



**WSPOMAGANIE INFORMATYCZNE
ROZWOJU
SPOŁECZNO-GOSPODARCZEGO
I OCHRONY ŚRODOWISKA**

Suplement

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Książka wydana dzięki dotacji KOMITETU BADAŃ NAUKOWYCH

Książka zawiera wybór artykułów poświęconych omówieniu aktualnego stanu badań w kraju w zakresie rozwoju modeli, technik i systemów zarządzania oraz ich zastosowań w różnych dziedzinach gospodarki narodowej. Wyodrębnioną grupę stanowią artykuły omawiające aplikacyjne wyniki projektów badawczych i celowych KBN.

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Zastosowania informatyki w ochronie środowiska

RETHINKING RURAL SUSTAINABLE DEVELOPMENT - LANDSCAPE, MAIN DRIVING FORCES AND NEW CHALLENGES AFTER EU ACCESSION OF POLAND¹

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In this paper author presents a state of sustainable development paradigm on the rural areas and focuses on the main driving forces of changes and suggests possible background for application of the multi-criteria decision aiding in regional sustainable development where landscape is concerned as main goal of sustainable modeling. The paper summarizes achievements of the State Committee for Scientific Research (KBN) research projects.

Keywords: sustainable development, rural areas, driving forces, landscape, multi-criteria decision aiding

1. Introduction

The main purpose of this paper is to present the achievements of the research projects in which author was and is engaged. Author focuses on the multidimensional scientific and utilitarian aspects of multi-criteria decision making under sustainable development paradigm and highlights priorities, objectives and main driving forces of the changes after European Union (EU) accession of Poland on the basis:

- EU project (FP6) entitled "Sustainable agriculture and forestry in large protected areas (e.g. NATURA 2000) with regard to regional economic development" (No QLRT-2001-02367, Proposal Acronym SAFE; Key action 5: Sustainable agriculture, fisheries and forestry, and integrated development of rural areas; Thematic priorities: 5.5. New tools and models for the integrated and sustainable development of rural and other relevant areas), in which author was engaged,
- research project of the State Committee for Scientific Research (KBN) No PBZ-KBN-086/P04/2003 entitled "Extreme meteorological and hydrological events in Poland – The evaluation and forecasting of the extreme events impacts on the men environment", started at 2004 in which author is engaged in the 7.3 sub-task entitled "Land use land cover change model under change loss potential caused by extreme events", and

¹ Project of the State Committee for Scientific Research (KBN) No PBZ-KBN-086/P04/2003 and Inner University Grant of the Agricultural University in Szczecin No BW/HE/03/03

- authors' habilitation thesis entitled "Rural areas development as an evolution of the environment-economics-society dissipative system", started at 2003 (university research project).

Communities across the nation are chosen to complement traditional planning approaches with analytical decision-making tools to help them plan their sustainable futures. Today, with recent technological advances, a number of technologically-based tools are available to communities to use for assessing the impacts of various planning decisions and to help balance the demands of growth, environmental sustainability, and quality-of-life needs. Technologically-based tools such as Analytic Hierarchy Process (AHP) models (Saaty, 1980, 1990, 1994; Saaty, 1987; Bender et al., 2000; SAMI 2000; Miklewska, 2004), and many others (Holling, 1999; Janssen et al., 1999; Ludwig et al., 1997), and geographic information systems (GISs) provide increased clarity on probable or alternative outcomes, and thus enable decision-makers to more effectively use traditional planning tools.

1.1. Aims of the research and study areas

Main aims of the study were identification of:

- main indicators of regional rural sustainable development,
- main driving forces of changes,
- possible conflicts on the rural areas,
and
- rethinking landscape – functions and values,
- rethinking sustainable development.

Nearly 18 % of the EU is covered by protected area status through designations such as NATURA 2000 or national parks. The majority of these areas are used for agriculture or forestry. Particular land use in these areas is often essential for the maintenance and protection of natural resources, biodiversity and the cultural landscape. These areas are subject to policies aimed at protecting the environment and to other programmes and regulations such as the Rural Development Regulation (Regulation (EC) n° 1257/1999), Common Agricultural Policy (CAP) commodity regimes, Pan-European Biological and Landscape Diversity Strategy and forestry measures all of which have an impact on the viability of agriculture and forestry.

There is an urgent need for research and action along the lines set out in mentioned above projects. The projects investigate land use in selected large "protected areas" with a focus on improving the sustainability of agriculture and forestry. All relevant sectors in the region (ecology, agriculture, forestry, recreation, historic sites, tourism) both at farm level as well as at regional level were been taken into account.

The three projects listened above are placed in the main European research stream.

At Lisbon (2000), EU leaders stated their objective of making the EU *"the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion"* by 2010. The Lisbon Strategy (2000) was supplemented by a third, environmental pillar following the adoption of the EU Sustainable Development Strategy at the Göteborg European Council in 2001 and, on the agriculture field, the reforming of the Common Agriculture Policy (CAP) in 2003. The EU strategy for sustainable development was adopted by the European Council in Göteborg in June 2001. It focuses on four key-priorities: limiting climate change and increasing the use of clean energy; addressing threats to public health; managing natural resources more responsibly; improving the transport system and land use.

All these projects are linked with the common aim: improving of the land use land cover change methods under strong restriction conditions caused by sustainable land use rules and of the global problems such as reformed CAP, global climatic change and ongoing negotiating with World Trade Organization (WTO). Research area is the same in the three projects, namely, it is Zachodniopomorskie voivodeship area broadened by the four research areas in the EU (Germany, Austria, Great Britain, Slovakia) (Figure 1) and by the Oder River floodplain areas in the second case. Decision making process concerns large agriculture, forest, and protected areas with the predominating greater areas covered by the NATURA 2000 network. For the five research areas (two in Poland, one in Germany, one in Austria and one in Slovakia) (Miklewski, 2003) the very important factor to be included is the rising of floods and losses (Kundzewicz et al., 1999).

Rural areas cover 90% of the enlarged EU's territory and are home to approximately half of its population. Despite the decline of the primary sector over the last years, agriculture and forestry remain the main land users in the EU. Therefore these sectors play a key role in the management of natural resources in rural areas, and still have a valuable contribution to make to their socioeconomic development. But the viability of rural areas needs more than agriculture alone: Rural development policy needs to place agriculture in a broader context that also takes into account the protection of the rural environment, the quality of produced food, and the attractiveness of rural areas to young farmers and new residents.

With the accession of ten new countries, the Union's population increased on 1 May 2004 by 20%, its land area by 23% but its wealth by only 4%. The number of farms rose by 74% and the number of farmers by 56%. And it started precisely then, when the inequalities and divisions occurred greater than they were before, that we hear experts, professors and even political leaders say that the cohesion policy is antiquated and out-of-date by virtue of its age. The European Spatial Development Perspective (ESDP) prepared by the Committee on Spatial Development (CSD, 1999a) and adopted by all Member States on a voluntary basis, sets out objectives and guidelines for balanced and sustainable spatial development. About one third of

the 60 agreed policy options in EU are directly related to land use, and especially to the question of how to control the physical expansion of cities and towns.



1. "Wolinski National Park" (WNP) (Poland)
2. "The Lower Oder Valley National Park" (Poland)
3. "NATURA 2000 site Uckermark-Barnim" (Germany)
4. "Yorkshire Dales National Park" (United Kingdom)
5. "NATURA 2000 site Steirisches Joglland" (Austria)
6. "Morava-Dyje floodplains" (Austria, Slovakia)

Figure 1. Study areas all projects, source: own investigations.

Study areas encompass rural areas, agriculture, protected areas, NATURA 2000 network placed in the Zachodniopomorskie voivodeship.

Polish study centers (protected areas):

1. Wolinski National Park is located at the mouth of Oder River, in the North-Western Poland (Zachodniopomorskie voivodeship), close to the Polish-German border. It protects highly valuable north-western part of the Wolin Island. The Park was established in 1960 on the area of 4 844 ha. It was extended in 1996 by incorporating 1 nautical mile broad belt of Baltic coastal waters in the north and delta of Swina River. Inclusion of the part of Pomeranian Bay and

inner salt waters of Szczecin Bay has made the Woliński National Park the first maritime park in Poland. The total area of the Park today is 10 937 ha, of which forests covering 4530 ha (41%). 6 forest communities of a total area of 165 ha (1,5%) are under strict protection. Three marked walks lead along the Baltic shore or across the woods. Besides tourism fishery is an important economic factor.

