PROJECT N. 037033

EXIOPOL

A NEW ENVIRONMENTAL ACCOUNTING FRAMEWORK USING EXTERNALITY DATA AND INPUT-OUTPUT TOOLS FOR POLICY ANALYSIS

REPORT ON THE POLICY FOR BIODIVERSITY, CONSERVATION AND RESTORATION

Report of the EXIOPOL project

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Executive Summary

This report contains three main sections. The first provides an assessment of the various experiences of biodiversity preservation around the world. The second section follows with policies related to biodiversity preservation using economic instruments, and in particular, taxes and payments of ecosystem services are revised. Then, the last section provides some intuition of the main results obtained in the stated preference valuation exercise in WP II.3 in the context of biodiversity preservation in two surveys: one face-to-face Italian survey, and a second online survey conducted in the UK, Spain and Italy. To this end, two major conclusions are gathered with respect to the policy implications of the obtained results: a) the consideration of citizen´s preferences is very important when articulating sustainable biodiversity preservation policies, and b) in spite of their importance, citizen's preferences should be combined with scientific assessment in order to construct well grounded biodiversity preservation policies.

Introduction

In recent decades, the loss of biodiversity has been accelerated. Consequently a series of measures to relief this trend have been developed, and particularly, conservation actions have strengthens their efforts within the EU. Specifically, Natura 2000 has extended their action, and now it includes 18% of the surface of EU. In addition, the LIFE+ program has expanded its scope, and finally the causes of the decrease of biodiversity are better understood. LIFE+ is a financial instrument for the environment that provides specific support for developing and implementing policy and legislation on environmental. Furthermore, in the international arena, the International Development Association (IDA), the fund of the World Bank for poor countries, has assigned a budget of more than US$ 4,500 millions in investments for environmental management and natural resources. Specifically, World Bank has conducted some projects for biodiversity conservation for Bolivia, Guinea Bissau or India.

Recently, we had also seen the constitution of an important organization to combat the loss of biodiversity: The 'Intergovernmental Platform on Biodiversity and Ecosystem Services' (IPBES), which is a communication system between the scientific community and policy makers with the goal to support the use of science in policy making, it works with the UNESCO, FAO and UNDP.

IPBES studies decisions about global environmental conventions and develop the dialogue. Moreover, it responds to requests for scientific information related to biodiversity and ecosystem services from Governments, relevant multilateral environmental agreements and United Nations bodies, as well as, other relevant stakeholders. Its principal functions are: a) identify the most important scientific information for create new policies, b) to perform regular assessments of knowledge on biodiversity and ecosystem services, and c) to identify policy relevant tools and methodologies and improve the science-policy interface.

Recently, in May 2011, the EU has published the new biodiversity strategy to 2020, being the most important aspects the following: protect birds and habitats, maintain and improve ecosystems, help farming and forestry to improve biodiversity, to ensure sustainable use of fisheries resources, and finally to intensify the EU's contribution to

preventing global biodiversity loss. Keeping in mind these goals, in the current document we revised the experiences of biodiversity preservation and the role played by the main economic instruments, as well citizens´ preferences towards various actions based on biodiversity conservation. The document summarizes the main valuation results obtained from valuation exercise in WP II.3 in the context of biodiversity preservation. Our results reinforce the fact that valuation of ecosystem services linked to biodiversity preservation is rather complex. This complexity arises from the existence of multiple linkages between biodiversity preservation and the production of multiple ecosystem goods and services. In order for citizens to properly value and assess such diverse goods and services, general information and knowledge about the most important consequences of biodiversity loss should be provided via educational or awareness campaigns.

Economic Instruments to Preserve Biodiversity

Regarding the measures implemented to combat the loss of biodiversity, broadly speaking, two types of policy instruments can be highlighted due to their importance: ecosystem payments (subsidies) and taxes.

