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Payments for Ecosystem Services in favour of landscape and environmental resources

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Abstract. The protection of landscape has been traditionally managed by the public administration through command and control instruments. This type of measures was not able to counteract the negative consequences deriving from the abandonment of rural areas. Moreover financial resources in favour of landscape and environmental protection have been decreasing over time. These two conditions have encouraged the development of alternative instrumentation, such as economic measures involving private participation, to support landscape and environmental resources. In this paper we try to understand if it is possible to create a market for ecosystem services deriving from landscape and environmental conservation. To do this we have considered the results of our previous studies on monetary and non-monetary environmental evaluation, which have helped us, on the one hand, to identify landscape features able to improve or to worsen landscape appearance and, on the other hand, to measure the willingness to pay of beneficiaries to maintain landscape and environment features. In order to understand if it is possible to increase social benefits by using market and economic instruments in favour of landscape and environmental resources conservation, we have analyzed the case of *Payments for Ecosystem Services* (PES). PES are economic instruments that can be used to support the conservation and improvement of ecosystem services. Following a description of this instrument, we discuss the opportunity to use it for the provision of some ecosystem services in Italy and in particular in the Friuli Venezia Giulia region.

Key-words. Ecosystem services, incentives, social benefits.

1. Ecosystem services. To better understand the meaning of ecosystem and ecosystem services, it is useful to compare them with conventional economic systems. Following this analogy, an ecosystem may be equated to a capital stock of man-made goods such as streets, buildings, machiner-

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ies etc., while ecosystem services may be equated to the services deriving from this capital. Instead of streets, houses, machineries, etc. an ecosystem owns a complex dynamics of plants, animals, micro-organism communities and non-living environments interacting in a functional manner (Millennium Economic Assessment 2005). Ecosystem services are the benefits obtained from ecosystems and could also be defined as "services from nature". Examples are carbon storage, flood control, clean water provision, habitat provision and biodiversity conservation.

The *Millennium Ecosystem Assessment*, a four-year study involving more than 1,300 experts from all over the world, identified three categories of ecosystem services (Figure 1), which are able to function on the basis of *supporting services* (i.e. biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat).

The first category of services comprises the *provisioning services*. This category includes the products obtained from ecosystems: food and fibre, fresh water and aquaculture, animals, genetic resources, biofuel, biochemical substances, etc.

The *regulating services* include all the benefits obtained from the control of natural processes such as air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation, etc.

The third group includes the *cultural services*. This group comprises the non-material benefits people obtain from ecosystems, like spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences (i.e. ecotourism).

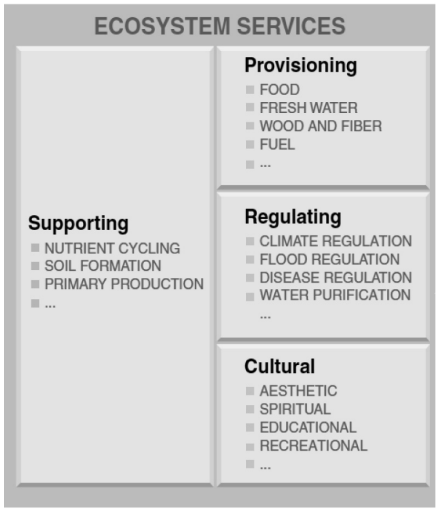

Figure 1. Millennium Ecosystem Assessment 2005.

In most areas of the world, as per-capita income is increasing, the stock of natural capital is decreasing. Consequently, ecosystem services are also decreasing (Kumar 2010).

The main reason of ecosystem degradation is the conviction that ecosystem services are free, therefore no one is able to become their owner and no one can be paid to provide them.

Ecosystem services have a great value to society (Marangon et al. 2009), nevertheless citizens have no incentives in conserving them. Farmers are the main managers of landscape and environmental resources:

their activity depends on the existence of these resources. Moreover the approach they adopt towards the use of natural resources can influence the production of ecosystem services but also their conservation or abandonment.

