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ECONOMIC ASPECTS OF NATURAL RESOURCES AND LAND USAGE

ASPEKTY EKONOMICZNE UŻYTKOWANIA ZASOBÓW NATURALNYCH I GRUNTÓW

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Streszczenie. Celem niniejszego artykułu jest pokazanie znaczenia gospodarczego wykorzystania gruntów. Ponieważ ziemia jest podstawą produkcji przemysłowej i rolnej, energetycznej i ochrony środowiska, stąd wynika waga tego tematu. Przedmiotem analizy jest zależność między użytkowaniem gruntów ornych a rozwojem zrównoważonym. W okresie, kiedy gospodarka światowa jest w kryzysie, konieczne jest przeanalizowanie różnych możliwości, które pomogą zmienić negatywną tendencję wykorzystania gruntów ornych. Należy również ocenić zasoby kapitału ludzkiego w relacji do zasobów naturalnych, spośród których jednym z najważniejszych zasobów są grunty orne.

Key words: land usage, scarcity, sustainability.
Słowa kluczowe: deficyt, rozwój zrównoważony, wykorzystanie ziemi.

INTRODUCTION

The current global economic crisis may well become the longest in three generations. If trust in finance and the economy does not return rapidly, economic reform, socio-economic growth and political stability will suffer. While some confidence in the financial system will return in due course, a new financial architecture is required to strengthen the global economy and increase economic and financial fairness. In this connection, it is critical that the needs for global food, and environmental, security are taken into account. World population growth is the biggest trend-making factor: 70 to 80 million more people a year, with close to 7 billion by 2012. Population growth creates a rapidly growing demand for food products including feed, arising from increasing meat consumption. Other major global trends are globalisation and urbanisation. Moving production to the most competitive regions causes the food trade to become more liberalised and also more concentrated. Growing energy demands and climate change will also influence food production; agriculture contributes to emissions of GHG into the environment and also suffers or benefits from changing climates, depending on climatic zones. Additional challenges are increasing market volatility resulting from yield and stock fluctuations and consumer sensitivity to food quality, safety, and price. Finally we face the question of who will pay for agricultural public services provided by land managers that the market does not pay for, such as rural landscape maintenance, environmental protection

biodiversity, and animal welfare. These challenges are aggravated by global irresponsibility related to food security, water and environmental sustainability – and energy security.

Energy prices have seen a decline (in constant dollars) over the past 200 years. The latest fossil energy price hikes have not even brought us back to the price levels of some 30 years ago. The tragic reality is that political zeal led governments to keep fossil energy prices as low as possible, thus frustrating most attempts to increase energy productivity. Energy price elasticity is very much a long-term affair, and the return on infrastructure investments crucial to the creation of an energy-efficient society requires time. Much debate surrounds the potential contribution of agriculture to renewable energies. Unfortunately, while existing technologies produce energies that may be renewable, most are not green. Whether second generation biofuels may eliminate most of the pitfalls of the first generation is open to doubt, although they include saving food components of plants. Biofuel policy is a major aggravating factor even if it is now in the background because of the decline in oil prices that reduced the demand and the drops in food prices. The current economic crisis is now the focus of attention, but renewable energy will return as a problem when the crisis ends.

In terms of climate change and the worldwide ecological situation, the picture is not better-it is a good deal grimmer. By adopting the correct policy mix, we can decouple wealth creation from energy and material consumption just as we decoupled wealth creation from the total number of hours of human labour. That was the great achievement of the industrial revolution. Labour productivity has risen at least 20-fold in the past 150 years of industrialisation. Resource productivity should become the core of our next industrial revolution.

Now we know that the (over)exploitation of our entire ecosystem and the depletion of natural resources (the reserve-to-production ratio of oil reserves is rapidly declining) carries a price that must be paid today to compensate future generations for the losses (or costs of substitution) they will face tomorrow. Moreover, the world population growth of 50% within the next 50 years, causing new scarcities (water) and pollution (CO_2 emission rights) is accelerating these issues.

Joseph Stiglitz and Nicholas Stern made a joint appeal to use the financial crisis as an opportunity to lay the foundations for a new wave of growth based on technologies for a low carbon economy (Financial Times 2009). The investments would drive growth over the next two or three decades and ensure its sustainability. They noted that "providing a strong, stable carbon price is the single policy action that is likely to have the biggest effect in improving economic efficiency and addressing the climate crisis." Lord Stern calculated that governments should spend at least 20% of their stimulus on green measures to achieve emission targets (Stern 2006).