- **Ecosystem payments**

According to the OCDE, payments for ecosystem services (PES) can be defined as "direct and flexible incentive-based mechanism under which the user or beneficiary of an ecosystem service makes a direct payment to an individual or community whose land use decisions have an impact on the ecosystem service provision". Consequently, payments for ecosystem services involve direct payments from the beneficiaries to the providers of enhanced ecosystem services and the nature of the transaction has to be voluntary (DEFRA, 2010). These payments can help to address the destruction of Earth's habitats, landscapes and ecosystems by assigning values to these services (Conservation International).

Wetz-Kanounnikoff and Wunder (2006) state that ecosystem payments can be a tool for conservation; but they are not the only solution. These are specially useful to internalize environmental services that present indirect externalities and for which the traditional environmental economic tool set was deficient. According to Ferraro and Kiss (2002) we can differentiate between direct and indirect payments. It has been argued that direct payments may displace biodiversity loss to other areas or create a social conflict, although these authors indicate that such problems can also arise from indirect payments. They state that direct payments can be seen like a form of bribery or imposition of western values on developing nations. Issues that need be examined are, on the one hand, the institutional complexity, given that both mechanisms need be monitored by institutions. On the other hand, the costs can be also important. Usually a direct payment will be more cost-efficient than any indirect approach. Another question is about development benefits: under an indirect approach, these may be effective for many stakeholders and under a direct approach, the benefits may be directed to poor farmers. The last issue to be considered is the sustainability of the payment; direct payments are seen as undesirable because financial commitment is necessary to

maintain investment and conservation objectives. On the contrary, indirect payments are also likely to need a sustained flow of funds over time.

Wunder (2006) points out four types of PES: carbon sequestration and storage, biodiversity protection, watershed protection, and landscape beauty. He also compares PES with other conservation tools like command and control regulations, sustainable forest management, integrated conservation and development projects, social markets, environmental taxes, product certification or land acquisition. He concludes that criticisms about the PES are based on preliminary results. Therefore, he stresses the need for care in its design and the need to refine further developments.

Wendland et al. (2009) indicate that five characteristics which are very important for PES: these are voluntary, they involve an environmental service, the service is "bought" by at least one buyer; the service is "provided" by at least one provider; and finally the transaction is conditional on provision of that service. They also establish a method that those interested in biodiversity conservation can use to target PES projects in areas that perfect biodiversity and provide important additional ecosystem services. They find that PES will not be the right approach for every situation where biodiversity conservation is warranted. Additionally, in many situations where PES might be an appropriate approach to biodiversity conservation, the institutional frameworks and the country´s capacity to implement these types of projects are still developing. There are other studies such as Wunder (2005), where the idea that through the PES poverty can also be reduced is presented.

If we attend now to countries that apply these mechanisms, it is observable that in recent years their use has increased. Wetz-Kanounnikoff and Wunder (2008) study four cases where PES has been implemented. The first one is in Bolivia, where the goal of this program is to reduce CO2 emissions from deforestation. The second case presented took place in Brazil. In this case, the principal objectives are: to improve forest conservation and livelihood improvements of traditional communities in state protected areas and sustainable use reserves. This program rewards indigenous communities and long-term settlers for their commitment to avoid deforestation. Ecuador also employs PES, establishing a scheme cost, where the target recipients are 27 households. In the same way, in Mexico there are payment levels derived from opportunity cost assessments, and differentiated by forest type.

In addition, Liu et al (2007) show how China has implemented two payments for ecosystem services. One of these is the Natural Forest Conservation Program, which from 1998 to 2005 has invested more than 61 billion Yuan and the second one is the Grain to Green Program, that by the end of 2005 is expected to have invested more than 90 billion Yuan; concluding that both programs have demonstrated ecological and socioeconomic positive impacts but also negatives in the short run. Furthermore, Hall (2008) evaluates the effects of Proambiente in Amazonia. Proambiente is a system of PES obtained by producers who are helping to maintain the Amazon rainforest by adopting more sustainable farming systems, arriving to the conclusion that this system has problems such as limited financing, limited implementation capacity and coordination, among others. Limited payments have been made, while there has been almost no effective monitoring, quantification or certification of such services. Alpízar et al (2007) study a pilot project in Honduras, illustrating how targeting and the use of more precise proxies can be used to enhance effectiveness and efficiency of a PES system. The problem is that in two watersheds live 1000 families that drink water from local rivers, being the quality and quantity of this drinking water lessened by human activities. The administrators developed an index like a combination of land management practices and land uses, obtaining a method for constructing payments on the level of ecosystem services provided by each site. They conclude that the success of the program depends on both strategies and methods for targeting payments to ensure a change behavior.