It is very important to understand the decisional process that drives farmers to choose how to use natural resources. Understanding this process is necessary for designing new strategies able to enhance ecosystem services and contribute to sustainable growth.

Farmers mainly produce food and fibres, but they are also able to produce other goods (or negative effects) as a consequence of their primary activity. On one hand a positive consequence of agricultural activity could be landscape conservation. Another one is to assure higher water quality. On the other hand if farmers use a lot of chemical substances there could be a risk of runoff of harmful nitrates from cropland to downstream catchments or soil erosion from overgrazed hillsides: in these cases we have negative effects from agricultural practices.

In any case, whether positive or negative, these consequences do not reflect in farmers' income, i.e. their provision is not considered during a farmer's decisional process. In fact, these consequences are named "externalities", as the market does not reflect their value. It is necessary to find a solution to motivate farmers to reduce the negative consequences of their activity and at the same time to continue producing goods and services in favour of citizens, as our well-being depends on ecosystem services provision. Nevertheless who is able to produce these services is not compensated, consequently the ecosystem services are less than optimal provision. The solution is not so simple, but the use of innovative instruments could help.

2. Payments for Ecosystem Services.

Payment for Ecosystem Services (PES) is an innovative instrument to provide incentives for long-term landscape and environment conservation through targeted payment schemes as part of a policy-mix appropriate to local context and priorities.

PES is a payment for ecosystem services provision or for specific land use able to obtain an ecosystem service (UNEP/IUNC 2007), that occurs as an externality, a secondary effects of environmental management activity (FAO 2007). In concrete terms, PES is a contract, a voluntary transaction, during which a well-defined landscape or environmental service is bought by a minimum one buyer from a minimum one seller if and only if the providers secures the ecosystem service provision (*conditionality*) (Wunder 2005).

Inside the term PES we can find all direct payments from ecosystem services beneficiaries to landscape and environmental resources managers. Others such as FAO (2007) also include indirect payments, i.e. ecosystem services deriving from certified products.

There are several types of PES: area-based vs. product-based sche-

mes; public vs. private schemes; asset-building vs. use-restricting schemes. Payment modes may also be different, being in the form of cash payments, technical assistance, tax reductions, and so on. Payments, however, should be of the same amount the provider would be able to gain by using landscape or environmental resources in an alternative manner (*opportunity cost*).

It should be pointed out that PES is a voluntary tool: traditional incentives derive from mandatory contribution, while PES is a voluntary and direct payment from beneficiaries to providers of ecosystem services.

Moreover this economic tool is an opportunity to raise land managers' incomes if they develop a maintenance, conservation or restoration activity, using a landscape or environmental resource in a sustainable manner and implementing a sustainable ecosystem management (The Katoomba Group 2008). In fact, PES programmes try to make it more convenient for land managers to choose to perpetuate an ecosystem service provision and can be instrumental to create a market model able to produce income from ecosystem services provision (Kumar & Muradian 2009, Ruhl & Salzman 2007). These services act as more traditional products for which the provider can exercise the right to demand a compensation from consumers.

Although the importance of landscape and environmental services is not a new concept, PES programmes were first launched at the end of Nineties and quickly spread all over the world. Their first formal implementation was in Costa Rica in 1997 to contrast the negative consequences of deforestation (Pagiola 2008). Since then hundreds of incentives have been defined as PES, sometimes erroneously including also "market-based" instruments like subsidies and tradable permit systems (Jack et al. 2008). It is very important to remember that PES are different from these instruments: in fact, "*by altering private incentives to induce desired outcomes, PES schemes offer a direct, and possibly more equitable, method for achieving environmental outcomes than other approaches*" (Jack et al. 2008, p. 9469). Sometimes the PES concept is used under different labels, such as *Compensation for Ecosystem Services* (CES) or *Compensation and Rewards for Environmental Services* (CRES) (Swallow et al. 2007).

