

## ECONOMIC VALUE OF BIODIVERSITY AS A PRODUCTION RESOURCE

*George Zheliazkov<sup>1</sup>, Darina Zaimova<sup>2</sup>*

### Summary

*In the last few years the interest towards sustainable development issues and management of biodiversity has rapidly reached global dimensions and undergone changes with meaty character. One of the main reasons for this is the changed proportion between economic purposes and interests; the wider span of ecological priorities; and preserving breeds, which represent society interest and have potential for market demand.*

*The goal of the present study is twofold: to utilize conceptual framework of the business related to biodiversity preserving; and to analyze the economic value and market effect of biodiversity as a production resource. A special attention is given to the balance between economic and market growth, and the system of financial stimuli for those economic subjects whose economic activity and private consumption implies the two sustainability criteria: ecology and social equity.*

**Key words:** *sustainable development, biodiversity, agriculture, economic value*

**JEL:** *Q51, Q57, Q58*

### Introduction

Integrating biodiversity in the process of development and implementing European policies and strategies emerges as an important priority considering the benefits which biodiversity and ecosystem services provide for the different economic sectors, and especially for the agriculture. This process presupposes defining the main reasons for biodiversity loss: intensification of systems' productivity, overexploitation of natural resources, dissemination of invasive alien species and pollution. Estimating economic value of biodiversity appears as an important factor in the process of consolidating

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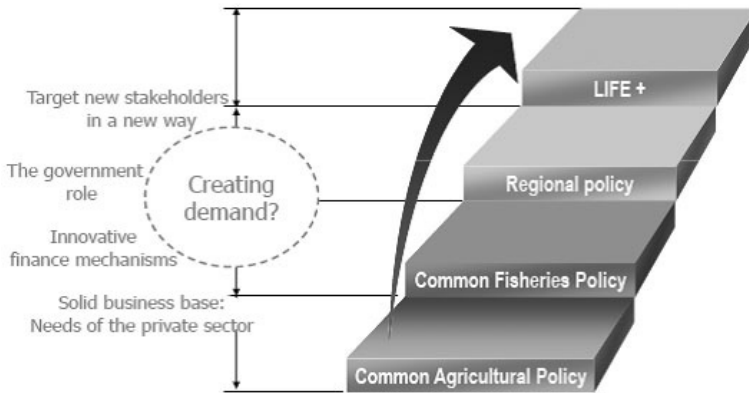
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political and economic decisions. The substantial role of biodiversity as an important determinant for social and economic stability, society well-fare and poverty reduction, and for adaptation towards climate changes, has received acknowledgement in a study provided by the European Commission on the different aspects of liability regime for damage to biodiversity or natural resources (European Environment Agency (EEA), 2008). The document aims to answer three inter-related questions: how to define ‘significant’ damage to natural resources and decide on the ‘minimum level of restoration’; how, and to what extent, monetary valuation techniques can be used to estimate the economic value of damage to natural resources; and how, and to what extent, cost-benefit analysis can be used to choose between restoration options. Later on, the European Economic and Social Committee (EESC) focused on another emerging threat, related to the increasing interest towards economic aspect of biodiversity: *“The fact that the EU has not achieved its biodiversity objective is not attributable either to a lack of understanding of what needs to be done or to a lack of willingness on the part of civil society to take the necessary steps. Basically it is because the world of politics places short-term economic interests above the long-term effects of ecosystem services. The fact that our economic system is unsustainable, based on overuse of natural resources, is also reflected in biodiversity”*. (COM (2010) 4 final (2011/C 48/26)

European policy has appointed the challenge of halting the loss of biodiversity and preservation of ecosystem services as a priority. Nevertheless the literature and analysis available deal more often with the pollution and emission’s related policies, rather than with biodiversity conservation (Policymix, Issue 2/2011). Thus the main criticism towards strategic measures undertaken is that the interventions in agriculture and forestry are carefully considered and reflected, but at the same time the role of sectors with direct negative impact on biological diversity, such as transport and territorial infrastructure is underestimated and often omitted.

