THE INTERACTIONS OF THE NATURAL ENVIRONMENT AND SUSTAINABLE AGRICULTURAL PRODUCTION*

Dr. FÁBIÁN, GYULA – Dr. MARSELEK, SÁNDOR – Dr. ABAY HAMAR, ENIKŐ

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SUMMARY FINDINGS, CONCLUSIONS, RECOMMENDATIONS

The accelerating consumption of natural resources has caused significant economic growth and improved financial conditions in industrial countries, but destroys the forests, soil, air, water and the biological diversity of the Earth. By ecologically overloading our planet, economic development is becoming self-destructive. Many scientists believe that this tendency can even threaten the existence of mankind.

At international levels, the condition of Hungary's natural environment is considered average, and it is gradually improving. However, the environmental condition of the Earth is continually deteriorating and this process is accelerating. The main factors in environment pollution are industrial production, transportation and energy production, but littering and sewage are also significant. The special pollution of the different sectors of the agricultural economy, particularly industrial output, cannot be neglected either.

There are complex interactions between the natural environment and agricultural production. The damaging effects of agricultural industries are mainly due to overusing fertilisers and pesticides. Animal husbandry pollutes the environment with liquid manure and chemicals, while power machines cause air pollution, soil compression, and oil and fuel pollution, also damaging the environment.

Ecological and integrated farming is less harmful to the environment, so the new agricultural model can lead us to sustainable agricultural development. Sustainable development is indispensable to preserving the natural environment. It would make it possible to use and, at the same time, preserve natural resources on global, regional (national) and local levels. The aim of subsidies should also be the creation of a 'liveable countryside'.

In Hungary, the National Environmental Protection Programme was introduced in order to encourage sustainable development and reduce environment pollution. One of its sub-programmes, the National Agricultural Environmental Protection Programme helps support environmentally friendly farming.

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INTRODUCTION

Hungary has been making various efforts to improve the natural environment, so the condition of the area under examination is favourable by international standards and is continuously improving. On the other hand, the environmental condition of our Earth is continuously and rapidly deteriorating - the worldwide effects of environmental pollution are astonishing.

Despite the recognition of the necessity of sustainable development the practice of sustainability is only gaining ground in the EU very slowly. According to the EU's evaluation, most results derive from local programmes so in the first instance, it is worth clarifying the concepts of local and regional sustainable development, which requires an analysis of the dimensions and levels of sustainability.

Sustainable development and improved energy efficiency are closely related. We should aim to decrease energy consumption per capita while spreading the utilisation of non-polluting or less damaging energy resources and technologies.

The condition of responsible management is a survey of the supply of private and public assets and the profit-oriented evaluation of the value of these services with regard to external costs and returns (*Farkasné et al., 2004).*

It is very important to examine the consumption that is in harmony with the environment in the long run. 30-40% of everyday environmental loading results from the processes of household consumption (*Valkó, 2005*).

According to *Láng (2003)*, sustainable development has three pillars: the Stockholm Conference created the natural-environmental pillar, at the Rio Conference the economic pillar came to the foreground and at the Johannesburg Conference the social pillar was emphasised.

The present paper examines the changes in the condition of the environment, the regional differences in environmental protection, and EU plans for sustainability and for protecting the natural environment. The paper describes the interactions of agriculture and the natural environment; it refers to sustainable agricultural development, as well as to its sustainable levels and areas. It also gives a brief outline of the subject's economic connections.

The methodically selected data are arranged into tables and conclusions are drawn. The main relations are presented in figures.

THE CONDITION OF THE ENVIRONMENT AND THE NATURAL ENVIRONMENT IN HUNGARY

In an international comparison, Hungary has especially favourable natural and ecological features, valuable natural territories (national parks, nature conservation areas, landscape conservation regions, protected areas and treasures), as well as landscapes characteristic of the Carpathian basin, and traditional landscape usage. The natural conditions of agricultural production are particularly favourable. The physical, chemical and biological characteristics determining the quality of the soil are excellent; the extent of damage to the soil is relatively limited.

When examining the condition of the environment and the natural environment, the changes of the following factors are evaluated: the elements of the environment (air, water, soil), waste management, environmental safety and nature conservation. By analysing the regional structure of the condition of the environment, it can be stated that the

most damaged territories are the regions with large cities in their centres, and the ones with significant agglomerations. The capital and its agglomeration are especially endangered. In those places, the water bases are extremely vulnerable; there is insufficient sewage cleaning, an intensive use of territories and landscape modification by the population, as well as significant quantities of waste.