2. The Lower Oder Valley National Park (*German: Nationalpark Unteres Odertal; Polish: Park Krajobrazowy Dolina Dolnej Odry*) is a common German - Polish nature reserve. It comprises the western banks of the Oder River within the Uckermark district in Brandenburg as well as the eastern (Polish) banks further north. The area is 165 km² (Germany 105, Poland 60 km²); together with adjoining nature reserves in Germany and Poland the total area is 1172 km². The park was founded in 1995. Rare animals in the region include the Black Stork, the Aquatic Warbler, the Corncrake, the European Otter and the European Beaver.

1.2. Methodological aspects of the regional rural sustainable development modeling

The key question that faces policy makers is the allocation of resources to different available activities. The ultimate goal is to reach a "satisfying" situation where a good compromise has been obtained between somewhat conflicting goals related to economic efficiency, environmental damage reduction, public health, etc. Sustainable regional development policies aim to increase prosperity (economic capital), enhance social well-being (social capital) while protecting the environment and natural resources (natural capital). While noble in intent, they rarely have clear operational plans and monitoring strategies.

Multi-criteria decision aid (MCDA) method is able to widen the panorama of the study and let analysts to consider different, concurrent and, sometimes, even opposite aspects. This feature makes them suitable to provide solutions for idle issues, where not only efficiency seeking, but also distribution and equity questions have to be matched. In this respect, equity is especially important for applications in which sustainability is a purpose, given that trans-generation and intra-generation disparities, embedded in the Brundtland Report (1987), are the main concerns to be solved. This multidimensionality is a characteristic of most questions concerning sustainable development. MCDA is therefore suitable for supporting decision making dealing with sustainability issues. It allows the use of such heterogeneous criteria like costs and benefits of the project, environmental quality in physical and qualitative terms, social impacts in non-monetary terms, and even verbal descriptions of aesthetics (Munda, 1995).

Multi-criteria decision aid (MCDA) methods are used to support decision making in case of problems where conflicting economic, environmental, societal, technical, and aesthetic objectives are involved (Rodenburg et al., 2002). This is

why MCDA is increasingly applied for questions concerning sustainable development. These problems was investigated in the all above projects in which author of this paper was and is engaged.

A typical application of MCDA in the context of land use planning involves the classification of land zones according to land cover, agricultural exploitation, construction types and accessibility by road etc. These criteria might then be organized in one or several layers so as to define a suitable hierarchy for determining the corresponding preferences. The MCDA has also been applied to the problem of real estate selection. In the context of real estate valuation other empirical and analytical approaches such as the hedonic models have so far been more popular. More recently, the general dynamics of Geographic Information Systems have opened up interesting avenues for applying the MCDA to quantitative real-estate valuation using the so-called geo-index.

Sustainable development, (development that enhances the environment), is an issue that affects all aspects of life (Miklewska, 1995, 1996b, 1997). This issue has great significance for farmers. In choosing between conventional farming systems and alternative, more environmentally-friendly farming systems, farmers must weigh and prioritise different objectives (Figure 2).

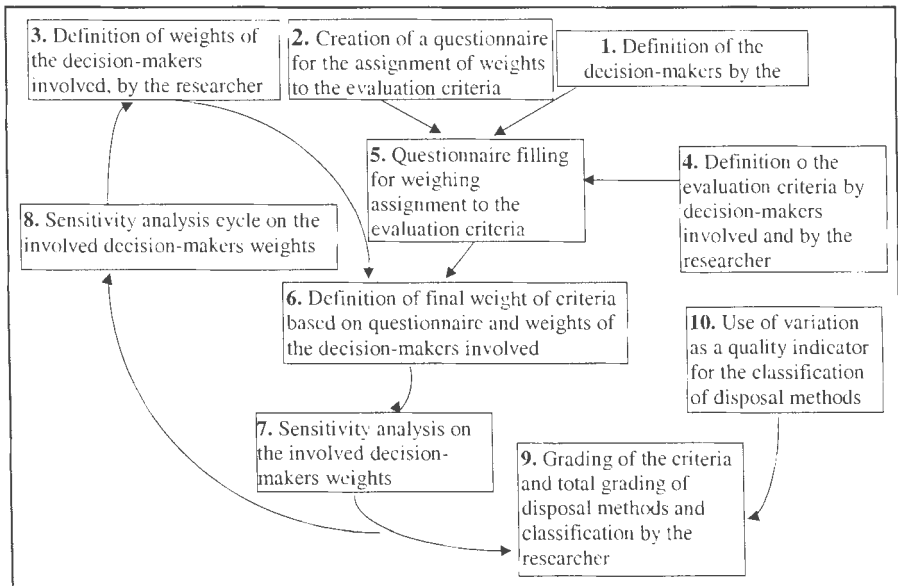


Figure 2. Decision process (AHP-Analytical Hierarchy Process), source: own investigations.

In addition to profitability, these objectives include issues related to the health of the farmer and the farm family and consumer concerns. To choose the

most appropriate farming system (conventional or alternative), farmers must not only assign weights to each farming system, but also assign individual weights to the underlying objectives related to profitability, health concerns, and environmental issues. This study uses the MCDA to analyze farmer's opinions on how they compare different objectives in choosing a farming system from a set of three alternatives. These alternatives are: a conventional farming system that relies heavily on agricultural chemicals; an organic farming system that does not use any purchased agricultural chemicals at all; and a biological farming system in which commercial fertilizers are replaced primarily, but not exclusively, by natural nutrients and where biological controls are favored over chemical pesticides.

As the decision problems in the field of sustainability are complex, the decision aid methods are not simple either. Sometimes they are very specialized and even experts using a MCDA method have the problem to decide which one is the best for their problem.

2. Main indicators of regional rural sustainable development

Main indicators encompass protected areas, land use, unemployment, income are presented in Table 1, 2 and 3.

Table 1. Main indicators – part 1.

Voivodeship	Average farm [2002]		Employed 2002 Persons/100 ha of agricultural land	Unemployed End of 2003 %	Employment rate %	Income All sectors % of EU25
	All ha	Private ha				
Poland [average]	9,28	7,7	18,0	20,0	51,5	45,1
EU [average]	18,4		4,5	9,1	NA	100
Dolnośląskie	9,35	7,35	13,8	26,1	47,6	46,3
Kujawsko-Pomorskie	10,74	9,50	16,9	21,8	50,6	40,5
Lubelskie	5,55	5,14	29,5	15,0	56,1	31,5
Lubuskie	11,57	8,70	9,9	24,5	45,9	40,7
Łódzkie	6,40	5,47	27,5	19,7	52,8	40,9
Małopolskie	2,56	2,10	53,9	13,9	54,6	39,9
Mazowieckie	7,39	6,09	24,4	13,7	57,1	68,3
Opolskie	9,52	7,60	18,0	19,2	50,3	37,5
Podkarpackie	2,83	2,59	47,0	20,3	53,2	32,4
Podlaskie	11,28	9,60	18,9	14,5	54,8	33,6
Pomorskie	14,76	11,33	11,9	21,5	50,2	45,4
Śląskie	3,17	2,15	34,0	16,2	46,9	49,6
Świętokrzyskie	4,37	3,65	39,5	18,5	50,3	34,9
Warmińsko- Mazurskie	16,65	14,00	9,0	30,6	46,0	33,8
Wielkopolskie	10,14	9,00	18,1	15,4	52,9	47,8
Zachodniopomorskie	17,57	14,27	7,1	26,8	45,8	45,2

Source: GUS, EUROSTAT and own investigations, NA – not available.

Table 2. Main indicators – part 2.

