the whole evaluation process. Even in countries with long traditions of evaluation, institutions responsible for it have to put in a lot of effort so that their recommendations be followed in practice. The extent to which evaluation study results are used, is determined by many elements: adjusting the subject and scope of the study to real needs, quality and reliability of the study, getting the results at the right moment and putting them through to the decision-makers. Poland, with a relatively short history of the evaluation culture, faces especially important challenges in this regard.

Conclusion

The adoption of the Sustainable Development perspective in Polish evaluation studies is still virtually inexistent, despite some positive trends in the field of building the evaluation culture, which are supported by the requirements imposed by the European Union. The predominant evaluation perspectives tend to focus only on selected dimensions of the SD. One of the reasons may be shortage of demand for this kind of evaluation studies. Secondly, the potential of firms preparing evaluation studies commissioned by the Polish authorities may be insufficient to perform this task, taking into account the growing (quantitatively) demand for various specialised evaluation studies as well as the relatively weak involvement of representatives of higher education and research institutes in the processes of evaluation.

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Przypisy powinny być numerowane, a ich treść umieszczana na dole każdej ze stron.

Prace do druku proszę przesyłać na adres redaktora naczelnego drogą elektroniczną:
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