In western countries, environmental management strives to improve efficiency. The key issue is how to produce more national product by using a given amount of natural resources with the emission of fewer polluting materials. At the same time, they aim at increasing prosperity as well. The environmental protection of industrial countries increases competitiveness. Although environmental measures, e.g. the eco-tax and other elements put a burden on society, they have economic advantages. The preservation of resources and the environmentally friendly products resulting from these measures, increase competitiveness.

Quality of the soil

The soil is one of the main natural resources of Hungary. 83% of the country's territory is suitable for agricultural production or silviculture, while 17% is not cultivated. The ratio of irrigated and ameliorated territories has increased (Table 1).

Quality of the air

The level of air pollution in Hungary is continuously decreasing; the pollution covering contiguous areas has disappeared. Compared to the territory of the country, the ratio of areas with polluted air fell from 13.2% to 11% in 6 years (between 1997 and 2002). The quality of the air is mainly threatened by NO_2, 60% of which is caused by transportation (Table 2).

Waste management

There remains a lot to do in waste management. The National Regional Development Concept (2004) reveals that in Hungary almost 70 million tonnes of waste is produced, of which 4.6 million tonnes are from the settlements, 20-25 million tonnes are non-dangerous waste from production and services, 5.5 million tonnes are fluid including about 0.7 million tonnes of sewage mud, and 3.4 million tonnes are dangerous waste, while the amount of waste from agriculture and the food industry, together with the biomass waste, is around 33 tonnes.

Table 1

Area affected by amelioration and fertilisation per year*

Year	Irrigated	Fertilised (artificial)	Fertilised (organic)	Amelioration				Lime fertilisation
	Agricultural area (1000 hectares)			(hectare)				
				total	sour	salty	sand	
2000	125.3	1519.8	104.3	11911	9894	266	1751	5082
2001	105.0	1571.8	95.9	11767	11173	90	504	8407
2002	124.8	1560.2	115.0	10500	10097	20	383	9085
2003	n.a.	n.a.	n.a.	15822	11309	1142	3371	19019

Source: FVM, KSH, environmental statistical data

*Data from economic organisations

Table 2

The national emission data of traditional air polluting agents (kt/year) Hungary (2000-2002)

Name	2000	2001	2002
Sulphur–dioxide	486.15	399.79	365.36
Nitrogen–oxides	185.45	185.50	185.54
of this: transport	109.90	112.90	115.65
Solid material	128.50	121.91	118.59
Carbon–monoxide	633.04	575.53	563.14
of this: transport	435.92	423.70	413.85
Carbon–dioxide	59,411.00	61,920.00	60,778.00
of this: transport	10,441.00	10,913.00	11,215.00
VOC	172.70	158.30	154.60

Source: KvVM

Nature and landscape conservation

The extent of national and local protected natural reserves is 859,747 hectares at present (9.3% of Hungary's area). This area has expanded by 15,440 hectares since 1998. 13.4% of the nationally protected reserves are under enhanced protection.

Nowadays there are almost 3,000 species of plants and more than 43,000 species of animals. In five years the number of protected plants grew by 39% to 695 while that of animals also increased by 14% to 965. 63 plants and 137 animals are under enhanced protection. With the EU legal harmonisation a total of 1,066 species, 498 plants and 568 animals were declared protected in national regulations and laws.

The environmental policy of the European Union

The environmental policy of the EU is based on continuous cooperation and consensus-seeking. The basic principles are published in Article 130(2) of the Treaty of the European Community. The basic principles are the principle of high-level protection, the principle of precaution, the principle of prevention, and the "polluter pays" principle. Further principles of the EU and EU treaties are the principle of subsidiarity and the definition of sustainable development as a goal. In the period 2007-2013, the financing of rural development will not be included in the system of structural funds. As part of the budget line 'handling and conservation of natural resources' of the new EU-budget, rural development programmes will be financed by the European Agricultural Rural Development Fund within the framework of the Common Agricultural Policy.

The main areas to be developed in the following programme period are:

- the competitiveness of the agricultural and silvicultural sectors;
- environmental protection (including nature and landscape conservation) and earth management;
- the diversification of the rural economy and the improvement of the living standard of the rural population.

