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Evaluation of Market Limitations in the Case of Ecosystem Services

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***Abstract*—**Biodiversity crisis is one of the many crises that started at the turn of the millennia. Concrete form of expression is still disputed, but there is a relatively high consensus regarding the high rate of degradation and the urgent need for action. The strategy of action outlines a strong economic component, together with the recognition of market mechanisms as the most effective policies to protect biodiversity. In this context, biodiversity and ecosystem services are natural assets that play a key role in economic strategies and technological development to promote development and prosperity. Developing and strengthening policies for transition to an economy based on efficient use of resources is the way forward.

To emphasize the co-viability specific to the connection economy-ecosystem services, scientific approach aimed on one hand how to implement policies for nature conservation and on the other hand, the concepts underlying the economic expression of ecosystem services' value, in the context of current technology. Following the analysis of business opportunities associated with changes in ecosystem services was concluded that development of market mechanisms for nature conservation is a trend that is increasingly stronger individualized within recent years. Although there are still many controversial issues that have already given rise to an obvious bias, international organizations and national governments have initiated and implemented in cooperation or independently such mechanisms. Consequently, they created the conditions for convergence between private interests and social interests of nature conservation, so there are opportunities for ongoing business development which leads, among other things, the positive effects on biodiversity. Finally, points out that markets fail to quantify the value of most ecosystem services. Existing price signals reflect at best, only a proportion of the total amount corresponding provision of food, water or fuel.

***Keywords*—**ecosystem services, economic evaluation, nature conservation

I. Introduction

DEVELOPMENT of market mechanisms for nature conservation is a trend that is increasingly stronger individualized within recent years. Although there are still many controversial issues that have already given rise to an obvious bias, international organizations and national governments have initiated and implemented in cooperation or independently such mechanisms. Consequently, they created the conditions for convergence between private interests and social interests of nature conservation, so there are opportunities for ongoing business development which leads, among other things, the positive effects on biodiversity.

[7] consider that such business is a triple referential for sustainable development, through positive effects on three dimensions: creates profit (economics); helps protect biodiversity (environment) and helps fair distribution of benefits (social). Business models that can develop are grouped into the following categories:

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- *Carbon*; compensation to maintain the carbon regulation services. This is one of the most popular markets through emission credits trading schemes. The voluntary emission credits markets are emerging too;
- *Water;* Payments for watershed management to conserve water quality and volume. They are motivated by the treatment services (water orifice size) and hydropower potential ("green" energy);
- *Biodiversity;* payments for conservation of natural habitats and ecosystems health. Compensation is the most common form of payment. EU and U.S. law require certain types of ecosystems loss compensation, as a result of economic activities, in order to avoid net loss of biodiversity (biodiversity credits or habitats bank);
- *Certified*; forest products: lumber and products;
- *Ecotourism*; access fees in parks and payments for specific services (accommodation, transport, guides etc.);
- *Genetic resources / bio-prospecting*; made by pharmaceutical companies.

[1] completes this list with the following market segments, sectors and approaches: organic agriculture, sustainable fishing and aquaculture; sportive hunting and fishing and bio-mimicry (bionic).

II. Emphasizing the Co-Viability Specific to the Connection Economy-Ecosystem Services

Biodiversity crisis is one of the many crises that started at the turn of the millennia. Concrete form of expression is still disputed, but there is a relatively high consensus regarding the high rate of degradation and the urgent need for action. The strategy of action outlines a strong economic component, together with the recognition of market mechanisms as the most effective policies to protect biodiversity. In this context, biodiversity and ecosystem services are natural assets that play a key role in economic strategies to promote development and prosperity. Developing and strengthening policies for transition to an economy based on efficient use of resources is the way forward. To emphasize the co-viability specific to the connection economy-ecosystem services, scientific approach aimed on one hand how to implement policies for nature conservation and on the other hand, the concepts underlying the economic expression of ecosystem services' value. Implementation of environmental policy is a topic widely discussed in the literature. It identifies a number of useful tools:

- *Legislation;* This type of political instruments is a priority option to ensure sustainable use of natural resources, reducing pollution and the frequency of accidents affecting natural resources; to implement urgent measures to form the basis for applying all other implementation tools;
- *Market-based instruments*; such instruments include taxes, subsidies, tradable permits, fees, etc.., using the mechanism of their action to change economic incentives and,

consequently, the behavior of private actors when they decide to use resources.

- *Communication and information;* the mechanism of these instruments including behavioral change through involvement, requiring respect for the well-being of others in a voluntary context, based on awareness of the individual action's consequences on different plans and assuming activities as: understanding common interests, the availability of operational information, transfer of knowledge (for example, extended services) and the existence of attractive interactive information and communication.