The environmental resource scarcity issues are entirely real. As a result of climate changes, most agricultural patterns may become disrupted and the poorest countries are the most vulnerable to such disruptions. Over the long term, environmental security is the mirror image of food security, because we have no food without substantial clean water resources,

productive soils, and an appropriate climate. Climate change subjects all businesses and society in general to cumulative, long-term risk. The failure of agriculture alone would lead to widespread hunger in developing countries and the mass migration of people (half a billion according to the United Nations), mostly to developed countries. (Gyuricza et al. 2003)

In this period when the world economy has decreased rapidly, it is necessary to analyse the different possibilities which help us change this negative tendency, and find the right way to do so. So we need to evaluate our resources from human capital to natural resources. That is the reason why we are focusing on one of the most important resources which is arable land.

The land as an economic resource is mostly utilised by agriculture. Land usage occurs in a competitive environment (market competition) and economic factors are of primary importance for all farmers. (Guth 2005) However, it should not be forgotten that land is a natural resource at the same time. No matter whom the owner of a given piece of land is. Land is part of the national wealth and it must be used in an optimal way. The regulation of land use activities is governmental task (e.g. environmental protection).

In our opinion, land usage can be defined as a fine balance between sophisticated and inter-related activities, a precise order and harmony of biological, physical and chemical processes. This system of relations can only be described by using the rules of system theory and its adaptation to the specific conditions of land usage. It is important that land usage is defined on the basis of system theories by the fact that the whole system and the relationship between certain elements must be clearly specified and quantification must also be done.

On the one hand, we have to emphasise that land utilisation is a complex category, and agricultural utilisation is only one part of it – however, it may be the most important one. On the other hand, the present type of agricultural land usage give us such examples, showing us that this area cannot be defined on its own, but rather only in a complex system compared with other land utilisation possibilities. It is true for both micro and macro levels as well. The aim is to find the best solution of utilising land in the most effective way. In a narrow sense land utilisation is part of global utilisation, because it uses only some parts of it, but on the other hand, in some cases it is a wider category because it includes those lands which are needed for the processing industry and services. Global utilisation can provide an answer only to those questions that are connected with the comprehensive relations of economical development. However, in order to make a thorough analysis of the most important production factor in agriculture (arable land) we will have to separate the different forms of land usage and point out its external and internal relationships.

After finding the best utilisation, our task is to produce in a sustainable manner. Nowadays it is very important – when we use so much of so many limited resources such as oil, gas, arable land. Everybody is well aware that we are borrowing land from our grandchildren, so we will have to give it back after its use.

RESULTS AND DISCUSSION

Land utilisation and scarcity

The problem of how to define, determine and assign the price, or the value of the land, is an important issue in economic literature. Land could be seen as an asset, but also as a production factor that serves production and consumption purposes. Land assets have three important characteristics: *scarcity* (land exists only in fixed amounts and cannot be created easily), *immobility*, and *durability* (it cannot be destroyed easily: but fertility can be destroyed easily: biodiversity loss: crop production is impossible without biodiversity because that creates food production. (crop and grass).These characteristics make land an attractive asset as a productive factor, as collateral for credit and as a store of wealth.

Scarcity

The total land area of the World is 148 940 000 km^2. Europe has a land area of 10 180 000 km^2. The surface of Hungary is only 0.91% of Europe, 93 030 km^2. About half of the total area of Hungary is agricultural area, which is outstanding in the world.

The total amount of land available at a given location is fixed, and the total supply of usable land in a nation is fixed – the territory of Hungary is 9,303 thousands hectares. There's also usually more than one competing use for a parcel of land. The rent that can be charged for the use of land depends on its highest marginal revenue product.

We can state that the supply is perfectly inelastic overall. If land rents at that location increase, the quantity of land supplied at that location couldn't increase. Because the supply at a given location is fixed, the price of land depends entirely on the level of demand at that location and governmental subsidies. Governments provide support to agriculture in the form of transfers through a wide variety of policy measures. Fortunately, the OECD has created a methodology to calculate the support. The most important are: CSE, PSE. The Consumer Support Estimate (CSE) is an indicator of the annual monetary value of gross transfers to (from) consumers of agricultural commodities, measured at the farm gate (first consumer) level, arising from policy measures which support agriculture, regardless of their nature, objectives or impact on consumption of farm products. The Producer Support Estimate (PSE) is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income. http://stats.oecd.org/glossary/detail.asp?ID=1901

Immobility

The land is an immobile resource, because we cannot move it from one part of the world to another. The root of this characteristic results in both advantages and disadvantages. If the land is located near industry and the market, it is an advantage and of course, the op-

posite is a disadvantage. We can abate the problems of the disadvantages with well planned industry locations and a well planned production structure of the plants.