Apparently studying economic value of biodiversity appears as fruitful field of research, and also quite challenging in view of the various factors which should be taken into account. Collective decisions are needed to evaluate the status of biodiversity loss, and to define the most cost-effective ways of ecosystem protection. At first place, economic methods can estimate the value of biodiversity so that comparison of the relative importance of different ecosystems can be based on the cost of protecting or restoring them. Secondly, economic analysis offers insights into the specific causes and potential solutions to some of the reasons why biodiversity loss occurs.

As one of the most significant constraints appears biodiversity management, especially at regional and local level (Figure 1). This concerns the capacity for regulation, planning and budgeting, linkages with the civil society, and participation of private organizations in providing services.

**Figure 1.** The changing dimensions of biological resources

The present paper focuses on the methodological approaches and specific problems related to economic value of biological resources and its effect on the activity in the agricultural sector. It is organized in three parts of which in the first one is dedicated to the changed perspectives of the business strategies and impact in compliance to the European strategies for 2020. The second part analyzes the relationship between the agriculture and biodiversity, in particular agro-biodiversity and multifunctionality of the agricultural sector. Basing on these two concepts is built the role of the sector in planning, preserving and maintaining biodiversity. The third part deals with the effect and contributions of genetic diversity on market dynamics and production increase in stock-breeding. In the last part is formalized the impact of the genetic diversity on the ecological goals, defined at regional and global level.

### **New perspectives in doing business in the context of biodiversity preserving**

Being a major stakeholder, the business sector has always been an integral part of the solution of biodiversity loss through corporate social responsibility initiatives, direct investments to specific biodiversity programs, and other support mechanisms. Principles of sustainable business behavior and activity were formally defined in the UN Global Contract (UNGC) at the World Economic Forum in 1999. In practice, this contract sets forth 10 principles in four thematic areas: human rights, labor standards, environment and anticorruption. Later on in the definition of corporate social responsibility given by the World Bank, business has attained importance and is committed directly to "... *sustainable economic development working with employees, their families, the local community, and society at large to improve their quality of life, in ways that are both good for business and good for development.*" (Jørgensen, Pruzan-Jørgensen, Jungk and A. Cramer, 2003) This responsibility is revealed as a sustainable process that brings balance both to economic growth and stability, and development of society and environmental protection.

One of the most clear and explicit definitions of corporate social responsibility has been proposed by the European Commission as "*a concept whereby companies integrate* EP 2012 (59) 2 (319-331)

*social and environmental concerns in their business operations and their interaction with their stakeholders on a voluntary basis. Being socially responsible means not only to fulfill legitimate expectations, but to go beyond compliance and investing more in human capital, environment and relations with stakeholders*<sup>33</sup> In the past several years the so-called socially responsible investments were developed in the financial sector. They should be included in the investment and business plans of the organizations, among other objectives and activities. The “socially responsible funds” which allocate funds at the advantage of companies that are committed to sustainable development is an example of one of the common forms.

What actually constitutes the business and its corporate social responsibility in the context of biodiversity? In terms of environment, actions intend to make it clear to companies the effect of their business on environment and calls for reducing the adverse impacts and protecting of environment through the introduction and management of clean production processes. Thus, the idea of “sustainable development”, as well as the use of renewable energy sources is advanced. Certainly, one of the main questions is whether it is profitable for the business to be environmentally responsible? And why in practice should take care of developing areas, which in most cases are subject to significant government involvement and regulation. Although until presently no research has been conducted to identify purely financial benefits from the application of similar activities, such actions lead to improvement in production process, reduction of industrial and commercial risks which entail the realization of better profits. On the other hand, the introduction of transparent relationships with customers, local community, and also the study of new products or processes is leading to the enhancement of the business potential and learning of new strategic skills.