A more recent study was conducted by Alpízar and Nordén (2011), analyzing entrance fees in tourism destinations. Specifically they employ a survey to study the case of Cahuita National Park in Costa Rica. The survey was applied randomly and excluding community residents, finding that in this case study, low entrance fees had a positive effect in visitor's utility and people's willingness to contribute to public goods. In a Costa Rica's setting, Robalino et al. (2008), study the effects of PES implementation during 2000-2005, concluding that less than 1% of the parcels involved in the program would have been deforested annually in the case that the payments were not to exist.

In the EU area, some budget is provided through programs designed by each Member State according to their environmental priorities payments to supply environmental

services. These payments are supported up to a given percentage from the EU budget, while the rest is provided by the Members States budget and from private sources. Specifically, the Common Agricultural Policy (CAP) has one of its principal objectives is biodiversity conservation. In this way, the EU has stressed the importance to prevent its abandonment and its intensification using the CAP as a key action to avoid biodiversity decline.

The CAP was born in 1962 and is the principal policy instrument that the EU uses for influencing the agricultural land use. In a first moment, this policy instrument focused on the economic and social objectives of increasing productivity, establishing markets and ensuring a fair standard of living for European farmers and reasonable prices for consumers. In 1992, the CAP was reformed with the aim to address overproduction, budgetary costs and environmental issues linked to intensive farming. At present, the CAP budget amounts around 53€ billions, approximately 290€/ha of agricultural land.

In 1998, the EU adopted the biodiversity strategies with the following objectives: "maintenance and further development of farming with a view to optimizing its positive impact on the conservation taking into account the positive role of extensive agriculture, sometimes in marginal areas; it is necessary to preserve the value that such areas have for biodiversity".

As stated earlier, Natura 2000 is the main tool of EU nature and biodiversity policy. Principal actions include optimizing the use of available measures under the reformed CAP, notably to prevent intensification or abandonment of high nature value farmland, woodland and forest and supporting their restoration.

Currently, the structure of CAP has two pillars: one is 100% financing from EU budgets and the other is co-financed by Member States and regions. The first include direct payments, such as income support payments for farmers. Furthermore, there are markets interventions, such as tariffs, exports subsidies, and intervention purchasing and output quotas. As a consequence, there are enormous differences across member states in the level of expenditure per hectare of farmland, and it would be necessary a redesign of the policy intervention with the goal that funds redistribution would be feasible and effective.

PES in Europe could be designed based on the future agri-environmental policies (AEP), because these policies protect the environment, provide ecosystem services and maintain the countryside, cultural heritage and landscape (Vakrou, 2010). According to Baylis et al. (2007), there are some differences in the application of theses policies between EU and US. Thus, in the EU they address positive environmental externalities while in the US address negative externalities. Moreover, AEP in the US are based on the anticipated environmental outputs associated with certain activities; on the contrary in Europe it is sufficient to use agricultural inputs or technologies that have been qualified such as environmentally friendly. On the other hand, in US they also take into account the individual opportunity costs, while in the EU are based on national or regional set fees.

Now attending to taxes and according to the Directive 2004/35/CE of the European Parliament, new measures are necessary, specially promoting the "polluter pays" principle. In this way, a polluter that causes environmental damages should be bearing the cost of necessary preventive or remedial measures. The principal goal of this Directive is to establish a common framework for prevention and reparation of environmental damages with a reasonable cost to society. Environmental damages should be understood as "damage caused by airborne elements as far as they cause damage to water, land or protected species or natural habitats".