Durability

This characteristic is true, but not in every case. If we only use the land, without conducting any measures regarding environmental protection on it, the quality and the productivity of the land will be lower. On the other hand, agriculture uses that part of the land – the topsoil -, which is the most dangerous in that case, because it can be easily destroyed by both wind- and water erosion (and biodiversity loss). Therefore, my opinion is the following: durability is true in general, but it is not true in the case of agricultural land.

Land utilisation and sustainability

It is very difficult to determine a concrete definition of sustainability. In my mind a reasonable definition of sustainable development might be as follows: it involves maximising the net benefits of economic development, subject to maintaining the services and the quality of natural resources over time Mankind is directly influenced by the loss of biodiversity. Through the extinction of species, we lose crucial opportunities to solve many problems within our society. Biodiversity provides us directly with essentials like clean water and air and fertile soil; it protects us from floods and avalanches. These benefits can all be valued economically. It is a difficult and complex task, but such a valuation would clearly show how important biodiversity is for human wellbeing and economic development.

Many people are unaware of the speed at which we are consuming our natural resources. We are producing waste far faster than it can be recycled. It is important to compare the needs for public goods and services with arguments as to whether or not market failures are linked to the provision of services. Market failure is a crucially important justification for taking measures to protect our landscapes. Corrections in market failures may also be achieved through investments and the provision of payments to reward land managers who provide public goods and services (European Commission 2008, Table 1).

Table 1. Future Environmental Scenario to 2050

Use	2000 Million [km^2]	2010 Million [km^2]	2050 Million [km^2]	Difference 2000 to 2010 [%]	Difference 2010 to 2050 [%]	Difference 2000 to 2050 [%]
Natural areas	65.5	62.8	58.0		–8	–11
Bare natural areas	3.3	3.1	3.0	–6	–1	–9
Managed forests	4.2	4.4	7.0	5	62	70
Extensive agricul-	5.0	4.5	3.0	–9	–33	–39
Intensive agriculture	11.0	12.9	15.8	17	23	44
Woody biofuels	0.1	0.1	0.5	35	437	626
Cultivated grazing	19.1	20.3	20.8	6	2	9
Artificial surfaces	0.2	0.2	0.2	0	0	0
World Total	108.4	108.4	108.4	0	0	0

Source: Braat, L., and Brink, ten P., Eds. 2008. Contribution of Different Pressures to the Global Biodiversity Loss between 2000 and 2050 in the OECD Baseline: Interim Report. Brussels: The Economics of Ecosystems and Biodiversity (TEES).

When we focus on sustainability, in relation to the land we need to think in the long run. That's why a basic condition turns us to sustainable agriculture, to fit in with the environment, which means to use the land everywhere for those production and so intensity, which will be the most optimal utilisation without destroying it.

In the beginning of the 1970's at the time of the world oil crisis, economists suddenly realised that some resources are limited. That was the reason, why so many various dissertations were written about the different alternatives of sustainability. One of these documents was the "Limits of growth" by D. H. Meadows. At that time, her purpose was to remind the members of different national governments of the dangerous situation in the society, with sketching a concrete global problem. In her research we could find a lot of problems, but we would like to focus on only five which are in close relationship with the land utilisation.

At first we mentioned the population growth. Analysing the following table we can see a huge increase in the number of the world's population, which will be more than 3.5 times greater in 2050 than it was in 1950. It will be a major problem because nowadays about 1 billion people starve and this figure will be increasing in the future. From the table we can see that the biggest problem occurs in the case of the less- and least developed countries, where this increase is much higher than the average (Table 2).

Table 2. World population (1950–2050)

Characteristics	Years			
	1950	2000	2003	2050
Total (million)	2519	6071	6301	8919
Developed countries	813	1194	1203	1220
Less developed countries	1706	4877	5098	7639
Least developed countries	200	668	718	1675

Source: UN (2003) World Population Prospects: The 2002 Revision. Highlights. New York: United Nations.
Less developed countries: each African, Asian country instead of Japan, Latin-America and Caribbean region.
Developed countries: each European countries, North-America, Australia, New-Zealand and Japan.

The second problem is the increase in natural resource production. It started in the 18th century after the industrial revolution and has increased step by step, but with a higher rate. On the 3rd table we can see the production of the primary energy in the last decade. In this period in EU countries – including Hungary – it was decreasing by a small proportion, but the increase in China in the same years was about 70%, which was shocking. The production in the USA and Japan was really even.