Developing business and market-based instruments (MBI) has been increasingly perceived as a powerful mean of bringing the biodiversity problems into the process of economic decision-making. These biodiversity businesses, as defined by a 2008 IUCN report entitled Building Biodiversity are “*commercial enterprises that generate profits via activities which conserve biodiversity, use biological resources sustainably and share the benefits arising from this use equitably*”. To incorporate business into the implementation of the Convention of Biological diversity, the new goals for 2020 include the need for dialogue between business representatives and other stakeholders at national, regional and international levels and the engagement of: “... *wider efforts to promote business engagement in the achievement of the three objectives of the Convention and its new Strategic Plan, such as the Business and Biodiversity Initiative initiated at the ninth meeting of the Conference of the Parties, and the Jakarta Charter, as a step to highlight their commitment to the three objectives of the Convention on Biological Diversity*”<sup>4</sup>

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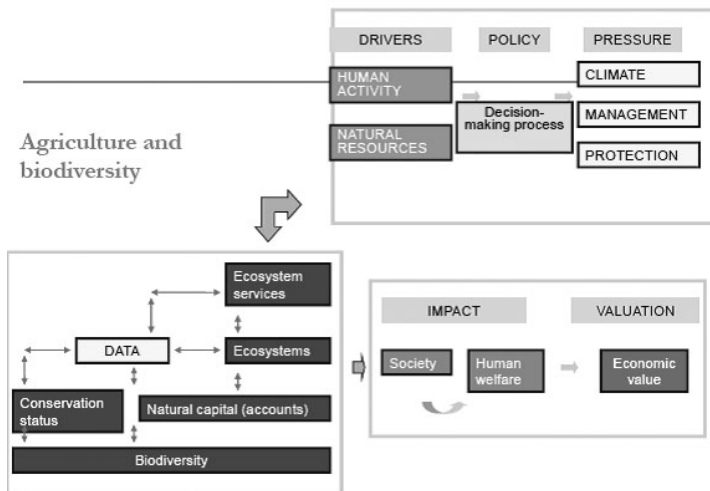
3 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A renewed EU strategy 2011-14 for Corporate Social Responsibility, Brussels, 25.10.2011 COM(2011) 681 final

4 COP 10 Decision X/21: Business engagement

**Assessment of biodiversity and sustainability of the agricultural sector**

Questions related to the concept of sustainable development could be differentiated within three categories: changes in the economic situation, changes in the social status and dynamics of society, and changes of ecological status. Although these three categories have been periodically analyzed and represented by considerable statistical data and indices, these traditional measures do not allow for studying the relationships and interdependence between society, economics and environment. Agriculture plays an interesting and quite often contradictive role in the process of planning for sustainable development. The low levels of income per capita corroborate the necessity to increase productivity in the sector in order to consequently improve living standard of the people in rural areas and to maintain the food supply for urban areas, resources for food industry and export production. These contributions of agricultural sector to the common economic development urge for an elaborated political program and strategies to stimulate the agricultural producers to improve their productivity through implementation of environmental friendly practices and technologies (Figure 2).

**Figure 2.** Relationship between agricultural sector and biodiversity



From micro-economic perspective the higher the levels of income per capita are, the lower are the costs for supplying of provisions as a relative share and the demand is consequently redistributed towards products with non-nutritious character. While productivity at farm level increases, the increase trends in the relative share of agricultural production usually remains lower than the increase in the rest economic activities. As a result the role of the agricultural sector in macroeconomic aspect decreases and this process is accelerated with the introduction of new production technologies. In general the response of agriculture towards the changes in the policy measures are based on the supply analysis. Increasing the level of income and living standard depends on the level of efficiency and the final product. There is a direct relationship between income and final product per capita. In particular, the

final product and the income are the two sides of one coin. The final product is the value of goods produced and services provided, measured by the price paid by buyers. Income is the profit for people (including entrepreneurial bonus), which provides resources for sale of the final product. This income should also be comparable to the price of the final product or service. To improve the living standard (income) it is necessary to determine how to produce more of what is more useful for the consumers. Economic progress is dependent on the growth of the real product - no improvement of income and living standards can be effected without it.