Current threats against biodiversity

Over the past few decades, global food production has grown at a spectacular rate. This has been possible by the release of high-yielding varieties, increased use of agrochemicals and reliance on irrigation. However, the expansion and industrialization of farming has also resulted in detrimental effects on natural ecosystems, wildlife and the environment. In this context, the intensification of land use in agriculture is widely considered the main reason why biodiversity has been declining in Europe and around the globe.

It is a fairly widespread belief that nature is worth preserving for its own sake. However, conservation has also been advocated based on the economic argument that

biodiversity loss reduces human welfare. The underlying idea is that natural and semi natural ecosystems sustain a variety of ecological processes that are beneficial to society. Turning the ecosystem level approach to conservation into practical guidance for policy makers is problematic given that it requires measuring and valuing the contribution of biodiversity to ecosystem services.

The relationship between human activities, biodiversity and ecosystem services are particularly complex in agricultural landscapes, mainly due to two reasons. Farmers influence the provision of ecosystem services by altering biodiversity on their farms and in addition, the agricultural production is enhanced by ecosystem services and is afflicted by ecosystem disservices.

A remarkable number of distinct patterns have been proposed for how the magnitude of ecosystem processes may respond to changes in species diversity. Much of the empirical work in this area has tended to focus on the link between diversity and primary productivity in plant communities. Nevertheless, patterns vary considerably across locations and environmental conditions. Two sorts of mechanisms might explain why experimental manipulations of diversity would enhance ecosystem functions. Firstly, species might exhibit positive interactions. Secondly, as the number of species in a system increases, so does the probability of including one species that performs particularly well under the present conditions.

Focusing on the use of pesticides, this is costly for farmers and has being linked to a variety of adverse environmental effects. Pesticides may harm also non-pest invertebrates that represent alternative sources of food. An additional problem with pesticides is that they tend to become ineffective. Biodiversity has been often associated with the ability to control pest populations. Some important aspects to consider are: firstly, crop diversification in time and space can contribute to the natural suppression of the unwanted organisms and improve crop resistance to pests. Secondly, non-crop biodiversity is also credited with the ability to produce benefits in terms of pest regulation; and finally, it has been argued that pest damage to the crops is likely to be less of a problem in farming systems that create a mosaic of relatively small fields where different crops

On the other hand, another aspect to take into account is the pollination, that consists on the transfer of pollen between flowers. This is necessary for many plants to achieve sexual reproduction. Insect pollination of crops represents in part an ecosystem service and in part the result of farmers´ practices. Moreover, wild pollinators can increase the productivity of crops that are self-pollinating. So, pollination by wild insects is believed to depend in a crucial way on the availability of areas of natural or semi-natural habitat in the surrounding landscape.

Other important issue is the biodiversity and soil quality, because soil organisms and their interactions are important actors in the processes that maintain soil fertility and ensure plant growth, it has been proposed that changes in soil biodiversity have potentially large effects on the quantity and quality of agricultural production.
Also it is important the use of genetic resources on farms. These provide the raw material for breeding new varieties with improved adaptation and productivity. Until recently, concern for the biodiversity implications of agricultural land use has centered around the negative effects of intensification, industrialization and habitat loss, but also it is necessary to consider that the abandonment of agriculture represents as much of a threat to biodiversity. In the present work, we explore new venues to analyze the value of biodiversity services.

European preferences towards biodiversity: what have we have learnt

Due to all these concerns mentioned in the earlier section, in WP IV.3b we assessed the importance of environmental, agricultural and cultural services related to preservation of biodiversity in samples of three European countries: Italy, Spain and UK. The link between biodiversity preservation and policy applications requires an understanding of citizens' preferences and willingness to pay or support such biodiversity services.

In order to elicit Europeans´preferences towards biodiversity, several research proyects were conducted within EXIOPOL. The first survey we will refer was done in Italy in 2009 while the second panel survey was conducted in Italy, Spain and UK in 2011.

2009 Italian Survey

The questionnaire was developed by using the results from two focus groups and one pre-test, in collaboration with WWF Italia and a team of biologists of the University of Pavia, working on pilot practices for rice cultivation in the study area. The survey questionnaire was administered with face-to-face interviews by a trained interviewer to a selected sample of 300 households. Respondents are those persons in the household who contribute to the household's income. Overall 300 questionnaires were completed.