Table 3. Primary energy production (billion tons, oil equivalence)

Countries	Years					
	2000	2001	2003	2005	2007	2008
EU-27	933.0	932.2	926.4	890.2	859.5	–
USA	1678.8	1699.9	1634.5	1629.9	1665.2	1716.1
Japan	105.8	104.7	84.0	99.8	90.5	87.1
China	1073.0	1104.5	1331.3	1640.9	1814.0	–
Hungary	11.3	10.8	10.7	10.4	10.2	10.4

Source: Hungarian Statistical Office, 2009.

The third problem is the expansion of industrial production – production of electricity is presented in the 4th table – which is in close relationship with the increase of natural resources production. Electricity is very important because it is the basis of all the other industries.

Table 4. Gross electricity production (billion kWh)

Countries	Years					
	2000	2001	2003	2005	2007	2008
EU-27	3020.9	3108.1	3216.0	3308.9	3361.7	–
USA	3990.5	3924.1	4075.8	4257.4	4348.9	4354.5
Japan	1057.9	1039.7	1082.6	1133.6	1133.7	1085.2
China	1368.5	1434.6	1905.2	2474.7	3277.7	3103.1
Hungary	35.2	36.4	34.1	35.8	40.0	40.0

Source: Hungarian Statistical Office, 2009.

The fourth problem is the environmental pollution which was increasing to a great extent. All three factors – population growth, growth in the natural resources- and industrial production - generate environmental pollution alone, but these are cumulated which is why we could find a higher increase in this sphere than in the others.

Last but not least, we could see a great decrease in the territory of the agricultural areas all over the world except in China. It is very dangerous because the population has increased in a high ratio and needs more territories for producing basic materials for the food industry (Table 5).

Table 5. Agriculture area (1000 ha)

Countries	Years				
	2000	2001	2003	2005	2007
World	4 960 102.0	4 967 137.1	4 937 312.0	4 945 770.4	4 931 862.0
Europe	486 189.0	483 612.6	479 373.0	476 634.4	474 273.5
USA	414 399.0	414 944.0	416 902.0	412 878.0	411 158.0
Japan	5 258.0	4 793.0	4 736.0	4 692.0	4 650.0
China	544 358.0	543 356.0	541 851.0	547 340.0	552 832.0
Hungary	5 854.0	5 865.0	5 865.0	5 863.0	5 807.0

Source: Faostat 2008.

These five factors are connected with each other. When the population increases, they need to use more resources that are used by industry. All of these three factors generate environmental pollution, and they usually use agricultural areas. It is true all over the world, which is why the quantity and the ratio of the agricultural land have decreased in the past. Daniela Meadows suggested in her survey, a zero economic growth, so to her mind it will be necessary to decrease the first four components increasing rates by 30–70% and increase the fifth one at the same ratio.

CONCLUSION

Population growth creates a rapidly growing demand for crop products. Growing energy demand and climate change will also influence food production; agriculture will contribute to emissions into the environment and also suffer or benefit from changing climates, depending on climatic zones. Additional challenges are increasing market volatility resulting from yield and end stock fluctuations and consumer sensitivity to food quality, safety, and price. The challenges are aggravated by global irresponsibility related to food security, water and environmental sustainability-and energy security. The exploitation of our entire ecosystem and the depletion of natural resources carry a price that must be paid today to compensate future generations for the losses they will face in the future. The food crisis affected more people more severely than the macroeconomic issue because the populations most affected by sharply rising food prices spend larger shares of their income on food. The global food crisis produced an extraordinary human impact, larger and more adverse than the global financial crisis. Resource productivity should become the core of our next industrial revolution. There are five factors in close relationship with the land utilisation. These are as follows: rapid population growth, increasing utilisation of natural resources, expansion of industrial production, increasing environmental pollution, and decrease in territory of agricultural area.

The land as an economic resource is mostly utilised by the agriculture. It can be seen as an asset, but also as production factor that serves production and consumption purposes and have three important characteristics: scarcity, immobile, and durable. It is constitutes part of the national wealth and it must be used in an optimal way. The land utilisation is a complex category, and agricultural utilisation is only one part of it – however, it may be the most important one. Land utilisation is needed to be in accordance with sustainability. The root of the problem is the population growth, which will be more than 3.5 times bigger in 2050 than it was in 1950. It will be a great problem because nowadays about 1 billion people are starving and this number will be increasing in the future. About forty years ago when the price of oil went up worldwide, economists suddenly realised that some resources are limited. In addition, other crucial problems emerged, like the increase of the natural resources production, the expansion of industrial production and environmental pollution, which has increased manyfold. It is highly dangerous because the population has increased at a high ratio and needs more territories for producing basic materials for the food industry.

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