PES schemes that have been implemented so far have allowed transactions on a portion of land, on a particular approach to land or resource management, or on a product. As regard to products, it should be pointed out that PES schemes only cover a part of the product price, that is its *green premium* originated from the environmental compatibility of the production process and corresponding to the ecosystem service (Wunder 2005).

As said before, PES programmes can use different financial sources and types of administration. In practice, we can have various types of buyers that may not coincide with the actual beneficiaries: in *private schemes* beneficiaries pay directly for the service provided, while in *public*

schemes the state acts on behalf of service users. This is the case of agro-environmental payments paid by the European Union to farmers. If the State acts as a mere buyer we have a *public-private scheme*, which is very similar to a private scheme.

In general, in private schemes the focus is more local, while public schemes are generally larger in scope. Nevertheless they could also focus locally (Engel et al. 2008).

There may be very different motivations for people to take part in a PES scheme. In a private scheme participation is voluntary both for the buyer and for the seller, although involvement might be motivated by the requirement to follow new regulations. In a public scheme participation is voluntary for the sellers only.

3. PES creation: advantages and disadvantages. PES seems to be a suitable tool to directly finance ecosystem conservation and moreover it is a source of new income for farmers, an important factor considering that the European Union has been decreasing its financial support for agriculture.

Nevertheless a PES scheme is not so simple to implement: its design and creation are expensive. First of all it is necessary to identify the ecosystem service to be conserved. Then we have to decide its price, but it is not simple to understand the value of an ecosystem service, since it has no market and relative price and it is very difficult to quantify its relevance or estimate its value.

Environmental valuation studies give us the opportunity to estimate the benefits landscape and the environment are able to provide. Valuation could be used in several manners: to better understand the value of ecosystems for human well-being, to determine the incentives to be used when managing an ecosystem, to value the consequences of alternative actions, etc.

So to establish the value of a payment for an ecosystem service provided by agriculture, it is necessary, first of all, to consider what benefits are deriving from that service, even if in some cases these benefits are uncertain or only foreseeable in the future.

A possible approach towards this problem is by way of the total economic value method, which considers all the economic values connected with the opportunity to use a service (or with the lack of it). But it is not possible to affirm that a specific method is the best that one can use to estimate benefits deriving from landscape and environmental conservation (Turner et al. 2010). On the other hand the underestimation of the value of these services represents a real limitation in defining a PES.

There are also further difficulties that we have to face before we can implement a PES scheme. In some cases PES schemes are not practicable due to a high risk of conflict among resources (Huberman & Shepherd 2010). In this case it could be necessary to guarantee the presence of a third party with the function i) of intermediary among parties engaged in the PES scheme or ii) of defining the most appropriate rules (Waage 2007).

The functioning of a PES scheme in a specific context depends on the distribution of service rights among actors. In the case of negative consequences deriving from an industrial activity everyone agrees on the principle that polluters must pay for their actions. This principle, however, is not unanimously accepted in the case of farmers, because of the difficulty in identifying the source of the negative effects or the persons responsible for them.

The existence of a suitable institutional context is a necessary condition for PES creation and functioning. In particular, to better design and implement PES schemes it is fundamental to have the support of institutions, an adequate legal frame and policies that are able to identify the ecosystem service, its providers and buyers, who has the right to use and benefit from a service and the financial mechanism adopted to implement the PES programme.

4. The role of public institutions in the development of PES schemes. Institutional intervention in the development of a PES scheme could take place in different ways, for example to eliminate the difficulties in creating a market between beneficiaries and providers of ecosystem services, or to directly promote and finance PES schemes.

In the first situation, institutional intervention is essential to create the conditions for the introduction of a PES scheme. For example, the existence of a suitable normative frame able to favour the development of a PES and to include property rights definition is necessary to implement an ecosystem services market. Moreover there may be factors such as risk, price fluctuation, future prospects, etc. making institutional participation necessary (Gutman 2007).