The questionnaire consisted of three sections. The first section introduced the concept of biodiversity and its related services, and how they can be affected by agricultural practices. Next we focused on rice production. By using a cost-benefit perspective, which emphasized existing trade-offs between the positive and negative externalities associated with intensive and alternative rice production practices, we presented possible methods to produce rice, while minimizing threats to biodiversity. In particular, we used the traditional rice production method as a reference point to depict a rice production strategy able to be in harmony with the environment. Differences between traditional and modern cultivation methods, and negative effects of intensive rice cultivation were therefore explained with the help of simple tables (see Table 1 and Table 2).

Table 1: Explanation of the differences between traditional and modern cultivation methods.

TRADITIONAL	TODAY - MODERN
• Small fields	• Large fields
• Limited use of fertilizers	• Massive use of fertilizers and chemicals
• Paddies are dry for short periods of time	• Paddies are dry for long and frequent periods of time
• Presence of hedges and trees between paddies	• Absence of hedges and trees between paddies

Table 2: Explanation of the negative effects of modern rice cultivation practices.

The **NEGATIVE ASPECTS** of modern rice cultivation include:

1. The paddies, large and often dry, create a monotonous and arid landscape.
2. The use of fertilizers and chemicals pollutes the water and soil harming plants and wild animals.
3. The paddies act as "ecological traps". During the spring, when they are flooded, they attract many aquatic organisms (frogs, tree frog and other amphibians) which will then reproduce. When the water is removed the eggs, larvae and tadpoles are unable to survive.
4. The absence of water favors the proliferation of mosquitoes because of the absence of the insects (dragonflies) and aquatic organisms (frogs, tree frogs etc) that prey on mosquitoes
5. The lack of shrubs and trees between the cultivated fields removes natural environment for plants (flowers, shrubs and trees), insects (butterflies, bees), birds and small mammals (hares, porcupines).

It was explained that by changing the modern methods of rice cultivation it is possible to protect the environment and the variety of animals and plants (biodiversity). The presented three alternative techniques of rice cultivation that protect biodiversity are in line with those recently studied and tested by the University of Pavia[1]:

1. Spontaneous vegetation along the levees
2. Canals in the rice paddy
3. Re-naturalization of the paddy

To facilitate the rice production practices' comprehension, respondents were provided with figures depicting alternative production methods.

The second section of the questionnaire contained the CE exercise. Preliminary to the CE questions, respondents were informed that the three alternative production techniques can be planned and used in various combinations based on local requirements. In this manner, it is possible to identify the best potential intervention to achieve the desired environmental results. To reduce the problem of hypothetical bias, we informed the respondents that their Municipality support a project of the Region to protect biodiversity in the areas dedicated to rice cultivation. We explained that the Municipality, in collaboration with the regional administration is evaluating the best possible combination of the above techniques to be applied in their area; but

[1] The experiments conducted in the area of Novara have proven that with small interventions and slight modifications of currently used methods, it is possible to grow rice in equilibrium with the cycles of nature and to protect biodiversity.

implementing these changes has a cost due to both the decrease in paddy productivity and the cost of execution. In order to meet the financial obligations for the protection of biodiversity, in the fiscal year 2009, the administration of Lombardy may therefore use a part of the funds earmarked for administrative expenses and for promotional/entertainment expenses. In this way, the Region would be able to finance these interventions without unduly burdening the budget of families or that of the farmers. Finally, the third section gathered information on the respondents socio-demographics and attitudinal profiles.

Following the above mentioned explanation, the respondents focused on the CE questions. These questions were formalized by the following elements:

i) change in the rice cultivated areas supporting habitats and species diversity;
ii) the resulting positive effects in terms of improved biodiversity services; and
iii) the cost per family. The attribute that captures the change in the rice cultivated areas is represented by the share (percentage) of agricultural land that will be converted into natural.