Connection economy-ecosystem services is intended to create a system in which contributions of ecosystems to human well-being find an economic expression of value, becoming subject to market negotiations. This expression is justified on several grounds: i. Basis for decisions; ii. Relationship between biodiversity and the poor; iii. Respecting economic principles; iv. Aligning incentives with the distribution of biodiversity benefits and ecosystem services; and v. Building a more efficient economy.

III. Analysis of Business Opportunities Associated with Changes in Ecosystem Services

Business developed in this area includes a combination of the previous mentioned categories. For example, maintaining forest can generate emission credits, tradable water rights, compensation (credits) for biodiversity and ecotourism revenues (the so-called *package of payments*). Another form, sufficiently developed, refers to products certified as organic food, in which case the conserving ecosystems costs being included in price. Business opportunities associated with changes in ecosystem services occur by considering new paradigms promoted by the concept of ecosystems management (Fig. 1).

Ecosystem management replaces short-term productivity with long-term ***sustainability*** in defining objectives. Ecosystem management involves the transfer from ensuring goods and services to the viability of ecological, social and economic systems. This is done by comparing the contribution of ecosystems to economic and social needs.

Ensuring a ***balance*** between anthropogenic ***use***, ***environmental integrity*** and biodiversity conservation results from the fact that ecosystem management believes that people cannot be separated from nature, because they have a major influence on ecological processes. Also, the perception of nature and the value attributed to it have a role in the formulation of realistic goals.

Management alternatives, partially or totally exclusive, characterize the nature conservation decisions because once natural ecosystems are used, the loss of ecological capacities is inevitable. Thus, ecosystems management is an analysis of alternatives in terms of costs and benefits for both natural systems and social systems. Understanding and accepting losses are part of ecosystems management.

Social-ecological systems are more ***complex*** than we think. Moreover, it seems more complex than we could think. A consequence of this complexity is ***reduced predictive ability*** compared with the dynamics of influence factors, as complex systems are characterized by nonlinear dynamics with thresholds, reciprocal retroactive loops, gaps, resilience, heterogeneity, and surprises.

The current status of social-ecological systems warrants urgent intervention to avoid irreversible processes and to ensure the contribution to human welfare. The high level of uncertainty and the need for urgent action define ecosystems management as a post-normal science, in which scientific knowledge combines with practical experience to base decisions with substantial repercussions on the humans lives [2].

Ecosystem management requires a ***systemic perspective*** as problems to be solved are systemic problems. Systemic perspective requires an interdisciplinary approach, imagination, flexibility and adaptation. Managers must be familiar with interdependencies, but also able to think independently.

Success in meeting the overall objective of ecosystems maintaining and their long term functions in involves identifying and solving problems that are emerging at ***different*** spatial and temporal ***scales***. You also need to take into account the connections between scales.

Ecosystems management takes a long term perspective that allows capturing the ***dynamics of ecosystems***, their change in the context of global change.

Although there are many ambiguities in the definition of ecosystems [3], the operational concept of ecosystem management is necessary to delimit the ***spatial*** unit. In establishing this framework, the contribution of ***ecological criteria*** should be prevailing.

Stakeholders involvement of and horizontal ***institutional cooperation*** is a key requirement for achieving the objectives. In this context, building proactively consensus is the defining feature of ecosystems management.

Adaptive management is an important issue for the ecosystems management. This requires flexibility to integrate different types of information and acceptance of social-ecological systems dynamic changes. The main requirement of adaptive management is the continuous consideration of the relationship between actions and results. This requirement involves the formulation of clear objectives and the possibility of quantification. Scientific knowledge is considered provisional and management is a learning process in which actions are experiments with working hypothesis, generating results with different degrees of uncertainty.

Fig. 1 Ecosystem management
Source: [6], pp.149-152

To create a business based on ecosystem services, their provision must be paid from public funds or by private buyers. Factors on which depend creating business opportunities can be grouped into three categories: corporate management, legislative framework and government mediation.

IV. Conclusions

Markets fail to highlight the value of most ecosystem services. Existing price signals reflect at best, only a proportion of the total amount corresponding provision of food, water or fuel. Even in this case, prices may be distorted or to produce benefits without a trading market value. Value of other ecosystem services is not reflected, an exception being services that support tourism.

[4] considers the use of market mechanisms and, in particular, the PES limited by the following problem: inclusivity and poverty, high transaction costs, combining services, social pressure and flexibility of decisions.

Inclusivity and poverty; An important constrain for PES is that they are available to land owners that can provide quantifiable services and may exceed the transaction costs of participation in the program. Thus, the program excludes those who have no land or who have small areas. For example, in Ecuador, the PROFAFOR program operates only with owners

holding at least 50 *hectares*. If the same criteria would apply in Kodagu region from India, almost all owners would be excluded. For those without land, the application of the required conservation regime of PES means the loss of *seasonal employment* opportunity.

Transaction costs are important for ecosystem services that may be provided independently and can be measured for many landowners. Negotiating with each of the owners increases cost, being the main restriction in the case of RUPES program implementation.