Voivodeship	NATURA 2000		Forest 2003	Population	Population	Population Rural areas	Population Rural areas
	Area						
	Ha	%	%	Persons	%	Persons	%
Poland	3 175 862.7	10,2	28,6	38 282 657	100	14 683 220	38,4
EU	NA	18,0	32,0	456 791 700		NA	NA
Dolnośląskie	293 568.9	14,7	28,4	2 904 000	7,59	833 448	28,7
Kujawsko-Pomorskie	158 790.8	8,8	23,0	2 069 000	5,40	786 300	38,0
Lubelskie	84 332.6	3,4	22,3	2 242 000	5,86	1 197 228	53,4
Lubuskie	203 084.7	14,5	48,2	1 008 000	2,63	362 880	36,0
Łódzkie	48 760,3	2,7	20,6	2 601 452	6,80	913 110	35,1
Małopolskie	116 753,7	7,7	28,3	3 237 200	8,46	1 605 500	49,6
Mazowieckie	171 626,0	4,8	22,0	5 130 400	13,40	1 811 031	35,3
Opolskie	86 162,0	9,2	26,2	1 057 994	2,76	507 837	48,0
Podkarpackie	246 293,9	13,7	36,4	2 105 050	5,50	1 252 505	59,5
Podlaskie	392 793,9	13,7	29,6	1 208 606	3,16	496 737	41,1
Pomorskie	130 760,8	7,1	35,7	2 186 004	5,71	699 521	32,0
Śląskie	91 880,7	7,5	31,7	4 731 500	12,36	993 615	21,0
Świętokrzyskie	113 851,4	9,7	27,0	1 319 611	3,45	712 590	54,0
Warmińsko-Mazurskie	213 657,8	8,8	29,7	1 428 400	3,73	568 503	39,8
Wielkopolskie	354 692,0	11,9	25,3	3 356 458	8,77	1 423 138	42,4
Zachodniopomorskie	468 853,2	20,5	34,5	1 696 982	4,43	519 276	30,6

Source: GUS, EUROSTAT and own investigations. NA – not available.

Land use in proposed Special Protection Areas (SPA) and Special Areas of Conservation (SAC) (based on Land Cover categories) is presented in Table 3.

Table 3. Land use in proposed protected areas in Poland.

Land cover	% SPAs	% SACs
Forests	42,6	57,6
Meadows and pasture	13,1	13,1
Arable land	21,2	17,7
Water reservoirs (including sea)	13,8	6,8
Others	9,3	4,8
Total	100,0	100,0

Source: Own investigations on the basis www.mos.gov.pl

In 2002, agricultural land accounted for 54 % (16,9 million ha) of the total area of the country with a rate of 0,44 ha of agricultural lands per capita. 38,4 % of the Polish population lived in rural areas of which 29 % worked directly in the agricultural sector. Furthermore 36 % of all unemployed people lived in rural areas. Agriculture still plays an important role in the Polish economy. However, since the last decade a decreasing share of farming in the GDP has been observed (in 1988 - 11,8 % of GDP, in 1994 - 6,4 % of GDP and 2001 only 3,3 %).

The average farm size in Poland exhibits considerable regional variation. The highest degree of fragmentation of individual farms occurs in the southern

voivodeships where the average area of farmland per farm is 2,10 ha in Małopolskie and 2,15 ha in Śląskie. The farms with the largest average size are found in the northern voivodeships where an average farm covers more than 14,27 ha in Zachodniopomorskie, 14,0 ha in Warmińsko-Mazurskie and 11,33 ha in Pomorskie.

3. Main Driving Forces of the Changes

Spatial planning is related to space in the context of locality, territory or region, and tries to solve the spatial aspects of all problems in one locality. In this aspect spatial planning differs from sectoral planning which is related to an administrative sector, function or branch (Baltic21 1999). Spatial planning is directly related to the key-issues of sustainable development due to the cross-sectoral and integrated approach needed.

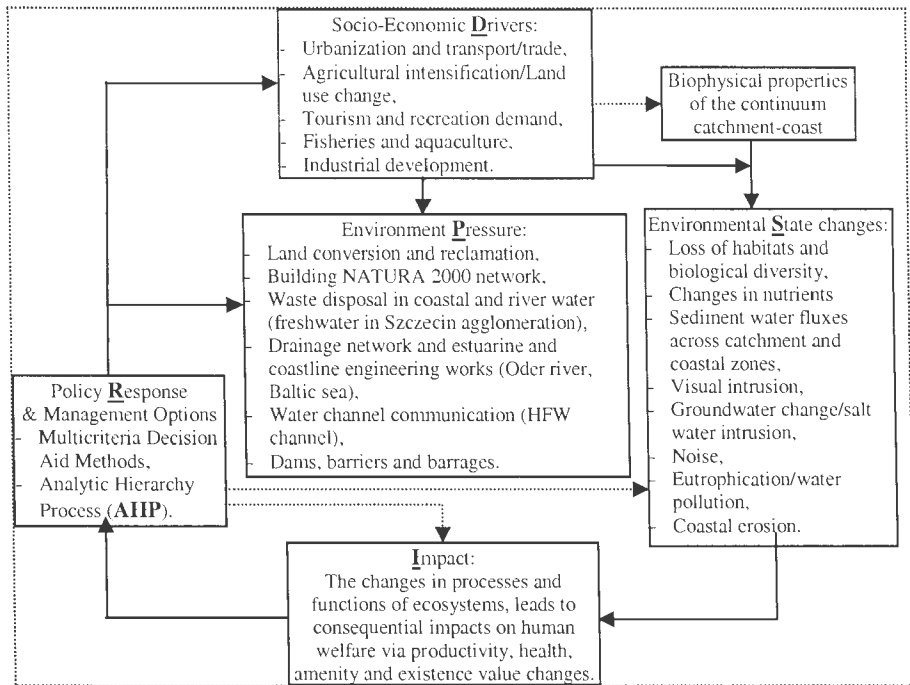


Figure 3. The Monitoring-Data-Information-Assessment-Reporting chain in sustainable development planning process in regional scale, source: own investigations.

The integrated approach needed in spatial planning for sustainable development calls for a framework for structuring of information on cause-effect relationships and related indicators. Various frameworks are in use in different organizations. OECD uses a Pressure-State-Response (PSR) model for organizing environmental information (OECD 1993). Human activities exert pressures on the

environment (pressures) which result in changes in quality and quantity of natural resources (state). Society responds to these changes through economic, environmental and sectoral policies (response). In the preparation of a list of indicators for sustainable development including social, economic, environmental and institutional aspects of sustainable development UNCSO use a Driving Force-State-Response Framework (DSR). In the DSR framework, the term "pressure" has been replaced by that of "Driving Force" in order to accommodate more accurately the addition of social, economic and institutional indicators. The use of the term "Driving Force" allows that the impact on sustainable development may be both positive and negative as is often the case for social, economic and institutional indicators (UNCSO, 1999b). Author proposes following model (Figure 3).

As a fundamental political driving forces author enumerates the main: sustainable development, reforming of the decision process in EU, building NATURA 2000 network and transboundary influences.

3.1. Sustainable development

Timeline sustainable development in the European Union is below presented.

The Cardiff European Council (EC), held in June 1998, invited certain Council configurations (Transport and Energy, Agriculture, Industry and Development) to develop strategies for the inclusion of environmental protection requirements in their policies. In doing so, it laid the foundations of the process towards integrating environmental aspects into other policy areas (the Cardiff Process).

The Helsinki EC in December 1999 called upon the European Commission "to prepare a proposal for a long-term strategy dovetailing policies for economically, socially and ecologically sustainable development".

In Lisbon (March 2000), the EC defined a strategy, the principal goal of which was to make the EU "the most competitive and dynamic knowledge-based economy in the world" by 2010. The EC also set targets for employment, economic reform and social cohesion (the Lisbon Process). No reference was made to the environment or the overarching principle of sustainable development.

The European Sustainable Development Strategy was then presented in Göteborg in June 2001, where it was adopted by the Council. It adds the environmental dimension to the Lisbon strategy.

The EU aims to be the world's leading force on sustainability issues. Its strategy is intended to be a catalyst for political decision-makers and public opinion, to be an incentive to institutional reform and to change the behavior of companies and consumers. Furthermore, it should influence international cooperation and promote sustainable development world-wide using global partnerships as its main instrument.

In addition to the resolutions on poverty, social exclusion and the ageing population that are laid down in the Lisbon strategy, the main aims of the EU Sustainable Development Strategy include combating climate change, improving the use of renewable energies, addressing risks to public health, managing natural resources more responsibly, promoting ecological mobility and reducing land use. The EU's 6th Environmental Action Programme (EAP)* is one of the key means of implementing the Strategy.