As for the change in biodiversity services, the CE questions focus on three different services that are affected by rice cultivation practices. The first service that would benefit from a more traditional type of cultivation is the quality of the rice landscaping. In particular, we propose an amelioration resulting from two different types of landscaping engineering: one focusing on water, via the creation of canals, pools and lake; the other focusing on land, via the creation of hedges, trees and woods. The second aspect is bird's biodiversity, being the rice ecosystem an attractive habitat for many birds species (e.g. black-winged stilt, migrating waders, etc). In this concern, two different levels of biodiversity protection: 3 to 5 and 10 to 15 bird species protected. Thirdly, the effect that a change of rice cultivation strategy would have in terms of mosquitoes reduction was analyzed. A recent project leaded by the University of Pavia in the proximity of the study area has indeed shown that the modern rice cultivation practice has aggravated the mosquitoes problem. The absence of water in modern paddy-fields, favours the proliferation of mosquitoes because of the absence of aquatic and terrestrial organisms that prey them, such as dragonflies, frogs, etc.

Table 3: Attributes and levels.

Attribute	**Levels**

Extension of the cultivated area to be transformed into natural reserves	– 2%; 8%; 15%
Type of landscaping amelioration for the area (land or water landscape engineering	– Landscape engineering: hedges, trees, woods – Waterscape engineering: canals, pools, lakes
Birds' biodiversity	– The presence of few bird species is facilitated (3-5) – The presence of many bird species is facilitated (10-15)
Mosquitoes reduction	– No decrease in mosquitoes – Decrease in mosquitoes
Cost per family (in terms of tax-reallocation)	– 0€ (status quo) – 40€; 80€; 110€; 160€; 200€

Special attention was given to the selection of the payment vehicle. During pretests respondents protested any payment vehicle implying additional direct expenditure at the household level. We therefore adopted a 'budget reallocation payment regime', a new payment mechanism that does not alter a household's income. In this context, the financing of new public environmental goods is to be paid for by a decrease in the amount of a household's taxation money that was previously spent on other government-funded goods. Respondents were thus informed that, in order to meet the financial obligations for the protection of biodiversity, the regional administration would use a part of the funds earmarked for administrative expenses and for promotional/entertainment expenses. Bids were selected and tested during focus groups, resulting into five possible costs per family, in terms of tax-reallocation.

Table 4 shows the implicit prices under the basic RPL model including attributes. As can be seen, MOSQ is the highest ranked attribute, for which the respondents are willing to pay approximately €497household/year2009. For birds biodiversity respondents are willing to pay about €46/household/year2009 for the protection of one additional bird specie population. The respondents are willing to pay about €14/household/year2009 for the conversion of 1% of rice cultivated area into natural.

Lastly, respondents are willing to pay for an amelioration of the rice landscape, up to €129/household/year2009, via waterscape engineering based on canals, pools.

According to the results discussed in the previous section, there are several interesting points that can be set. Firstly, all the attributes are statistically significant. In terms of biodiversity services this signals that respondents are able to understand the relationship between the proposed changes in rice cultivation practices and what this would bring in terms of enhancing both biodiversity as such (i.e. species diversity), and its related services (i.e. regulating and aesthetic ones).

Among the services mentioned in the survey, mosquitoes reduction represents the most important service for respondents (€496.73household/year2009), who were therefore able to understand that an amelioration of the rice-field ecosystem would lead to a reduction of mosquitoes' proliferation. Similarly, respondents showed to appreciate the renaturalization of a part of cultivated area (€14.22/household/year2009 for the conversion of 1% of rice cultivated area into natural), and its effects in terms of landscape improvement, which is raked as the second important service (€129.03household/year2009). Biodiversity protection in terms of species diversity is also relevant for respondents, but it shows a lower unit WTP (€45.96/household/year2009 for the protection of one additional bird specie population). However, if we consider the average proposed protection of 7.5 and 12.5 birds' species, such as those proposed the CE scenarios, the WTP ranges from about 344.7 to 574.5. In addition, in principle, we might suppose to observe different WTP values for a different indicator of species diversity; but this issue lays out of the purposes of the present study.

