

Indicators of land use and agricultural sustainability - the moral of a story

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Abstract

It has become obvious that serious attempts at achieving sustainability cannot be based on changes of technologies. An applicable system of sustainable land use requires both the termination of isolated searches for "greener" technologies in agriculture and the beginning to understand agriculture as an integrated part of a broad range of activities taking place in a region. Sustainability should be analysed at regional level (in catchments) rather than at the level of individual human activities - agriculture, transport, industry etc. A truly sustainable system of rural land use should incorporate protection of biotic and abiotic resources while maintaining an acceptable level of local economy and achieving satisfactory social conditions. In this process science cannot be regarded as the leading force. Its results are only of advisory value and the burden of responsibility to take steps towards sustainability remains on the shoulders of decision-makers. The search for sustainability must be based on the broad consensus of all stakeholders and the result always reflects the influence of various preferences. Science loses its character as a trusted leader and becomes a partner for discussion. The complexity of sustainability allows us to assume that it will never be totally achieved. Nevertheless, we could move close to it. In the case of regional sustainability, the following steps are necessary:

- identify a state of a region which its inhabitants assume sustainable and the practices they are willing to follow in order to achieve the goal
- define environmental, economic and social indicators of sustainability respected by a local community
- use environmentally sound technologies in a whole range of activities
- create a political system which respects sustainable land use and controls local investment activities

Keywords: local community, regional development, watersheds, sustainability, sustainability indicators, sustainable agriculture, participation, localization

1.0 Introduction

The term "sustainability" has become the criterion of various aspects of human activities during the 1990's, but it should be stressed that sustainability has more of the character of a moral principle than a precise definition – as was expressed by de Vries (ex Peet 1992): „Sustainability is not something to be defined, but to be declared. It is an ethical guiding principle“. Nevertheless the main aspects of sustainability can be identified:

- Social sustainability - reflects the relationship between development and valid social norms, it is achieved only by systematic community participation and strong civil society. Activity is socially sustainable if it complies with these norms both written and nonwritten or if it does not violate them more than a society is willing to tolerate.
- Economic sustainability - depends on the analysis of costs and benefits. It is easily measurable because it can be expressed in money terms. Generally speaking development should be economically effective within the framework of ecological and social limits. The struggle for reduction of costs must not result in a violation of these limits, otherwise the economic effectiveness would lead to unsustainability.
- Environmental (ecological) sustainability - can be characterised with relatively less effort (van Pelt et al. 1995). The development process must respect the carrying capacity of life-supporting systems and by doing so contribute to their preservation including biodiversity protection. Renewable resources can be used within the limits of their renewability, non-renewable resources must be used in the most careful way.

Sustainability cannot be guaranteed in the long term because many factors remain unknown or can be anticipated only with difficulties. For practical use it is therefore necessary to search for and to support activities which will be likely sustainable and to repress activities unsustainability of those is evident. In this process we can observe attempts to apply the idea of sustainability not only to separate economic activities (sustainable transport, agriculture, forestry, resource use) but also to human activities in a broader sense. This trend is illustrated by the search for principles of sustainable cities (Camagni 1998, Banister 1998), regions (Redclift 1990, UNCED 1992, D'Souza, Gebremedhin 1998, de Haan et al. 1997) or sustainable living (IUCN/UNEP/WWF 1991, Vavroušek 1993, Keller et al 1996) as the manifestation of an individual responsible behaviour that is beneficial to a whole society. In both cases the situation calls for a tool which would inform about a character and consequences of human behaviour. Sustainability indicators (SI) are accepted as such a tool (see WCED 1987, UNCED 1992, Moldan, Bilharz 1997, OECD 1997, Bell, Morse 1999, Riley 2001, Wang et al. 2001) although there are authors stressing the temporary character of indicators (Mitchell, May, McDonald 1995), and expecting that they will be gradually replaced by methods directly combining environment and economics ("green accounting"). Methods of qualitative assessment matrix (Gray et al. 1993) and methods of ecological-economic models (Pearce, Turner 1990) are also suggested for sustainability assessment. Compared with these methods, the SI are more useful because they can be defined more precisely. SI can quantify

information so their content is more distinct and at the same time they are also able to simplify the characteristics of complex phenomena. From this concept of gradually aggregating indicators the concepts of “environmental space” (Hille 1998, Carley, Spapens 1998) and “ecological footprint” (Wackernagel, Rees 1996, 1997, Wackernagel et al. 1998, Holmberg et al. 1999, Chambers et al. 2000) have been derived.