In any case the government or the local administration must guarantee that all citizens are able to enjoy an ecosystem service, even those who are not able to pay for its provision. In this case the public institution should intervene to directly finance the creation of a PES scheme. However, it has been pointed out that publicly-financed PES are less efficient than user-financed ones. This inefficiency is due to the lack of institutional information: the government or the local administration are not able to understand the real value of an ecosystem service and to control the service provision.

In many situations publicly-financed PES are based on flat payments in favour of providers, with little geographical differences and without specific targets regarding the zones of implementation. Nevertheless publicly-financed PES have some advantages: for example, they can enjoy the use of scale economies, due to the extent of their intervention; they can also pursue target that are not appealing for private actors.

5. Some examples to support PES implementation in Friuli Venezia Giulia. To better understand PES schemes and consider possibile implementation scenarios, it is useful to report some examples.

In France a PES scheme was developed to promote high-quality drinkable water derived from sustainable land managing. Since 1993 Vittel mineral water has been produced with the support of a PES programme, which has helped producers maintain the high quality level of their spring water. In practice, the beneficiaries of water-protection ecosystem services (i.e. the Vittel company selling the water) have been rewarding local farmers (26 sellers of ecosystem services) for sustainably managing the land near the water spring. Specific contracts in favour of farmers were stipulated: their value was € 200 ca per hectare per year and the duration was variable (18-30 years). The PES scheme provided the exchange of services for money and technical assistance in favour of farmers. In order to verify if the instrument was efficient, a number of monitoring actions were developed, which identified the real usefulness of the PES scheme for water quality improvement.

Another useful example for Friuli Venezia Giulia is the PES scheme that we are creating in South Tyrol, in the Trentino Alto Adige region (Bossi Fedrigotti et al. 2011). In this area traditional chestnut orchards (*Castanea sativa*, Mill.) have dramatically decreased in the last decade despite incentives from the Rural Development Programme, and so have the ecosystem services that these orchards are able to provide. In particular, chestnut orchards play a key role by providing recreational and didactic benefits: these services have also been diminishing. A PES programme seemed to be an appropriate instrument to reward these services: on the one hand it could be implemented to exploit the traditional landscape created by chestnut orchards for recreational and didactic benefit; on the other hand it could provide direct payments between suppliers and users, by way of a compensation rewarding land managers for provision of the service. With a PES we can: i) avoid ecosystem services decrease and ii) earn by providing services through the chestnut orchards.

6. Conclusions. As shown by the incentives promoting ecosystem services produced by agro-energy resources (Troiano 2009), PES schemes seem useful to motivate farmers and land managers to decrease the negative consequences of their activity and to increase the positive ones (Troiano & Marangon 2011). To obtain an optimal PES scheme certain issues need to be dealt with, such as the evaluation of the benefits provided by a service and its accurate pricing, or the choice of the best transaction model to guarantee optimal social consequences. In particular, the determination of recreational values needs suitable indicators, over a time necessary to point out how PES is going to reflect on ecosystem services provision – an activity that is not easily implemented.

Yet in spite of these difficulties, a PES seems to be an appropriate instrument to reward ecosystem services, particularly if it is implemented with a trans-disciplinary approach

and in a virtuous manner (Farley & Costanza 2010). Therefore it seems advisable that PES schemes in favour of landscape and environmental resources are developed also in Friuli Venezia Giulia, particularly considering the willingness to pay (WTP) declared by local citizens for the preservation or enhancement of ecosystem services (Marangon et al. 2009).

With regard to PES implementation, tourism-based schemes are especially attractive given the touristic vocation of the region and the increasing popularity of nature-based tourism and recreation. Eco-tourism, in particular, appears to be performing very well compared to other touristic sectors (Ecotur 2011). So what about using PES to improve this activity?

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