Table 4: Willingness- to- pay estimates .

	Mean
AREA	€ 14.22
LAND	€ 129.03
BIODIV	€ 45.96

MOSQ € 496.73

2011 Survey: Spain, UK and Italy

According to many financial reports, 2011 is clearly marked by the worst economic crisis suffered in Europe since the War World II. Given this exceptional economic situation, a tax revenue reallocation scheme was adopted as the payment vehicle to minimize strategic behaviour and protest responses. Protest responses were a major concern at the designing stage of the survey, since given the deteriorated economic conditions, not many households are wiling to pay extra taxes to protect biodiversity or environmental amenities.

The structure of this survey is common in all countries and it contains five differentiated parts. First, it starts with some introductory questions about citizens concerns and biodiversity issues. Second, it contains the valuation section in which information was given about the current situation of cereal areas in Europe, the intensification of harvesting and its impacts in landscapes and biodiversity. Next, the stated choice experiments are used in order to elicit preferences for various agricultural biodioversity related services. It continues with the NEP scale and it concludes with socio-economic questions.

In the valuation scenario participants were presented with a choice scenario in order to select the most preferable agricultural policy in terms of biodiversity and landscape conservation benefits. In particular, the exact verbatim presented in the survey was:

> "*Your Country participates to a European agri-environmental program to protect biodiversity in the areas dedicated to cereal cultivation. Your Country, in collaboration with the European Commission is evaluating the best possible policy to be applied in the most intensive cereal cultivation areas.*
>
> *The main biodiversity benefits that could be achieved are:*

- *Landscape enhancement: amelioration of the visual beauty of the rural landscape aimed at restoring the local traditional rural landscape by*

converting a part of the cultivated areas into natural areas and by fragmenting cultivated areas with establishment of hedgerows, shelterbelts, small trees and natural streams.

- *Additional protection of pollinating insects: the current number of pollinating insects (bees, hornets, etc.) would be preserved from additional decline.*
- *Additional protection of rural sites: the current rural sites of interest for traditionally and locally produced food would be preserved.*

To cover the cost of the agro-environmental biodiversity protection program described above funds will be raised from the government purse in your country. In this case no new taxes will be introduced. Money will be reallocated to the biodiversity protection program through a reduction only in 2011 budget on the public services you think that can be reduced, without any further taxation.

Now we will ask you to choose among different agri-environmental policies leading to different biodiversity benefits and characterized by different cost and financial mechanism.

Please read the effects attached to each different agri-environmental policy (A and B) and to the status quo, and pick which of these you would buy.

Table 5: Example of Choice: Which would you select now given the new options below?

EFFECTS	*Status quo*	*Policy A*	*Policy B*
Landscape enhancement	*As today: 0% of cultivated areas converted into natural*	*5% of cultivated areas converted into natural*	*5% of cultivated areas converted into natural*

Protection of pollinating insects	*As today: continued decline of the number of species of pollinator insects*	*As today: continued decline of the number of species of pollinator insects*	*Stop of the decline of the number of species of pollinator insects*
Protection of cultural heritage	*As today*	*As today*	*Additional protection of local rural sites of interest for traditionally and locally produced food*
Cost: tax reallocation *In the year 2011 (Pounds)*	*0,-*	*70,-*	*180,-*

I prefer:

☐ Status quo ☐A ☐B

Then several choice experiments that contained three combinations (Policy A, Policy B) and status quo were presented to participants. Table 1 shows the description of these choice sets and their corresponding levels.

Table 6: WTP equivalent results (National policy Ranking), Tax reallocation scheme sample

Variable	**Italy (€)**	**Spain (€)**	**England (£)**
Landscape	12.7 (3rd rank)	9.6 (3rd rank)	3.9 (1st rank)

	(8.7152)	(5.5422)	(2.5251)
Pollinator insects	61.9 (2nd rank)	74.7 (2nd rank)	-3.8
	(71.5959)	(61.1129)	(25.8495)
Heritage	98.3 (1st rank)	100.0 (1st rank)	-7.3
	(85.8414)	(73.8902)	(21.2038)

(*) standard errors are in parentheses.