The Sustainable Development Strategy is the subject of an annual spring report to the European Commission and it is also on the agenda at the Spring European Council. Here, progress achieved within the Strategy's framework is evaluated using what are known as structural indicators, and priority measures are determined in order to achieve targets.

The Strategy must be reviewed at the start of each new Commission's term of office, i.e. in 2004.

3.2. Reforming of the decision process in EU – CAP

On 26 June 2003, the EU Agriculture Ministers agreed to a fundamental reform of the CAP. This is likely to significantly change the way the EU supports its farming and could therefore have beneficial consequences for NATURA 2000. Here are some of the key changes:

1. **Single farm payments:** The vast majority of the CAP's direct payments will no longer be linked to production. Instead a "single farm" payment will replace most of the existing premia under the CAP. Farmers will receive "single farm" payments as of 2005, unless Member States consider they have specific reasons for delay, in which case they have until 2007 to comply with the change over. The "single farm" payment system is good news for NATURA 2000 since it ought to remove one of the factors driving agricultural intensification. However, there are fears that it could also lead to further land abandonment in areas of low profitability. Recognizing this, the reform does allow Member States who fear a risk of abandonment to maintain part of the per hectare payments in the cereal sector or for suckler cows and sheep.
2. **Cross-compliance with environmental legislation:** The "single farm" payment will be conditional upon keeping farmland in "good agricultural and environmental condition" and will be linked to the respect of a number of statutory environmental, food safety and animal welfare standards (i.e. cross-compliance). The provisions of the Habitats and Birds Directives are for the first time explicitly mentioned. Thus, only those farms that respect these legal requirements and maintain their farms in "good agricultural condition" will receive payments. If cross-compliance is not respected, direct payments will be reduced in proportion to the risk or damage caused. Again, this could be significant for NATURA 2000 sites since Article 6 of the Habitats Directive will

have to be respected. However, it will be important to see what the definition of "good agricultural and environmental condition" will finally be. The role of the farm audits set up to help establish and control cross-compliance at individual farm level will also be central to the success of this measure. Another consequence of cross-compliance is that Member States are also allowed to make additional payments of a maximum of 10% of the "single farm" payment, to encourage their farmers to adopt specific types of farming which are important for the environment (e.g. NATURA 2000) or for yielding quality products.

3. More money for the Rural Development Programme: The amount of money available for rural development will be significantly increased. This will result from a gradual reduction in direct payments to bigger farms over ten years (known as "modulation"). Eventually, an additional €1.2 billion a year will be made available for rural development on average.
4. A strengthened Rural Development Policy: The scope of rural development support will be widened to introduce new measures and to strengthen existing ones. These changes will apply as of 2005, but it will be for Member States and regions to decide which measures they wish to take up in their national or regional Rural Development Programmes. Member States have also been given an opportunity to increase the EU co-financing rates for agri-environmental measures up to 85% for the new Member States and Objective 1 areas of the EU-15, and up to 60% in the rest of the EU (the maximum co-financing rate used to be 75% and 50% respectively). This could help to address the problems of insufficient matching funds from national or regional budgets. It will also be possible to provide temporary and digressive support to cushion the effects of complying with particularly demanding environmental, hygiene and animal welfare standards imposed by EU legislation. Aid will be payable on a flat rate basis (max €10,000 a year per holding) and will be digressive for a maximum of 5 years. The most significant change for NATURA 2000 is however in the definition, under Article 16 of the Regulation, of Areas faced with Environmental Restrictions (AERs). Now exclusively linked to NATURA 2000 areas, Article 16 aims to support farmers to meet the provisions of the Birds and Habitats Directives, for instance in maintaining or adjusting their farming practices to the conservation needs of the NATURA 2000 sites. Schemes developed under Article 16 can be further supplemented by agri-environmental measures or ecological forestry incentives under Article 32. The flat rate for AERs in the past was €200/ha per year, but, as a result of the CAP reform, it is now possible to increase the premium to up to €500/ha/year in duly justified cases. This payment will also be digressive starting at €500 and ending at €200, spread over a period of 5 years.

The income situation in agriculture in the new Member States is difficult to assess. Not only do farms in the smallest size group earn a small income; this holds, in general, for the average of all farms. With the exception of Estonia and the Czech Republic, farmers in all other CEECs earn less than the average worker. In all

countries joining the EU in 2004, positive impacts on farm income are expected due to product prices moving upwards, closer to the EU-15 average, and direct payments of the CAP, although not all groups of farmers will equally benefit from accession. For example, calculations for Poland indicate that in the first year after accession, the gross farm income of the entire sector will reach 128% (direct payments: 35% of EU level) to 147% (direct payments: 55% of EU level) of that in the base year 2001/2002.

Overcoming the barriers to agricultural development comprising, *inter alia*, the current, disadvantageous rural agrarian structure, self-sufficiency of most farms as well as a dramatic problem of unemployment and educational backwardness, requires profound structural transformations. Poland's accession to the European Union and coverage of Polish agriculture and rural areas with instruments of Common Agricultural Policy (CAP) create an opportunity to improve economic effectiveness of agriculture and the situation of rural population on the labor market. Simultaneously the current lines of modifications within CAP enable development of Polish agriculture accompanied by respect for environment protection requirements and avoidance of excessive intensification of production - which is a problem in many EU Member States. This will be possible through access to resources and instruments whose introduction by Poland alone would not be feasible for many years to come due to high costs.

An immensely important instrument of support to agriculture under CAP instruments will be constituted by intervention measures aimed at securing to farmers fixed sales prices guaranteeing profitability of farming production. At present, unstable prices of agricultural products are one of major problems of the Polish agriculture. As a result of implementation of CAP market intervention mechanisms prices will stabilize, which shall allow for better planning of agricultural activity and improve loan-related credibility for banks. This will be affected mainly through introduction of the EU system of minimum and intervention prices, as well as an increase in the level of subsidies for producers of major agricultural products.

Upon accession to the European Union Polish agriculture will become covered by direct payment system. A part of payments to be received by Polish farmers (25, 30 and 35% of payments due in the years 2004-2006) will be allocated per each hectare of arable land (a simplified system). Additionally, in the first three years funding reallocated from CAP structural programmes will supplement this level up to 40% but this additional support proportional to land area will concern only those types of agricultural production that are eligible for direct aid schemes in the EU. It is also possible to top the payments up from the national budget.

The situation of the Polish agriculture will be positively affected not only by CAP instruments, but also by structural programmes targeted at support to entrepreneurship, labor market *etc.* Interaction between those various elements

comprising the stream of membership-related benefits for Polish agriculture and the rural areas, creates an opportunity to pursue coherent policy, taking into account the interests of both farmers and all rural residents. What is more, support to farm incomes through direct payments will be accompanied by mechanisms stimulating the investment process in agricultural holdings within CAP framework, e.g. through the programme supporting semi-subsistence farms. As a result, there will be a positive feedback between those instruments. Programmes comprising the Rural Development Programme (a programme for utilization of EAGGF-Guarantee Section structural instruments) and Sectoral Operational Programme (support to agriculture under EAGGF. Guidance Section) will serve the purpose of better utilization of direct payments and vice versa.

Accession to the European Union will entail two types of costs for Polish agriculture. Firstly, accession to the Common Market is related to several investments aimed at adjusting agricultural holdings to the EU's sanitary, health, veterinary etc. requirements. Hence Polish agriculture will have to make investments aimed at improvement in the quality and efficiency of agricultural production. Secondly, an increased profitability of agriculture will be accompanied by an increase in prices for means of production, although this development will take effect rather in a medium-term time perspective than immediately after accession.

Animal production farms will need to undertake significant pro-environmental investments. If required devices related to environment protection are missing, investment outlays are necessary in the amount of 3,0 – 17,6 thousand PLN per agricultural holding. However, the largest financing is required for adjustment measures in milk production, i.e. those aimed at meeting norms relating to milking, cooling and furnishing of premises. In a significant part of milk farms and milk processing plants, however, those investments have already been implemented. The total investment outlays ensuing from estimation of costs related to adjustment of Polish agricultural holdings to EU standards are set at EUR 1 708,9 million. A part of them will be financed under the framework of support from EU funds.