In comparison to the most economic sectors, the agricultural one develops within considerable uncertainty related to the global climate system and ecosystems. This peculiarity corroborates the necessity of correcting measures and policies, which are expected to decrease the negative interrelations in respect to the sustainability criteria. It is assumed that the costs of preserving biodiversity and ecosystems are considerably lower than the costs related to their restoring which considered on time could produce significant benefits, not only environmental but also economical (TEEB).

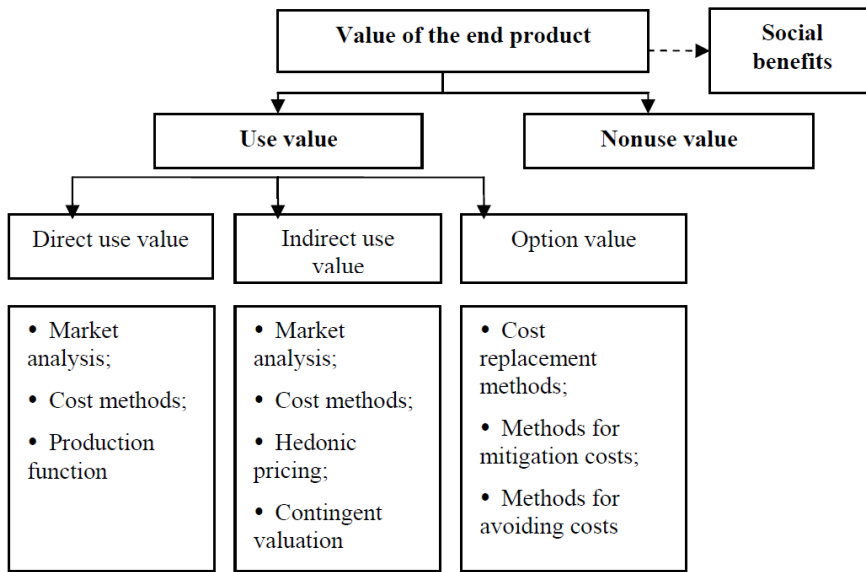
Global statistical data is also imposing in respect to the potential benefits of preserving and prevention biodiversity loss. For example conserving forests is expected to avoid greenhouse gas emissions worth \$ 3,7 trillion; halving the deforestation rates by 2030 would reduce global greenhouse gas emissions by 1,5 to 2,7 Gt CO<sub>2</sub> per year, and therefore avoiding climate damages estimated to more than \$ 3,7 trillion in NPV terms. This figure is not representative for the co-benefits of forest ecosystems (Eliash, 2008). The wider impact of these possible results is indisputable considering that 2,6 per cent of the working force in Europe owe its employment on the base of natural resources, and 16,6 per cent of the European work places are indirectly related to nature. The global business investments related to biodiversity are estimated between 2 and 6 trillion dollars up to 2050. Apparently biological diversity has the potential to contribute to establishing new work places and business initiatives, generating future economic benefits.

Therefore it is logically to identify the assessment indicators of biodiversity and ecosystems, and practically to implement and utilize them into methodological approaches. Considering the significance of the agricultural sustainability as the key element of the theory for sustainable development, the experts in the field have generalized that these indicators should integrate and reflect the following criteria – general political background, conceptual formulation, appropriate level of generalization, efficiency, analytical demonstration and technical applicability, and easier interpretation. This way the economic value of biodiversity could be usefully integrated within the policy-making process and consolidated in the business decisions by representing the full costs and benefits of the ecosystem services, rather than just these costs or values that are released in the market.

A variety of economic valuation methods have been developed in the recent years, stressing on the fact that the valuation is best applied for assessing consequences of the

changes resulting from alternative management options, rather than for the total value of ecosystems estimation (Figure 3). In the most cases these studies generally focus just on a few services provided by the ecosystems. Nevertheless the valuation method chosen, the first step is to identify the changes in the ecosystem services, even when it is not possible or necessary to monetize these changes. It is also necessary to define when and where these changes will take place (Hoffmann, 2011).