Results are displayed per country in Table 6. In the case of the Spanish data, all estimates are positive and statistically significant; implying that individuals are much willing to reallocate some of the current public expenditures towards biodiversity protection and landscape enhancement. The same pattern of preferences is observable in Italy. However, the UK sample shows clear differences. In particular, citizens are only willing to reallocate part of the existing public budget towards rural landscape enhancement measures, but are against enhancing insect and cultural heritage protection, if this requires a reduction on other present public services. Consequently, the present results show clear heterogeneous preferences towards biodiversity and rural landscapes across Europe. Table 6 provides the willingness to pay estimates (WTP) for the three attributes across countries. As observable, heritage protection, or in other words, cultural services are the most valued in Italy and Spain, where in the UK, landscape protection would be the most preferable service linked to an agricultural policy aiming at recovering traditional harvesting ways. In the three countries, insect pollination services seem not to be much valued by the population in general. Therefore, it seems that in order for public policies to be successful protecting or enhancing biodiversity services, citizens should be aware of the multiple services derived from biodiversity. This lack of knowledge may be behind individuals´ concerns

about protecting insect pollination services, which turned in lower valuations for pollination services.

Conclusions and Policy Implications

Many studies show scientifically the importance to enhance biodiversity not only to preserve the endangered species from an altruistic view point, but also from an economic perspective. Thus, the Millennium Ecosystem report clearly states the importance of the multiple services provided by biodiversity, classifying them into: provisioning, regulating, supporting, and cultural services. In this sense, we tested the importance of such services related to agricultural biodiversity two different surveys: the first one was conducted in Italy and the second in a sample of three European countries: Italy, Spain and UK. Our valuation study employs stated preferences techniques and we used a tax reallocation mechanism in choice experiments. In the first Italian survey, results reinforce and call attention to the feasibility of implementing an agri-environmental policy aimed at protecting biodiversity services in the future. More importantly, there are further implications about enhancing the applicability of biodiversity protection policies when we consider the results obtained for different biodiversity services. For example, the highest value attached to mosquitoes reduction would imply, for policy makers, that stressing more direct-use anthropocentric-related benefits in the biodiversity policies may encourage greater support from people with different environmental attitudes.

As stated earlier, in the second survey conducted online in Spain, Italy and UK, of we found that preferences of European citizens diverge considerably with respect to their aims for biodiversity preservation and their valuation or raking of the evaluated services. In particular, we found that Spanish and Italian citizens are more likely to be willing to reallocate current public budget and forego some of the current public services in order to enhance agricultural areas and biodiversity, whereas UK citizens are not so likely to be willing to reallocate existing public budget in order to enhance biodiversity protection. Specifically, they would rather not reallocate any existing public funds to preserve insect population and cultural heritage.

The implications of the results obtained in the conducted valuations in WP II.3 are various and all important. The survey developed in this study aimed at analyzing

citizen's preferences based on marginal willingness to pay for various measures that affect agricultural landscapes and biodiversity preservation in three countries: UK, Spain and Italy. In agriculture, biodiversity loss is being exacerbated due to two main trends: a) abandonment of marginal lands, and b) intensification activities in productive lands. However, although biodiversity generates many benefits, including environmental externalities and economic benefits, the general public may not be fully aware of such benefits. This is most likely the case of the pollination benefits that citizens are not willing to support, probably because the association of existence of insects with other negative insect externalities. Furthermore, preferences are also heterogeneous across countries. Thus, a common PES based on ecosystem services may have to vary between North and Southern European countries in order to properly reflect such heterogeneous preferences. While in the Southern European countries, survey participants are willing to support the cultural services linked to biodiversity preservation, such priority or concern does not emerge in the UK. Therefore, it is important that citizens fully understand the key role played by biodiversity in order to properly assess values to its multiple functions and services. As a consequence, policies of preservation and protection of biodiversity should be constructed based not only on preferences and citizens views, but also on scientific assessments.

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