For a full assessment of the balance of costs and benefits, particularly as there is a transitional period for reaching full level of direct payments by Polish farmers, the key significance is played by integration net effect for various types of agricultural holdings. Net effect is a function of a change in the level of production costs, financial support under CAP and a change in the level of direct surplus ensuing from differences in agricultural products' prices between Poland and the EU. In this chapter such estimate was made for three models of farms - a subsistence farm, a semi-subsistence farm and a market-oriented farm.

Basing on this simulation one can state that coverage of the smallest farms (usually of subsistence character) by CAP instruments will significantly increase their agricultural incomes. According to the Agricultural Statistics Yearly of 2001 subsistence farms, with the area between 1 and 5 hectares, comprise as much as

56,4% of all farms and 19,5% of arable land in Poland. In the long run however, low investment potential of this farm group will result in a decline of significance of farms with an area of a few hectares within the entire output of the agricultural sector.

Semi-subsistence farms, producing both for own needs and for distribution, comprise 33,7% of all farms (approx. 900 thousand) in Poland. They can count not only for direct payments since there is a support programme under the Rural Development Programme specifically targeted at them. Agricultural income of those farms will significantly rise immediately after accession against current incomes due to location of farms in less favored areas and the subsidy of EUR 1 250 per annum under the so called support programme. Since the programme of subsidies in the amount of EUR 1250 - the major one for this group of farms - can last for a maximum of 5 years, it is extremely important for high incomes in the first years after accession to be invested instead of consumed.

Table 4. Impact of CAP mechanisms upon the profitability of agricultural holdings (in PLN).

	Small farm	Semi-subsistence farm	Market-oriented farm
Area (in ha)	3,5	12,5	35
Agricultural income	3 190	12 436	30 301
Total income	20 962	24 879	40 532
Direct payments	520	2 000	5 600
LFA payments	700	2 500	7 000
Support to semi-subsistence farms		5 000	
Total: EU support	1 220	9 500	12 600
EU support / agricultural income as a percentage	38,24%	76,39%	41,58%

Source: own investigations on the basis www.minrol.gov.pl. It was assumed that: LFA payments amount to 50 EUR/ha; direct payments amount to 40 EUR/ha (i.e. 25%); support to semi-subsistence farm amounts to 1250 EUR per farm; exchange rate: 1 EUR=4 PLN. Moreover it was assumed that all three farms are eligible for LFA support. The instrument targeted at meeting quality EU standards, agri-environmental programmes and support under structural policy were not accounted for. Changes in purchase prices and costs were not taken into account either.

Agricultural incomes in market-oriented farms will also increase, but this increase will be less than for the two previously analyzed categories. These results from the typical plant-growing character of farm production - differences in cereal prices between Poland and the European Union are very small, and in case of soft wheat or barley, prices are higher in Poland than in the EU. Nevertheless, due to large areas of market-oriented farms, proceeds from direct payments will be sufficiently significant for the farmers to find funds required for modernization and investments. In the perspective of several years, accession will enable attainment of

agricultural incomes comparable to those of German farmers and competing on an equal footing with EU farms. Due to plant-growing production profile, the simulation assumed a zero level for adjustment costs.

The Table 4 below shows that as early as in 2004 direct payments - jointly with other transfers - will be responsible for almost a half of agricultural incomes ($\frac{3}{4}$ of incomes in case of semi-subsistence farms). Given a permanent increase in the growth of payment level, one can assume that in a few years after accession the amount of support from the EU can exceed the hitherto size of agricultural income.

3.3. NATURA 2000 network and conservation the protected areas

EU Nature conservation policy is based on two main pieces of legislation - the Birds Directive (1979) and the Habitats Directive (1992) - and benefits from a specific financial instrument - the LIFE-Nature fund. Its priorities are to create the European ecological network (of special areas of conservation), called NATURA 2000, and to integrate nature protection requirements into other EU policies such as agriculture, regional development and transport.

National park, landscape park, nature reserve, monument of nature, ecological land - these are main forms of nature conservation according to Polish law. It is obvious however, that neither a park and a reserve, nor the legal basis which they were established upon can protect the natural environment. These are people, who either conserve nature within the park's borders or damage it. Soon, a new form of nature conservation shall be introduced in Poland - NATURA 2000 areas.

Due to Polish accession to the European Union, Poland is obliged to establish and protect territories included into the NATURA 2000 network (Table 2). All EU member states share these legal obligations.

The main aim of NATURA 2000 network is to protect areas in the European Union covering fragile and valuable natural habitats and species of particular importance for the conservation of biological diversity within the territory of EU. Member States have committed themselves to halting the loss of bio-diversity in the EU by 2010. As emphasized by the EU authorities, the biggest threat to bio-diversity is mankind. Through their activities, people contribute to the loss of habitats and species. In order to maintain bio-diversity in the EU, the Member States reinforce their national legislation and upgrade their nature conservation practices.

3.4. Transboundary influences (synergy, diffusion)

It is often assumed that a larger number of conventions and other legal instruments, rules and procedures addressing a specific environmental issue in a specific region result in a more effective and quicker solutions of the environmental problems through creation of "synergetic compliance system(s) at the regional

level". At the same time, as the practice of managing regional environmental problems shows, coordination of these different arrangements and interests of multiple actors involved is a resource consuming and difficult process; and often it does not achieve initially established coordination goals. In the Baltic Sea Region, preserving a good water quality is critical for the development of the region. One of the major challenges in the region is development of effective cooperative arrangements for management of transboundary waters inflowing into the Baltic Sea. Author this paper stressed that significant challenges remain in the management of transboundary (Poland – German) waters – rivers, lakes, wetlands and coastal lagoons – in the Polish Baltic Sea Region. They are particularly important since they include rivers draining large areas with diverse land uses that contribute to pollution of coastal lagoons and the Baltic Sea itself. In many cases Oder River and lakes are the primary sources for domestic, agricultural and industrial water supplies and are critical for maintenance of aquatic ecosystems.

The issue of coordination of institutional arrangements for water management in the Baltic Sea Basin came again into the center of discussions among politicians and water managers after the entrance into force of the Directive in 2000 (further Water Directive).

Implementation of the Water Framework Directive is based on the development of strong institutional arrangements – the Directive has many rules and procedures that EU member states have to comply with; reporting on implementation of the Directive is quite extensive. The European Commission can submit a complain to the European Court and if a member state does not comply with the EU policies; in the cases of non-compliance member states can be charges with high fines or may loose funds that they receive from the Commission from specialized regional development and other funds. Institutional strength is a measure of the extent and stringency of an institution's rules and procedures or, in other words, the extent to which the institution requires subjects to alter or adapt their behavior to conform to its requirements. With entering into force of the Water Framework Directive, it is essential to understand a dynamics of the interplay between different water management regimes in the Baltic Sea Region that would allow to move forward consciously with changes in the transboundary water cooperation structures in the Baltic Sea Basin.

More intensive involvement of the local players in the water management will result in a more intensive political interplay of water management institutions in the Baltic Sea Region. Role of the nation states as key player in water management remains to be crucial; at the same time, there are more relationships in water management developed between the nation-states as actors with other actors in the region, especially with actors on the subregional level. Role of international organizations remains important in facilitating cooperation on the transboundary waters. In the Lake Peipsi Basin, assistance from Danish, Swedish governments, UNDP, UN ECE and the European Commission played a critical role in facilitating

a more effective transboundary water management regime implementation; in the Odra Basin, role of the European Commission in developing the working group for Water Framework Directive was important as well. Therefore, the political vertical interplay of water management institutions in the Baltic Sea Region should be further discussed.

4. Possible conflicts on the rural areas

This paper presents some topics possible conflicts on the rural areas. Conflicts at the interface between urban and rural are only one of the many aspects in the overall actual landscape changes. Much of the current landscape transformations are the result of changing relationship between an urban and rural way of life and their related forms of land organization. Most of the driving forces nowadays have also a globalizing component which increasingly influences local changes. A general polarization between intensification and extensification of the use of the land can be noticed. There is a continuing concentration of people and activities in rather small, highly intensive and densely crowded areas, while vast areas of land become disaffected or even abandoned.