**Figure 3.** Methods for assessing biodiversity



Source: Hoffmann, 2011

Defining the economic value could be helpful to achieve more efficient use of natural resources. The logic of organizing production process in the agriculture follows that any change in technical characteristics (production methods, new rotation schemes, non-production elements at farm level) directly results from changes in the environment. This bilateral relationship could also highlight the costs of achieving environmental targets and further identifying more efficient means of delivering ecosystem services. Economic value of biodiversity and ecosystem is also connected to the practical implementation of working mechanisms, which can integrate the value of ecosystems and the market and pricing signals in the decision-making process. The growing interest to conserve and preserve environment, combined with consumers’ demand for healthier food and wellness has changed the market place. In this case the appropriate mechanisms to biodiversity valuation and regulation may include payments for ecosystem services, reforming environment subsidies, tax break for conservation, creating new markets for sustainably produced goods and ecosystem services.

Estimating the value of ecosystem services could also define their economic efficiency. However, prices for natural assets and ecosystem services are not always necessary to be

calculated in order to establish market-based schemes. Major biodiversity assets, such as mountains, forests, rivers and lakes are either directly owned or controlled by government. This way the process follows the logic that since there is no market for biodiversity, there is no fixed price for its consumption and this resource is not taken into account in the companies' accountancy. This is a matter of various considerations and choices, based on wide range of variables, such as equal access to natural resources and economic efficiency. The main challenge sustains in estimating whether the final decisions regarding biodiversity are efficient, effective, solidary and culturally acceptable at the same time.

### Dynamic and trends of biodiversity markets

Green products and services represent a new market opportunity. Global sales of organic food and drink have recently been increasing by over \$5 billion per year, reaching \$ 46 billion in 2007 (Organic monitor, 2009). The global market for eco-labeled fish products grew by over 50 per cent between 2008 and 2009 (MSC, 2009); and ecotourism is the fastest-growing area of the tourism industry with an estimated increase of global spending of 20 per cent annually (TIES, 2006). The annual loss of ecosystem services is appraised up to 50 billion euros, as in 2050 the generated loss will be equal to 7 per cent of the annual consumption.

The new markets for production and services related to biodiversity and ecosystems already have emerged – the so called business opportunities of biodiversity. The potential for development of the biodiversity concept sustains in the opportunity to balance between its commercialization (i.e. market differentiation, generating incomes, and alternative services) and the sustainability of the ecosystems. One of the main suppositions is that it is necessary to distinguish between regulated and voluntary markets for the biodiversity and ecosystem products. The main factors which would simplify this process are summarized in the Table 1.

**Table 1.** Development factors for biodiversity markets and products

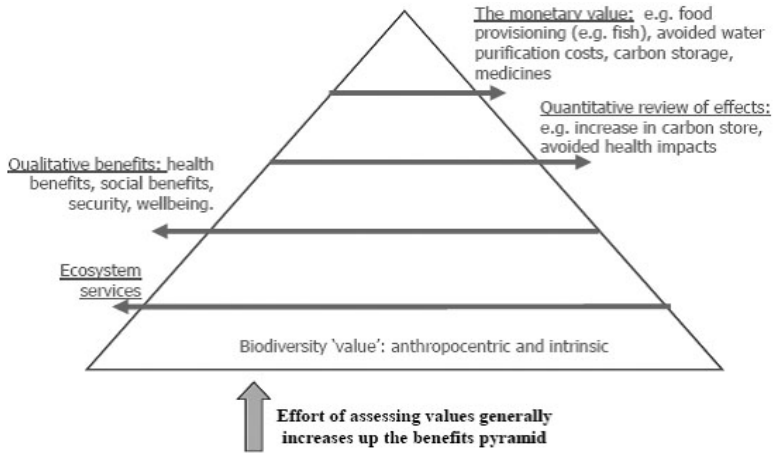
Financial	Legal	Market
Risk level of actives Clearly defined accountancy Investment activity Competitiveness Entrepreneurship premium Integrated approach among ecosystem, business development, and financial expertise	Property rights Assessment of investments in the sphere of genetic diversity Assessment standards and methods Fiscal preferences Legal framework for energy and climate борци	Classifying of actives Process for approval of projects Low level of transaction costs Systems for monitoring and control Creating data base and information system Role of mediators

Source: Zheliazkov, Zaimova (2012).