Combining services limits PES adoption due to the fact that majority of those entering the program are looking for a single service, or a limited number of services. By promotion, it is possible that other services be ignored or undermined.

Social pressure; The success of schemes involving the community depends on institutional structures that allow negotiation and communication between the stakeholders. This becomes very important when there are no clear-cut differences between correct and incorrect solutions and where the stakeholders are different in terms of power and values we respect. Conflicts and community organizations corruption is significant barrier to the use of PES. However, there is ample evidence that such situations can be overcome. For example, Kodagu Model Forest Trust is a partnership of several local organizations aimed at maintaining environmental quality and landscape of the region of Kodagu. The CAMPFIRE program in Zimbabwe, Chimboco community institutions from Bolivia, protected areas institutions established by the Uganda Wildlife Authority are other similar examples.

Decision flexibility is problematic given that landowners are bound by contractual obligations to carry out certain activities only because they cannot respond to any changes taking place in the market. The problem can be reduced and avoided by evaluating the delivery of ecosystem in the entire landscape.

The existence of these restrictions finds its explanation into poor correspondence between economic and social assumptions, considered to the proposal and development of market mechanisms for nature conservation. Thus, the reformulation of the "polluter-pays" principle under transformation into a positive externalities provider is not politically neutral. Conceptual change has significant implications, which are rarely discussed in the literature [13].

The implementation of market mechanisms for biodiversity protection has important implications for the legitimacy of actions. The key issue is the social limits of ownership. Thus, the appropriate characterization of externalities is not so much an object or a technical task, as a *moral and political problem, based on a value judgment* [10]. Also, differentiation of the evaluation criteria is a subjective process, even if many aspects are accepted as scientific facts, or examples of good sense.

Despite issues that weaken the theoretical background of market mechanisms as feasible tools to protect biodiversity and ecosystem services, such initiatives still have many followers and ambitious plans for their implementation.

Attention paid to market mechanisms for nature conservation has helped to raise political support [5] and the emergence of markets for ecosystem services. However, many uncertainties remain about side effects of this mechanisms generalization, which may manifest as changes in conservation motivation and in generalization of certain visions on human-environment relationship.Public and private decisions affecting biodiversity seldom fail to take into account the benefits that manifest at regional or global level (e.g. protection of water resources). Also, they may omit the local public benefits (for example, the commercial exploitation of timber), even when the local living conditions are affected. Decisions are made mainly by taking into account short-term gains and not by taking into account the possibility of providing long term benefits. This systematic undervaluation of ecosystem services and the inability to highlight the economic value are the main causes of contemporary biodiversity crisis. In these circumstances, it becomes very important to provide opportunity for public policy formulation and implementation, to highlight the main types of benefits and avoid their undervaluation. Policies should create well-functioning markets for ecosystem services, where their value is incorporated into price signals. At the same time, institutions and regulations may be established, together with secured funding.The transition from the existing situation to desired one, pursued by these public policies may be seen as a difficult process, in which the main problems are related to the replacement cost benefits, for those who exploit ecosystems in the current situation, to the delayed manifestation of policy's results, to both - business profile and way of life - change.

Overcome the problems depend on many factors, but change must occur at all levels of decision. This includes international collaboration for implementation. Experience of international agreements – such as the Framework Convention on Biological Diversity Conservation, IPCC - show that international cooperation efforts can favorably influence the political priorities and social attitudes. Inter-governmental science-politics Platform on Biodiversity and Ecosystem Services (IPBES) is a project which aims to create a similar framework to protect biodiversity.Limits and shortcomings of market mechanisms to protect biodiversity and ecosystem services are used by the opponents of these mechanisms. One of these, the Friends of the Earth NGO, at a conference in Nagoya (2010) believes that "we cannot and should not rely on market mechanisms to meet the burden of government power. Commoditization and privatization of nature and biodiversity are false solutions. Biodiversity is not for sale. Existing financial incentives work against biodiversity in place to support it and often violate the rights of local communities" [9].

Other issues considered problematic are synthesized by [13], as represented by the possibility of financing to buyers of ecosystem services and capital formation, the confidence in PES system.Thus, as a buyer you should have the possibility to fund ongoing payments. Then, while the demand remains restricted, extension services on offer is unrealistic. From the perspective of the supplier, any community may decide at a meeting of local authority to choose from ecosystem services in place to support to provide all services specific to ecosystems it manages. Except for the carbon sequestration services, that have a global impact, the other ecosystem services requires buyers or intermediaries initiative to ask suppliers to ensure a favorable maintain of ecosystems.

Creating a climate of trust, establish rules ans rewards can be a difficult process that requires time and the existence of trusted intermediaries. However, success is not guaranteed. Decades of paternalistic approach to rural development have created expectations that are difficult to overcome, even if all parties are taking benefits.

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