Vos and Klijn (2000) recognize the following trends of the transformation of the European landscapes:

- the intensification and increase of scale of the agricultural production transforms wetlands and natural areas into agricultural land are likely to occur particularly in densely inhabited areas,
- the urban sprawl, the growth of infrastructures and functional urbanization,
- specific tourist and recreational forms of land use that still develop at an accelerating speed in coastal and mountainous regions,
- the extensification of land use and land abandonment that is likely to continue to affect remote rural areas conditions and poor accessibility.

The distinction between urban and rural becomes diffuse and fuzzy. This is most clear in the urban fringes of the large urban agglomerations. The urban fringe or suburban landscapes are characterized by a wide variety of land uses, creating a complex and diverse landscape consisting of a highly fragmented mosaic of different forms of land cover and a dense transport infrastructure (Antrop and Van Eetvelde, 2000). Urbanized landscapes are highly dynamical and multifunctional. A multiplicity of new landscape functions can coexist in a more or less unrelated manner (Nohl, 2001). "Park cities" emerge as well as neo-rural functions (Gulinck, 2001), which might offer new opportunities for employment (Errington, 2001). Brandt and Tress (2000) summarized opportunities and problems related to multifunctional landscapes in research and in planning.

In order to develop an appropriate catchment strategy for removing or mitigating possible conflicts, for example, between agriculture and sustainable water use, it is essential to have sufficient baseline information. It is also important to set

meaningful and realistic targets for water quality and quantity. One of the guiding principles for effective river basin management is that of sustainable rural development in which agriculture is just one component (albeit a key component) of multifunctional rural areas. This implies the need for setting socio-economic targets, in addition to environmental targets, when implementing the WFD. Reform of the Common Agricultural Policy (CAP) under Agenda 2000 has brought some progress towards more environmentally sustainable agriculture, but the CAP continues to favour maximization of production over other possible scenarios. In particular, CAP subsidies for cereals continue to be paid in proportion to productivity per hectare (or specifically favour irrigated crops through higher payments) thus providing a strong incentive for continued use of irrigation over rainfed systems. Such an approach is liable to result in unbalanced and unsustainable rural development and continue to generate serious stress on water resources (both quantity and quality) in much of Europe. Further reform of the CAP is foreseen and will be closely linked to the EU enlargement process and World Trade Organization negotiations, as well as to the future of Genetically Modified Organisms in farming. This further reform will bring important opportunities for helping to resolve some of the current conflicts between high-input agriculture and sustainable water management. The river basin management plans foreseen under the WFD will provide a sound basis for spatial planning, development and implementation of components of the CAP and Structural Funds.

The need for an integrated approach, involving participation of all stakeholders, was frequently stressed. For example, it was pointed out that supermarkets can play an extremely important role in determining agricultural practices for some agricultural products (e.g. vegetables, fruits) in Western Europe. Supermarkets may demand that crops be irrigated with pristine water, even though this is liable to place pressure on water resources and not be justified in terms of consumer health protection. It was also emphasized that sustainable solutions require the support of water and land users if they are to be successful. In many cases the most effective solutions will be initiated at the local level. Constant consensus-building dialogue is required to maximize mutual understanding between different interest groups.

5. Rethinking landscape – functions and values

The European Landscape is under stress of changing land use and a changing attitude of its users. Globalization, the disappearance of the iron curtain and the recent EU enlargement to 25 countries has changed the economic and environmental dimensions of Europe. Europe is changing its face from a western and eastern part to one European Union and to fast connections between its centers of activity. The rural and cultural heritage of Europe has to be adapted to cope with this change. However, its landscape is worth to be conserved as well, because it represents the European history in the same way as castles and churches. It even more represents

the history of the common people, because it has been the tradition of the rural population that made these landscapes. It cannot be prevented that Europe is changing and it is good that Europe adapts to the new dimensions of the world. We, in Europe, have to define what we think is important and what must be conserved, what can be adapted to be used for new functions and what can be abolished because it has no value. These decisions will determine the new dimensions, functions and values, of the European landscapes. The development of knowledge and land-use skills has taken place through general approaches in management and regional specialization. This led to regional characteristics, regionally adapted but efficient production processes, and prosperity. Present development creates new perspectives and new problems: globalization is adapting the landscape to globally comparable scales, mechanization is adapting landscapes to the size and the capacities of machines and in this way regional characteristics are threatened to disappear.

There is not yet a strong body of interdisciplinary concepts and research to give a firmer foundation to ideas about landscape development and its sustainability. Landscape-development questions relate to complex problems with plural objectives, larger scales in space and time, inherent uncertainties and local or regional sentiments. Insight can come from intensive discussions between different fields of science and stakeholders. Common aspects of landscapes are not always accepted as being important for general understanding. As with their own home, for many stakeholders and even scientists the own landscape is unique and not comparable with other landscapes; its main characteristics are made up by their own management. Still all these unique landscapes adapt to the same global processes, and comparable elements or land uses disappear in the same way. The landscape structure is still the basis for the historical regional diversity of landscapes. This is its attractiveness, but it also causes a systems crisis: a misfit of structure and societal needs. It is known from history that artificially steady states in economic and ecological systems such as a fully planned economy or an isolated island can maintain themselves for long periods, but they are fragile and susceptible to external influences and lack resilience. This is also the case for artificially maintained cultural landscapes. They are not sustainable if they are under pressure of modern developments; they have to change in order to survive economically. Parts will disappear as the traditional corn-windmills have disappeared and new structures will be part of the landscape through the introduction of new functions such as new windmills for electricity production. The building of motorways to remote areas or an airport will also have immense impact. In this context planning as a control tool is important for organizing structure and functions in a harmonious way.

Perceptions of landscape are rooted in history and local, regional and national cultures, and usually vary over time for the viewer and between different users of landscape, such as between farmers, environmentalists and urban dwellers. Agriculture plays a critical role in shaping and affecting the quality of the national

"stock" of landscape, because farming is the major user of land. What defines and constitutes an "agricultural landscape" varies greatly within and across EU countries.

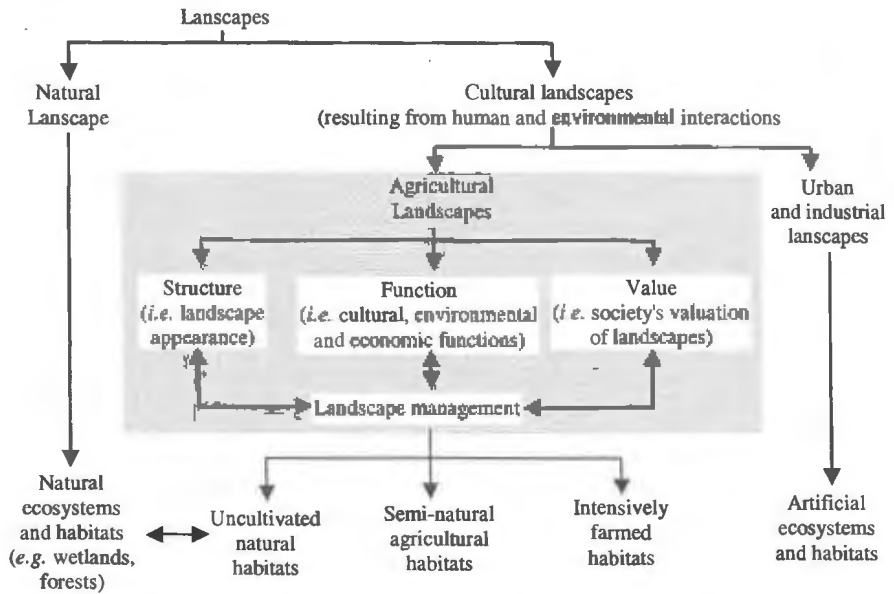


Figure 4. The agricultural context of landscape, source: adapted from OECD (2001).

A broad, all encompassing definition of agricultural landscapes is that they are the visible outcomes resulting from the interaction between agricultural commodity production, natural resources and the environment, and encompass amenity, heritage, cultural, aesthetic and other societal values. Two broad types of landscape can be identified: first, "natural" landscape formed by various biophysical forces of nature (e.g. geology, soils, climate, habitat, etc); and second, man-made or "cultural" landscapes resulting from the interaction between human activity and the environment, in particular, urban and agricultural landscapes (Figure 4). These interactions are dynamic: as technologies develop, policies and economic forces change, cultural values evolve, and populations move. The fundamental dynamic in creating and changing agricultural landscapes, however, is the need for agricultural products.

