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ECONOMIC QUESTIONS OF LAND USAGE – SCARCITY, SUSTAINABILITY

Róbert Magda

Ph.D., Associate Professor, Károly Róbert College, Gyöngyös, Mátrai u. 36. Hungary
email: rmagda@karolyrobert.hu

Abstract: The aim of this paper is to show the economic importance of land usage. This topic is important because land is the basis of industrial and agricultural production, as well as energy and environmental security. The focus of the analysis is the relationship between land usage and scarcity and sustainability.

Keywords: land usage, scarcity, sustainability

Introduction

The current global economic crisis may well become the longest in three generations. If confidence 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 context, 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, 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 globalization and urbanization. Moving production to the most competitive regions causes the food trade to become more liberalized and also more concentrated. Growing energy demand and climate change will also influence food production; agriculture contribute to emissions of GHG into the environment and also suffer or benefit from changing climates, depending on climatic zones. Additional challenges are the increasing market volatility resulting from yield and stock fluctuations and consumer sensitivity to food quality, safety and price. Finally, there is the question of who will pay for agricultural public services provided by land managers that the market does not finance, 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 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, existing technologies produce energies that may be renewable, but 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 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 labor. This was the great achievement of theIndustrial Revolution. Labor productivity has risen at least 20-fold in the past 150 years of industrialization. Resource productivity should become the core of our next industrial revolution.

Today, 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) carry a price that must be paid today to compensate future generations for the losses (or costs of substitution) they will face tomorrow. Moreover, world population growth by 50% during 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 tackling 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 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 mass migration of people (half a billion, according to the United Nations), mostly to developed countries.

Presently, when the world economy has decreased rapidly, it is necessary to analyse the different possibilities which help us change this negative tendency and to find the right way. We therefore need to valuate our resources from those of human capital to natural resources. This is the reason why I focus on one of the most important resources, which is arable land. Land, as an economic resource, is mostly utilised by agriculture. Land usage occurs in a competitive environment (market competition) and economic factors are primary for all farmers. However, it should not be forgotten that land is a natural resource at the same time, regardless of who the owner of a given piece of land is. Land is part of the national wealth of any country and it must be used in an optimal way. The regulation of land use activities is a governmental task (e.g. environmental protection).

In my 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, I have to emphasize that land utilization is a complex category, and agricultural utilization 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 that show us that this question area cannot be defined on its own, only in a complex system compared with other land utilization possibilities. This is true for both micro and macro levels, as well. The aim is to find the best solution for utilizing land in the most effective way. In a narrow sense, land utilization is part of global utilization, because it uses only some parts of it. Yet, 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 the services. Global utilization can give answer only to those questions that are in connection with the comprehensive relations of economical development. However, in order to make thorough analyses of the most important production factor of the agriculture – arable land – I will have to separate the different forms of land usage and point out its extern and intern relationships.

After finding the best utilisation, our task is to produce in a sustainable manner. Currently, this is very important - when we use so much limited resources, such as oil, gas, arable land. Everybody knows that we are borrowing land from our grandchildren, so we will have to give it back after we have used it.

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 the 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 (crops and grass). These characteristics make land an attractive asset as a productive factor, as a 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 10 180 000 km2 land area. The surface area 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 – territory of Hungary is 9.303 thousands hectares. There is 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 marginal revenue product in the highest.

Let me see the supply which is perfectly inelastic. If land rents at a location increase, the quantity of land supplied at that location could not 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 supports to agriculture in the form of transfers through a wide variety of policy

measures. Fortunately, the OECD has created a methodolgy 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

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

Durability

This characteristic is true, but not in every case. If we only use the land, without implementing any environmental prevention on it, the quality and the productivity of the land will be lower. On the other hand, agriculture uses those parts of the land – the topsoil – which are the most dangerous, 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 the agricultural land.

Land utilisation and sustainability

It is very difficult to determine a concrete definition for the concept 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 of 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 with 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 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	2010	2050	Difference	Difference	Difference
	Million km^2	Million km^2	Million km^2	2000 to 2010	2010 to 2050	2000 to 2050
Natural areas	65.5	62.8	58.0	%	–8%	–11%
Bare natural areas	3.3	3.1	3.0	-6%	mi]%	–9%
Managed forests	4.2	4.4	7.0	5%	62%	70%
Extensive agriculture	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 I focus on sustainability in relation to land, we need to think in the long run. It is the basic condition of long-term sustainable agriculture to fit in with the environment, i.e. to use land for production at an intensity which would mean the most optimal utilisation, without destroying it.

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

The first of these problems is population growth. Analysing the table below, we can see a huge increase in world population, which will be more than 3.5 times bigger in 2050 than it was in 1950. This growth will be a great problem, because currently about 1 billion people are starving and this figure will increase 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)

	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: all African and Asian countries, excepting Japan, Latin America and the Caribbean region
Developed countries: all 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 at a higher rate. On the 3rd table, we can see the production of primary energy in the last decade. In this period, in EU countries – including Hungary – it has 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 consistent.

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

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

	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	11,32	10,8	10,7	10,4	10,2	10,4

Source: Hungarian Statistical Office, 2009

Table 4. Gross electricity production (billion kWh)

	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 environmental pollution, which has increased to a great extent. All three factors – population growth, grow in the natural resources- and industrial production – generate environmental pollution alone, but these are cumulated that is why that we could find a higher increase in this area than in the others.

Last, but not least, we could see a great decrease in the territory of the agricultural area all worldwide, except for in China. This trend is very dangerous because the population has increased at a high rate and requires more territory for producing basic materials for the food industry. (Table 5)

Table 5. Agriculture area (1000 ha)

	2000	2001	2003	2005	2007
World	4960102,0	4967137,1	4937312,0	4945770,4	4931862,0
Europe	486189,0	483612,6	479373,0	476634,4	474273,5
USA	414399,0	414944,0	416902,0	412878,0	411158,0
Japan	5258,0	4793,0	4736,0	4692,0	4650,0
China	544358,0	543356,0	541851,0	547340,0	552832,0
Hungary	5854,0	5865,0	5865,0	5863,0	5807,0

Source: Faostat 2008

These five factors are interconnected. When the population increases, it needs 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 ratio of agricultural land has decreased in the past.

Daniella Meadows suggested zero economic growth in her survey, so in her mind it will be necessary to decrease the first four components increasing rates by 30–70% and to increase the fifth one in 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 the next: rapid population growth, increasing utilization of natural resources, expansion of industrial production, increasing environmental pollution and decrease in territory of agricultural area.

Land, as an economic resource, is mostly utilised by agriculture. It could be seen as an asset, but also as a production factor that serves production and consumption purposes and have three important characteristics: scarcity, immobile and durability. Land constitutes part of the national wealth and it must be used in an optimal way. Land utilization is a complex category, and agricultural utilization is only one part of it – however, it may be the most important one. The land utilisation is needed being in accord with sustainability. The root of the problem is the population growth, which will be more than 3.5 times larger in 2050 than it was in 1950. This growth will be a great problem because currently about 1 billion people are suffering from hunger and this situation will only increase in the future. About forty years ago, when the price of oil went up, economists suddenly realised that some resources are limited. In addition other crucial problems emerged, such as the increase of natural resource production, the expansion of industrial production and intensification of environmental pollution, which has been increasing exponentially. This development is dangerous, because the population has increased at a high ratio and requires more territory for producing basic materials for the food industry.

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