This is completed by the LEADER Programme, which finances the self-organised conceptions of small regions.

Environmental effects of agriculture

Marselek (2006) analyses the environmental effects of agriculture in detail. In Hungary, the present industrial mass-

production causes increased environmental damage, which can be evaluated in the case of each activity. When examining the effects of crop production, it can be stated that reasonable production, which takes into consideration the condition of the soil, the needs of the plants, pests and pathogens, is harmless for nature. The negative effects are the consequences of over-sized production, improper soil use and nutrient supply, over-irrigation, etc. Fertilisers and plant protection chemicals are the main polluters of water and soil. Even manure and liquid manure can pollute the environment. In animal husbandry, carcasses, methane emission, applied chemicals and micro-organisms can be harmful. Power and labour-saving machines cause damage by making the soil too compact. One cannot neglect the air-polluting effects of machines and of the oil and fuel dripping from them either.

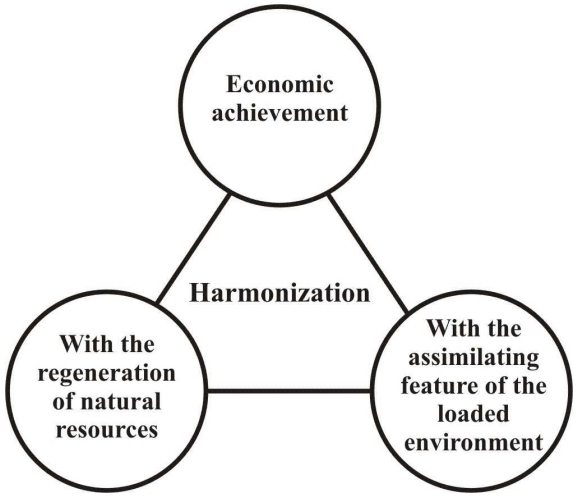
Thus, it can be stated that the present agricultural model pollutes the environment heavily. An alternative model could be the integration of certain technological elements of the traditional, the industrial and the organic types of farming. It is called an integrated agricultural model, which is in fact the model of sustainable agricultural development. According to *Buday-Sántha (2002),* 'integrated production can be defined in the following way: it is high-quality mass-production carried out at a high technological level, and with a high level of know-how, adjusting to local conditions, meeting the requirements of the market, hygiene, human and animal health care, environment protection, nature conservation and animal welfare, and controlled at every stage from the field or stable to the table of the consumer.'

Sustainable agricultural development

The economic growth of future agriculture does not mean a quantitative increase in results; rather it has a qualitative approach. The main points are summarised in Figure 1.

Figure 1

Sustainable agricultural production



Source: L Csete, 2004

Precision management opens a new path to the realisation of sustainability *(Csete L., 2004)*. It is very important for effectiveness to differentiate between the levels and areas of sustainability (*Csete L., 2005*). The global and long-term principle of sustainable development often derives from regional and local programmes, which can be organised, regulated and controlled by the authorities of the given level. The mobilisation, persuasion and education of people are also feasible at this point to make them receptive towards sustainable development (*Marselek, 2005*). Figure 2. describes this.

Figure 2

Levels and areas of sustainable development

		Global	Regional	Local
		Levels of sustainability		
Society	Areas of sustainability			
Economy				
Nature				

Source: L Csete, 2003

In the areas of sustainability we find the following main tasks:

– creating and sustaining equality is important from society's point of view;

– improving financial supply and efficiency in the economy; and

– preserving the natural capital and natural environment in nature, striving to improve environmental conditions (*Hopfenbeck, 1994*).

The recognition of environmental sustainability is decisive. During its examination we can analyse the relationship of the extended reproductive economy and the finite natural environment. If we fail to assess the system and the environmental load in production properly or it reaches a grave extent in consumption, then it will have a direct negative effect on production conditions (cost), the level of consumption, and the welfare of society (*Bod, 2002*).

Consequently, the state has to regulate the economy in such a way that the system of interrelations between man-nature-economy and environment should really be sustainable in the long run.

The changes can only be lasting with the realisation of a sustainable economy. Sustainable economy can mobilise new resources so the extension of resources is also possible. The state has to ensure the satisfaction of the genuine needs of society (*Abayné – Marselek, 2005*).

The prerequisite of local sustainable development is the satisfaction of basic human needs.