Despite the variety of individual, local, regional, and national interpretations of agricultural landscapes, three key elements are relevant to any landscape (Figure 5). These are:

- *structure*, including the interaction and relationship between various environmental features (e.g. flora, fauna, habitats and ecosystems), land use

patterns and distributions (*e.g.* crop types and systems of cultivation), and man-made objects (*e.g.* hedges, farm buildings),

- *function*, covering the provision of landscape functions for farmers and rural communities as a place to live and work; for society at large as a place to visit and space for the enjoyment of various recreational activities; and also the function of landscape in providing various environmental services, such as the provision of biodiversity, ecosystems, water supply, soil filtering and sink functions,
- *value*, concerning both the value society places on agricultural landscape, such as recreational, cultural, and other amenity values associated with landscape; and also, the costs of maintaining and enhancing landscape provision by agriculture.

The identification of these three elements can help to better organize the examination of agricultural landscapes to facilitate policy analysis and decision making. The *structural* landscape components provide the basis for landscape appearance and the connection to landscape functions. The latter have an important role in supporting the different societal *values* associated with landscape values. There is no unique way in which the various structures and functions of landscapes shown in Figure 5 can be defined, classified and then valued. This will to a large extent depend on who is viewing the landscape and the purpose for which they wish to use and/or analyze landscape. Hence, the urban public tends to value the landscape from a general aesthetic, recreational and cultural perspective. The ecologist perceives landscape as primarily a provider of biodiversity and habitats. On the other hand, farmers, rural communities and ultimately consumers, are interested in, or at least benefit from, the economic value of a landscape related to the production of agricultural commodities and as a place to live and work.

The perception and valuing of the landscape is in a fast transition. Different societal groups are forcing to make their values "hard" in rules and legislation. The most widely used and effective technique is to become the owner of the land. Protection and controlling access are intimately linked. The diversity and identity of the cultural landscapes are considered as common, collective-heritage values, characterizing Poland. In many countries of Europe only fragments remain of these typical traditional landscapes. The central question becomes what use to make of traditional cultural landscapes that are no longer functional? How to assess their intrinsic values in relation to their changing spatial context and changing valuation system? Creative, long-term and holistic visions of the future of our landscapes are needed.

The landscape is much broader and holistic than a piece of land and many actors with very different interests are involved in its maintenance. Consequently, landscape is much more difficult to take care of and to manage than land. Landscape protection as a legal instrument for preserving natural and cultural valuable sites or areas started in the 19th century when the devastating impacts of industrialization and the related urban growth became apparent.

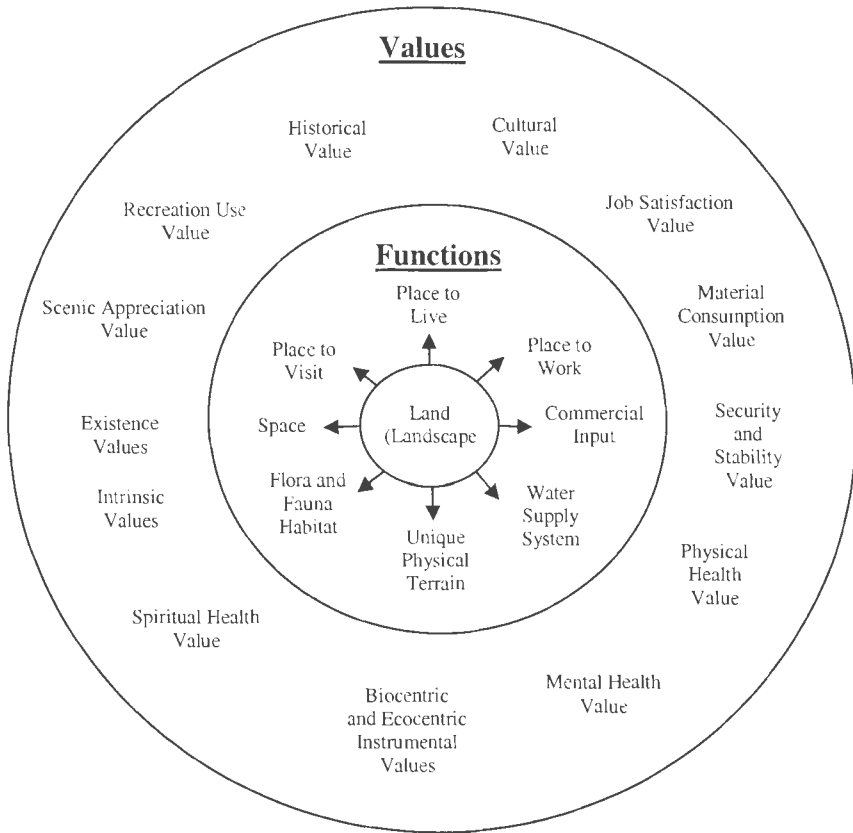


Figure 5. Key element of any landscape, source: adapted from Bergstrom (2003).

Actual changes in the environment are faster than the procedures for protection and planning. Also, monitoring and enforcement of the decisions taken are lacking. Gradually, new strategies for landscape conservation and management emerged. The European Landscape Convention (Council of Europe, 2000) is a good example of this new approach. Raising a general awareness of the ecological and cultural values of the traditional landscape is promoted as an important task. Participatory planning and management and a broad spectrum of incentives, including financial ones, are proposed to be introduced in all policy sectors involved. Although international co-ordination is on the top of the list, no concrete initiatives are given yet.

6. Rethinking sustainable development

By the late 1990s the exogenous model (driven from outside) was falling into disrepute. The continued intensification and industrialization of agriculture came up

against the saturation of domestic markets and environmental limits. The recession of the early 1980s also resulted in the closure of many branch plants. Areas that had experienced rapid expansion of tourism also came to realize its seasonal and cyclical fluctuations as well as the destructive impact on local cultures and environments of mass tourism. These difficulties encouraged the exploration in the 1980s of so-called *endogenous* approaches to rural development (driven from within) based on the assumption that the specific resources of an area – natural, human and cultural – hold the key to its sustainable development.

The most widely used definition of sustainable development (the Brundtland commission, 1987) is stated in broad philosophical terms. For development of the regional rural sustainable development operational definitions and methodologies are needed.

Unfortunately, a recent study completed by the UN Environment Program comes to the conclusion that sustainability initiatives have for the most part been disappointing (UNEP 1996). One can point to "best practices", but outcomes are small, few and slow. Political problems rooted in the uneven distribution of wealth both within and across the world's regions complicate matters. There is no consensus on what exactly needs to be sustained, how and by whom. And other issues compete for the attention of decision-makers. Even when strong political will exists to advance sustainability goals, the science, knowledge and know-how to make progress is often lacking. Upon evaluating 30 strategically sampled comprehensive city and county plans in the U.S., some of which explicitly incorporated the sustainable development concept and some of which did not, Berke and Conroy (2000) come to conclusion that "the explicit inclusion of the concept has no effect on how well plans actually promote sustainability principles" (p. 30). Similarly study was done in Poland (Kistowski, 2003; Miklewska, 2004).

While the literature promoting sustainable development is huge and growing, so is the literature that finds fault in this concept for its lack of precision. The term sustainability is a good example of what Ann Markusen (1999) calls a "fuzzy concept". James O'Connor (1994, p. 153) argues that the ambiguity of "sustainability" means it is, in the first instance, "an ideological and political, not an ecological or economic, question". When all is said and done though, it seems that even those authors with a critical eye on the subject, end up suggesting that there may indeed be value in the emergent sustainability discourse. Scott Campbell (1999), for instance, argues that: "sustainability, if redefined and incorporated into a broader understanding of political conflicts in industrial society, can become a powerful and useful organizing principle for planning. In fact, the idea will be particularly effective if, instead of merely evoking a misty-eyed vision of a peaceful ecotopia, it acts as a lighting rod to focus conflicting economic, environmental and social interests. The more it stirs up conflict and sharpens the debate, the more effective the idea of sustainability will be in the long run" (Campbell, 1999, p. 252). However, it still has overtones of a too fuzzy concept for many scientific disciplines.