2.0 Perceptions of sustainable agriculture (SA) and its indicators

Despite their broad diversity the definitions of SA usually stress the necessity of maintaining or re-establishing environmental, economic and social qualities of agricultural systems or rural space - but not always explaining what is actually meant by the term “qualities”. The study of definitions of SA gives us information about different approaches. A considerable number of authors (e.g. USDA 1991, Huffman 1990, Neher 1992, Doran 2002) stress that SA should use methods of integrated pest management, soil conservation technologies and should save non-renewable resources. These authors do not omit economic aspects of SA, but its social conditions are mentioned only vaguely. The approach adopted by the OECD (1995) can be included in this category. The works of J. Pretty (1995, 1997a,b, 1998) represent a rather rare, truly balanced approach which understands the SA as based on the effective use of biophysical and human resources.

2.1 The OECD approach

The main difference between the approach adopted by Pretty and the one of OECD is the importance given to the full participation not only of farmers but all inhabitants of a region in the process of creating of sustainable agricultural system. Among the agricultural practices with a high potential for sustainability the OECD (1995, 1997, 1999, 2001) includes the following: conservation tillage, crop rotations, intercropping, silvipasture, scientific management practices; other aspects of agroecosystem stability are mentioned only vaguely. By doing so authors cover only the environmental side of SA. At the same time, however, they do not aim at preparing an authoritative list of recommendations, but they stress that "sustainability should be judged with respect to each farming system as a whole, not simply in respect to particular practices" (OECD 1995:24). Another OECD material (1997) on indicators of SA on national and sub-national level is based on the general OECD framework of sustainability assessment "pressure-state-response" which lists the following criteria for the

selection of indicators: policy relevance, analytical soundness, measurability, level of aggregation.

Different sets of indicators selected by international institutions such as OECD are often criticised for reasons summarised by Reid (1995). First, they are environmentally oriented and they tend to omit the social aspects. Second, they usually do not include such important aspects of a problem as patterns or levels of consumption and ecological footprint. Third, international institutions usually give no or very limited space to members of communities to influence the process of the indicator selection. The insufficient technical coordination between the sets of indicators and policy targets and objectives is another, fourth, reason of criticism. Fifth, it is not clear whether the information needed for identification of comparable indicators is available in various countries.

2.2 The holistic approach towards SA

The detailed synthesis providing a truly holistic overview of SA is presented in the work of J. Pretty "The Living Land" (1998). Pretty characterises the present state of European agroecosystem and formulates institutional and individual preconditions of sustainable agricultural and food systems and especially of establishing sustainable rural communities. He begins with the description of a modern industrial agriculture characterised by a narrow spectrum of crops and animals, intensive use of pesticides, fertilisers, machinery, irrigation and external information (research, advisory service). This system leads to a degradation of natural capital (air, water, soil, biodiversity) and human health (both farmers and consumers) and a "rationalisation" of farming results in a loss of biological and cultural diversity and a degradation of landscape and rural space, thus reducing the social capital.

Based on the analysis of the development of European agriculture Pretty formulates three steps towards the sustainability of a rural space. The first step is the increase of economic and environmental efficiency by the use of information technologies (GPS, GIS) and methods of precision agriculture. Natural resources are not wasted and the costs fall. Nevertheless, the goals of farming remain unchanged and existing values and principles are not fundamentally challenged.

Dropping some conventional technologies and incorporating regenerative ones is characteristic for the second step. In practice this means using of nitrogen fixing plants, biopesticides, creating habitats for predators, using IPM and biological pest control, decreasing specialisation of farms and emphasising soil and water conservation technologies. During this

phase, the environmental impact of agriculture is taken into account, rural communities remain uninvolved in farming and food matters and farmers are usually not motivated to form new relationships.

The third step is characterised by the situation when agriculture begins to be a central part of economic and social activities of a rural community that understands the necessity of a regional sustainability. This situation is based on new approaches and the participation of individual members of local communities is based on following principles: emerging of locally specific resource conserving technologies; high self-reliance and cohesion of local people; changing situation of external institutions - experts are facilitators and enablers of local change rather than distributors of information; agriculture as a whole is structured to emphasise local economic regeneration. The revitalisation of regionally-based rural social and economic activities can be illustrated by the emergence of local food processing and marketing including direct marketing, farm shops, local markets and especially by the systems of community supported agriculture (ISEC 1993, Steele 1995, Henderson, van En 1999) and local exchange and trading systems – LETS (Williams 1996). Farmers also spent more money locally on goods and services and they employ more people. This third phase has not been reached yet broadly and it requires an extensive institutional reform not only of agriculture but also rural development policies.