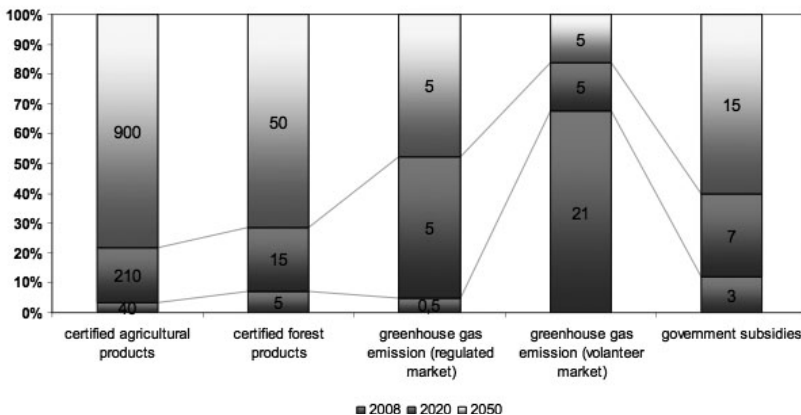
Economic justification of business activities related to biodiversity goes beyond the traditional framework of market price factors and accountancy (Figure 4). In fact, biodiversity is perceived as a community resource which is available and assessable for all economic agents excluding the risk that one or a group of them could embezzle monopoly right for its usage. Nevertheless the potential of business to conserve and preserve biodiversity and restore ecosystems depends on how biodiversity assets are managed. Consumption of biodiversity remains regulated by the public institutions, which are supposed to balance the interests of the economic agents.

**Figure 4.** Biodiversity value pyramid



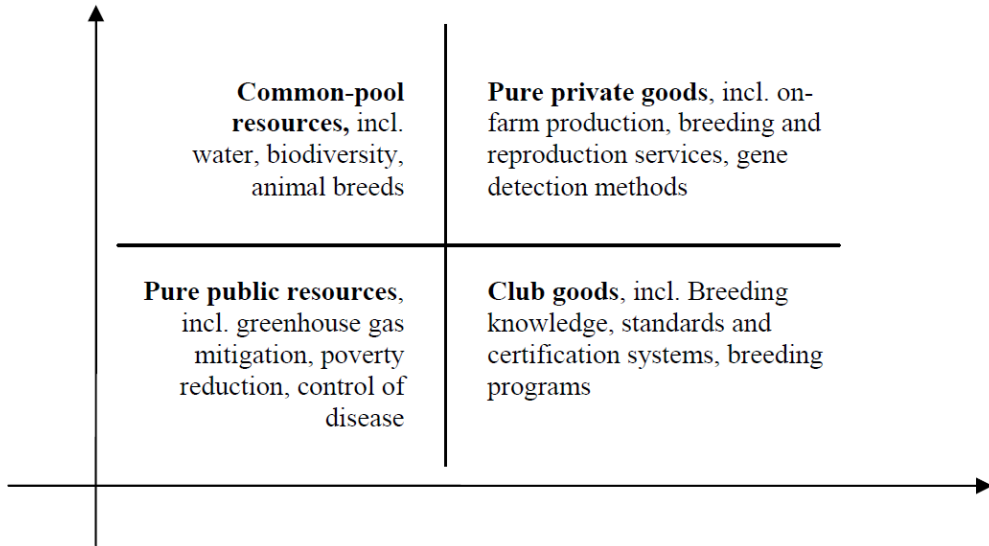
In the last years the number of the companies which profit directly or indirectly from biodiversity and ecosystems has increased significantly, as well as the interest towards management, marketing and risk management in this specific sphere (Graph 1).