Sustainable development is probably one of the most important but frustrating concepts to confront the science in recent years. Frustrating, because the concept has increasing support at all levels, but few understand how to implement it in practice.

Still the main goals of the sustainable development are important and unsolved: eradication poverty, reduction unemployment and minimization of social exclusion, especially on the rural areas in Poland (Table 1).

7. Conclusions

Poland's accession to the European Union on 1st May 2004 marks a turning point in its economic and political history. It follows 15 years of profound change and accomplishment. More than 75 per cent of GDP is now produced in the private sector, the economy is well integrated with those of western European nations and inflation has been brought down to low levels. After an initial fall, output has been growing continuously for more than 10 years and, on average, Poles are much better off now than they were then. However, the striking drop in employment since 1998 is suggestive of serious remaining problems (Table 1). To address these, much more needs to be done, notably in terms of raising productivity, expanding employment and increasing per capita income. This is 45 per cent of EU levels or 41 per cent of OECD levels.

Indeed, unless the pace of improvement picks up, Poland's convergence with the rest of the EU is likely to be disappointingly slow. So as to accelerate this process and ensure that its fruits are widely shared, policy needs to address five main challenges:

- In the short-run it will be critical to re-establish an appropriate balance between fiscal and monetary policy.
- A stable macroeconomic framework, characterized by low inflation and sustainable public finances is an essential pre-requisite to healthy economic growth. Currently, fiscal policy is too relaxed, requiring higher than desirable real interest rates, with adverse consequences for investment, activity and potential output.
- Over the medium to long term, increasing employment especially among young and older workers represents the most important challenge facing the Polish economy. With only slightly more than one in two Poles of working-age employed and an unemployment rate of 19 per cent, getting people back into productive work will be critical both to re-establishing a fast growth path and ensuring that all of society benefits from convergence.
- Investment conditions need to be improved so as to increase economic activity and the demand for labor. Higher investment levels would also serve to raise productivity, international competitiveness and the pace at which incomes converge with those in the rest of the OECD.
- Finally, with 19 per cent of employment in agriculture producing only 3 per cent of GDP and with 30 per cent of the population in rural areas, speeding the pace

of rural restructuring must form a central component of any development strategy for Poland. Over the long run, such restructuring could result in a 30 per cent increase in GDP.

Each of these challenges is critical, and progress is needed in meeting all of them so as to move onto a more dynamic growth path that combines rising employment with better and more productive jobs. The challenges are also interdependent, with success in any area requiring progress in others. Policy reforms are therefore needed across a broad front and should be implemented coherently to take advantage of the synergies among them. Efforts to reduce dependency traps and increase financial incentives to take up work need to be matched by policies to raise flexibility and reduce costs in order to stimulate hiring by firms. Likewise, reforms in product markets that promote investment and job creation need to go hand-in-hand with policies to accelerate rural restructuring so as to facilitate the shift from lower to higher productivity jobs. Finally, because many of the required measures involve increasing the targeting of government expenditures in certain areas, they should help fiscal consolidation. This, plus the resulting stronger growth and employment will in turn help generate the additional resources necessary to finance a sustainable increase in the level of public investment in infrastructure and human capital.

Addressing these challenges will be facilitated by the ongoing recovery, which saw GDP expand by 3.7 per cent in 2003 following two years of slow growth. Activity is expected to continue strengthening in 2004 and 2005, increasing by more than 4½ per cent a year allowing the output gap to close towards the end of the period. The global recovery suggests that export growth will remain strong. Nevertheless, reflecting a 1.7 per cent of GDP addition to fiscal stimulus programmed for this year and the past relaxation of monetary conditions, growth should be increasingly driven by domestic demand. In particular, investment activity is expected to pick up due to improved profitability, emerging capacity constraints and EU-accession related opportunities. Despite stronger growth, deep-seated problems in the labor market mean that employment growth will be weak and unemployment is projected to fall rather little. While increases in the prices of imported goods will generate some inflationary pressures, high unemployment and a negative output gap should ensure that headline inflation remains within the central banks revised target range for inflation of 2.5 ± 1 per cent. However, if domestic demand reacts more quickly to the fiscal and monetary stimulus, there is a risk that the economy may overheat, pushing up inflation and the current account deficit, provoking an increase in the risk premium on the zloty, even higher interest rates and choking off the recovery.

According to the Central Statistical Office (GUS) forecast, the population size will decline by 1 million persons until 2020 in comparison with the end of 2002 and by further 1.5 million in the next decade (2020-2030). As a result of the lower fertility rate in the urban areas than in the rural areas and the new phenomenon of

migration from towns to countries situated near to towns, the fall in population size will be higher in the urban areas than in the rural areas.

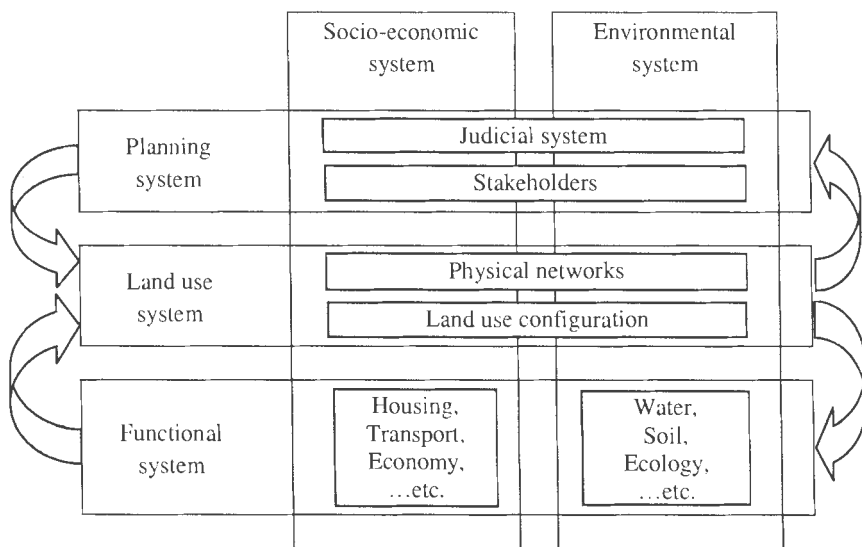


Figure 6. Systems approach for regional rural sustainable development, source: own investigations.

The transformation process in Poland has resulted in high unemployment in rural areas. In June 2002 there were 1,4 million registered unemployed in rural areas (43% of the total number of unemployed in Poland). This figure corresponds to the national unemployment rate of 17.4%. The owners of farms with over 2 ha of land are not registered as unemployed - according to the estimates about 1 million individual farmers cannot find a job and are referred to as 'the hidden unemployed', while 70% of people only have part-time employment. This and the fragmented farmland structure cause overpopulation in rural areas. There is observed regional variation of density of population which has historic reasons (state owned and cooperative farms wound up in the 90s were located in the northern and western territories of Poland, where lower population is noted).

Complexity of aims presented above extorts application of the Multi-criteria Decision Aid method. Authors of this paper prepared for evaluation a process of decision making (Figure 2). The assessment of agricultural ecosystem is not only the prerequisite of protection and management of ecosystem, but also the foundation of system's optimization and sustainable development (Figure 6).

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**WSPOMAGANIE INFORMATYCZNE
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I OCHRONY ŚRODOWISKA**

Monografia dotyczy rozwoju i zastosowań nowoczesnych narzędzi informatyki w różnych gałęziach gospodarki ze szczególnym uwzględnieniem obszaru inżynierii i ochrony środowiska. Zamieszczono w niej wybrane artykuły autorów krajowych zajmujących się tą tematyką, starając się zaprezentować czytelnikom aktualny stan polskich możliwości i potrzeb w dziedzinie informatyki stosowanej. Znaczną część artykułów stanowią prace wykonane w ramach projektów badawczych KBN. Autorzy artykułów prezentowali wyniki swoich badań na konferencji pn. Komputerowe Systemy Wielodostępne, zorganizowanej przez Instytut Badań Systemowych PAN i Akademię Techniczno-Rolniczą z Bydgoszczy w Ciechocinku we wrześniu 2004 r.

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