3.0 Participation and regional character of sustainability

From the review given above, it becomes evident that no matter how attractive the technological side of agriculture and indicators derived from it are for experts, the undefinable, value-based character of sustainability requires the full participation of all members of communities. In other words - visions of sustainable future, not only of agriculture but all activities in a region, cannot be formulated without the involvement of its inhabitants. The idea of indicators of SA therefore broadens into the identification of indicators of rural regional development (see Redclift 1990, D'Souza, Gebremedhin 1998, de Haan et al 1997, Nováček, Mederly 1996, Schmeidler 1996, Cocks, Walker 1994, Holmberg, Karlsson 1992, Hrnčiarová 1996, Volker 1997, Bosshard 2000, Stevenson, Lee 2001). Also the idea of sustainable urban areas should be taken into account (Camagni 1998, Banister 1998).

It is surprising how often the importance of general acceptance of sustainability is neglected in debates on its value, character and implementation. Those convinced on the necessity of sustainability concentrate on ways of its achieving, its opponents do not fight

against but ignore it, but it can be said that the majority remains unconcerned with this issue. Either because they do not know the concept or because its long-term character leads them to the attitude "we still have time, others will solve it". This approach was illustrated by a sentence of a young manager quoted by Macnaghten and Jacobs (1997:15): "I can't see further than another 2 years, let alone 30". Therefore it is of great use to ask whether the public supports the idea of sustainability and whether they are ready to demonstrate this support during the election. But how can they accept or refuse this principle if it is presented in a way they cannot understand, especially whether the indicators of sustainability are able to demonstrate the concrete manifestation of achieving sustainability. But if the public is not willing to accept the information, then it remains useless. As illustrated by Macnaghten and Jacobs (1997): "...without understanding the concept becomes curiously sterile: a technical, managerial goal without purchase on the real world of political debate and decision making, and with little hope of implementation".

The extent to what the public accepts an indicator is influenced by the method of its selection. These methods can be sorted into three groups according to level of their "exactness". Subjective intuitive approach, the first group, is based on often irrational preference of an indicator which a community accepts as the most informative. This approach is adopted in the works of Berkes et al. (1998) and Müller (1995) and is often mentioned namely in relation to the indigenous knowledge. The "salmon indicator" from the Sustainable Seattle project (Warburton 1998) or the method used in Český Krumlov (Laža 1997) are examples of this approach. The most important aspect of this approach is represented by fact that the distinctions between the science and society, between what is considered "objective" and "subjective", are diminishing, as described by Latour (1999, 2000).

A choice from a menu derived from previous experience represents the second group – the subjective expert approach. This method is based on an assumption that the experts' knowledge of certain past situation enables them to create a broader set of indicators and to select the most important ones. Experts usually think in a reductionist way, they may split complex situations into independent variables and their individual perceptions are central. Professionals control their clients from a distance, they tend not to trust farmers etc. who are simply the objects of enquiry. The lack of understanding and trust between experts and people and the difference between the long-term character of an agricultural system and a short-term experience of an expert can be the main disadvantages of this approach. Examples are quoted by Pretty (1995) and Warburton (1998)

The third group is represented by an analytical approach based on rational acceptance of science as a provider of information and solutions. As the discussions on sustainability are mainly of academic character, this approach is the most common one (Andreoli, Tellarini 2000, Loake 2001, Hansen et al. 2001). Methods mentioned by Smith (1998) and Mitchell (1995) that sometimes use exact ways to get results from information obtained by previous two approaches are examples of this attitude, apart from the "hard" OECD procedure already mentioned. This approach neglects the fact whether there is someone (politicians, farmers) who has to be willing to accept its recommendation, which is its main disadvantage. The detailed analysis of various ways of formulating indicators of SA given by Smiths (1998) identifies their main principles and their strengths and weaknesses. Smith finds out that most of the methods verbally appreciate the participation of the public and they give it an appropriate position but none of them solves the question how to achieve it in practice.

So far we have dealt with the indicators of SA understanding agriculture as an activity separated from other aspects of the society. However this reductionist approach is in the case of sustainability assessment unacceptable. Agriculture and its effects must be understood in unity with other economic activities in the landscape and in a concrete region. It is surprising how often even projects verbally accepting the holistic character of sustainability (Moldan, Bilharz 1997) separate even activities which are so close in a sense of regional land use such as agriculture and forestry. Thus both influence the character of road network and therefore also a system of transport, quality of life not only in rural areas but also in urban space (air, water quality, recreation possibilities) and up to a certain point set limits for the industry. For these reasons we prefer sustainability assessment on a regional level.

4.0 Conclusions

- Sustainability is a social construction, therefore it is a regionally unique process.
- Sustainable agriculture cannot be reduced to a set of environmentally friendly technologies.
- Agriculture must be understood as an integral part of human activities in a region.
- Regional (national) policies on sustainable agriculture/ sustainable regional development are required, using environmentally sound technologies in a whole range of activities
- Regional codes of proper agricultural practice are required.
- Policies and codes need to be formulated with the participation of stakeholders in order to be very applicable.

- More decentralised political system which respects regional identity and controls local investment is required.

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