There can only be results if social organisation is self-sustaining, developing a culture of use based on real needs and showing self-restraint towards its environment within certain limits.

Sustainability is threatened by globalisation. The increasing energy consumption of international commerce is a serious danger to the environment. This can be countered by sustainable regional development and the economic autonomy of small communities (*Marselek, 2005*). In many parts of the world, people use the local possibilities of sustainability. In Sweden, for instance, there are a total of 70 ecovillages, but they are also becoming popular in Scotland, Germany and Italy (*Molnár et al., 2006*). The harmful effects of globalisation can also be reduced by the development of information technology, where information and know-how is circulated instead of materials and products. In certain countries, globalisation prevents the implementation of independent development policies and strategies. For that reason, it is necessary to focus on reasonable employment and human rights in economic policies. Local control and decision-making must be strengthened (*Ellwood, 2000*).

Sustainable development also has to be supported by theory. This is the primary aim of an international research team in the Rockefeller Foundation's Bellagio research centre in Italy. They compiled the principles (Bellagio Principles) that can be used in the full evaluation process of sustainable development, in the selection and interpretation of indicators and the publication of results.

In Hungary, it was *Szlávik (2002)* who studied the subject, and defined the different levels and pathways of 'sustainability.'

It is necessary to amend and improve the KSH (Hungarian Central Statistical Office) system of indices applied in the examination of settlements, regions and the country by means of a settlement (region, country) sustainability index system (*Szlávik – Csete M., 2004; Magda et al., 2005*).

These indices have to be typical of sustainable settlements (region, country) and ensuring their creation is indispensable. To further this, the data collection system of the KSH also has to be reconsidered.

According to *F. Nagy et al. (1995),* the eco-social market economy can be the transitory stage towards sustainable development. The eco-social market economy takes into account values other than material values, and tries to consider the real values of resources in the market. Its strategies include solidarity and equal division of resources.

The economic relations of the subject

In our opinion, the evaluation of the economic relations between the natural environment and sustainable agricultural production can only be carried out if the whole system is taken into consideration.

*Due to its holistic (regarding the unity instead of the parts) nature, its evaluation can be done in a complex way.

**Nowadays a lot of environmental activists and economists agree that the value of natural resources should also be expressed in monetary terms to make them become market factors whose effective use and preservation are taken care of by the economy (*Magda – Marselek, 2005*).

The costs of environmental protection prevail more and more in cost calcu-

lations. The figures are often uncertain estimates within broad limits so working out and accepting the exact methodology is an urgent task.

*** According to *Farkasné et al. (2006)*, the examination of externalities is part of welfare economics. 'By their effects on welfare, externalities can be:

- positive (landscape, biodiversity),
- negative (soil pollution, acidification, climate change), and
- other contradictory aspects (motorways).'

Kerekes – Kiss (2001) refers to the directions of ecological economics. According to this, the economy should not be developed in the direction of a modernist model (globalisation, mass production, merging markets, a few multinationals rule the world, hierarchic leadership, etc.), but rather in the direction of a bioregional one (flexible production systems, production based on local needs, self-supporting regions, smaller companies, decentralised leadership, etc.) to make life on earth sustainable.

Competitiveness must be maintained with special regard to the requirements of sustainability, which is a very difficult problem these days.

All in all, we must not abandon these efforts (*Marselek – Molnár, 2005; Marselek et al., 2002; Wölcz – Pummer, 2004*).

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ADDRESS:

Dr. Fábián Gyula
főiskolai docens, tanszékvezető
Károly Róbert Főiskola
Vadgazdálkodási és Állattenyésztési Tanszék
3200 Gyöngyös, Mátrai u 36.
Tel.: 37/551-950, Fax: 37/551-952
E-mail: gyfabian@karolyrobert.hu

Dr. Marselek Sándor
főiskolai tanár
Károly Róbert Főiskola
Szervezéselméleti Tanszék
3200 Gyöngyös, Mátrai u. 36.
Tel.: 37/518-339, Fax: 37/311-875
E-mail: smarselek@karolyrobert.hu

Abayné dr. Hamar Enikő
főiskolai docens
Károly Róbert Főiskola
Vadgazdálkodási és Állattenyésztési Tanszék
3200 Gyöngyös, Mátrai u. 36.
Tel.: 37/551-953, Fax: 37/551-952
E-mail: ehamar@karolyrobert.hu