**Graph 1.** Market share of biodiversity and ecosystems



In a structured hierarchy from local up to national systems, despite the independence in their functioning, the management decisions are interrelated which is essential for their sustainability and rationality in distribution of natural resources. In global aspect, sustainable development includes maintaining of global ecosystems and ensuring human well-being. In practice this affects world natural resources, including decrease of greenhouse emissions, preserving biodiversity, poverty reduction, and control of diseases (Figure 5).

**Figure 5.** Public and private products from genetic diversity



Livestock dominates in the most production systems (MEA, 2005). It provides 43 per cent of the agricultural product in global terms with future projections of significant increase (FAO, 2010). Traditional livestock systems contribute to the livelihoods of 70 per cent of the world’s rural poor. Apparently the focus on the sustainable use of livestock genetic resources is an issue which guarantees a wide range of services and products, and strictly depends on continued use of breed genetic diversity. Genetic diversity has always been defined as a dynamic quantity – global statistics signifies that genetic diversity in intensive livestock-breeding decreases with rapid trends, while specialization and harmonizing effects from globalization increase significantly (CBD, 2010). The general statistic data represents disturbing facts regarding the current state of this resource. For example, 676 or 8 per cent of the breeds are extinct of which 7 are trans-boundary breeds. Going further – 1677 breeds are defined as being at risk, of which 21 per cent of all local, 24 per cent of all regional, and 11 per cent of all trans-boundary breeds (Hoffmann, 2011).

**Table 2.** Total number and risk status of the local and trans-boundary breeds

	Local breeds	Regional breeds	Trans-boundary breeds	Total
<b>Risk</b>				
Critical level	511	33	19	<b>563</b>
Critical level (managed)	73	-	-	<b>73</b>
Endangered	678	84	36	<b>798</b>
Endangered (managed)	243			<b>243</b>
<b>Extinct</b>	669	7	-	<b>676</b>
<b>Without risk</b>	2101	282	431	<b>2814</b>
<b>Not defined risk status</b>	2747	84	77	<b>2908</b>
<b>Total</b>	<b>7022</b>	<b>490</b>	<b>563</b>	<b>8075</b>

Source: DAD-IS, 2010

Due to the human activity and management, preserving genetic diversity in livestock breeding indisputably is related to its sustainable use in production systems. Its usage under efficiency levels sustains bigger threat to genetic resources for agricultural products than their over-utilization. This is the main difference with the management of natural biodiversity. Considering genetic diversity, its use value significantly exceeds its option value, which suggests that the major benefits stem from the current or potential value and therefore provide more incentives for preserving (Drucker, 2005).

According to FAO, between 1980 and 2009 the global meat product has risen on average at 3,7 per cent per year, milk at 1,7 per cent, and eggs at 5,0 per cent. This is mainly because of the increase of the number of the animals in the stock than productivity increase. 79 per cent of the global poultry meat, 73 per cent of eggs and 63 per cent of pork meat is produced in the industrial systems. The general trend shows that genetic improvements contribute to increase of productivity between 50 per cent (Shook, 2006) and 80 per cent (Havenstein et al., 2003), as in the countries with market-oriented breeding programs the end product per animal significantly leaves behind the world average statistics. In poultry, majority of genetic material is supplied by less than five global corporations, and the similar trends are observed in pig and dairy breeding.

### Concluding remarks

The role and urgent necessity to keep the balance between the nature and human activity have been acknowledged as a priority in the Strategy of biodiversity 2020 of the European Union. One of the leading goals of this strategic document is pointed as dealing with the negative results from biodiversity loss and ecosystem degradation, and considering measures for their restoration.

Sustainable development is attainable through commitment and interaction of government policy, civil society and business. Over the recent years, business has come to realize that its own success and survival depends not only on the traditional key

factors, such as: quality, customers, innovation, but also on its acknowledgement of obligations and contribution to conserving and sustainably using biodiversity as a vital part of development and nature conservation.

The major forthcoming issues relate to mechanisms for regulation and interaction between regional structures and industry; the balance between the goals for sustainable development at national and corporate level; definition of the industry role in realizing the national strategy for sustainable development, and last but not least creation of a clear mechanism for monitoring and control at national and corporate level.

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