COMPETING PERCEPTIONS ON BIODIVERSITY AND ITS BENEFITS: THEORETICAL AND METHODOLOGICAL IMPLICATIONS OF A FOCUS GROUP STUDY

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ABSTRACT

The paper presents the first-hand results of a biodiversity assessment process carried out within the BioBio project. Focus group methodology was used to explore how farmers relate to biodiversity and what kind of benefits they realize. In each of the three case study areas one focus group was dedicated to organic farmers and another one to conventional farmers in order to compare their perceptions. Our results suggest that biodiversity is not an independent, purely scientific concept for farmers, but it is considered through their everyday life and farming practices. When farmers think about biodiversity they address species and habitat diversity the most frequently. Complexity is also an important component of biodiversity for them, and the complex nature of biodiversity is often linked to their personal philosophical and spiritual commitments. Farmers – regardless of being organic or conventional ones – attribute a mixture of values to biodiversity. Beside economic benefits, the ethical and social values attached to biodiversity are also crucial and are often more directly acknowledged. These results warn us that scientific concepts become inherently value-laden when we put them into the local context. Hence, scientists should be aware of the various contexts of valuation and should understand how participants conceptualize the subject of valuation before choosing the appropriate method of valuation. Furthermore, the large variety of different values farmers attached to biodiversity reinforces that monetary valuation methods may have limits in biodiversity valuation because they may restraint the range of benefits acknowledged by farmers.

Keywords: biodiversity, focus group, organic farming, non-monetary valuation

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INTRODUCTION

The valuation of biodiversity is a crucial issue for three reasons. First, it can provide information for the comparison of land use or development options which have an impact on biological diversity. Second, by aiding the comparison of different land use or development options, it supports policy decisions at different – local, regional, national, EU – levels. Finally, as the valuation of biodiversity highlights the many ways through which biological diversity contributes to human life, it is able to raise the awareness of the society. Biodiversity in the agricultural context, however, differs a lot from many other contexts, because it is a joint product of human and natural processes and because the maintenance of biodiversity in agricultural landscapes requires further human activities (Soini and Aakkula 2007).

Organic and low-input farming systems contribute to biodiversity protection in many ways (e.g. by reducing the use of chemicals, fostering zero-ploughing, breeding a wide range of traditional species) and at the same time enjoy the benefits provided by biodiversity. However, there is a lack of generic indicators which would be able to assess these benefits (and possible disadvantages) across Europe. The BioBio project (www.biobio-indicators.org) aims at selecting and testing a set of biodiversity indicators to fill this gap. Although the core activities of the project focus on the ecological foundations of biodiversity assessment and apply a scientific approach, the research consortium is aware of the multiple understandings of biodiversity by different publics. Local residents, villagers and farmers perceive the non-importable and non-marketable functions resulting from agricultural activities that enhance biodiversity in the most direct manner. Thus, it is important to explore and understand the attitudes and values these actors attach to biodiversity, and to include their approach in scientific and policy discussions. Accordingly, we have carried out a non-monetary assessment of biodiversity in three case study areas (France, Hungary and Italy).

Our overall aim was to evaluate the economic benefits of biodiversity for organic and conventional farming, but based on our previous experiences and the lessons learned from the literature review, we decided to broaden the scope and bring non-monetary benefits into our focus. Thus, besides assessing the benefits of biodiversity, we aimed to understand the perceptions of biodiversity among farmers, as well as to test and critically review the chosen non-monetary valuation method.

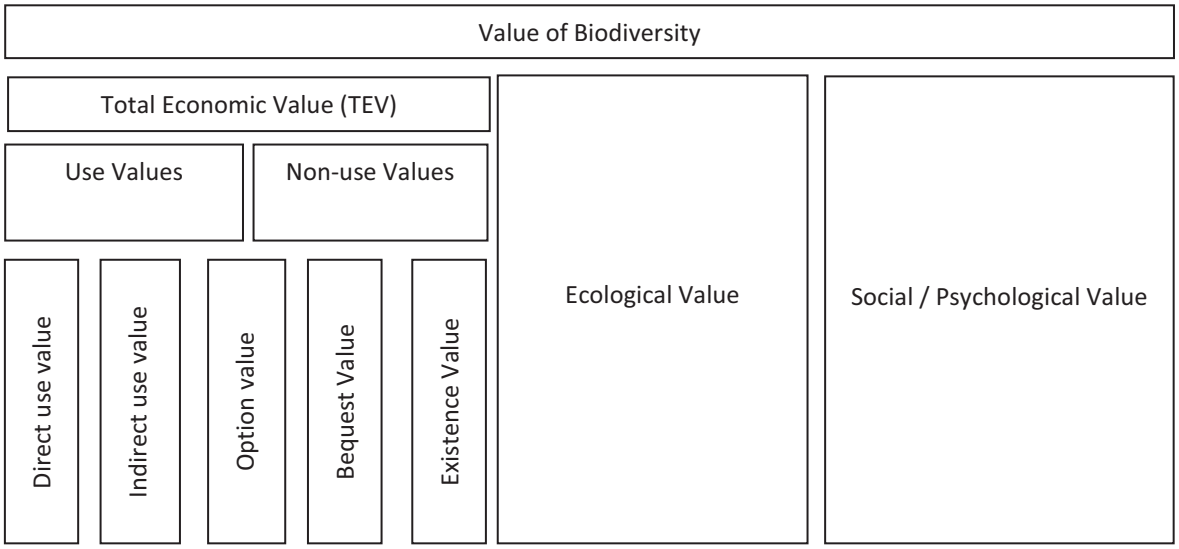
The paper proceeds as follows. Introduction is followed by a brief explanation of the theoretical background and a priori hypotheses (section 2). Then the used methodology and its limitations are detailed and some general contextual information about the focus groups is shared (section 3). In the discussion section (section 4) we present the main results of the study grouped around four issues: (I) how do farmers interpret biodiversity; (II) what kind of attitudes can be identified from the discussions; (III) what are the benefits and who are the beneficiaries of biodiversity; and finally (IV) what is the perceived role of farmers in preserving biodiversity. Finally we draw our conclusion by answering the initial hypotheses and summing up our experiences with the non-monetary valuation method (section 5).

THEORETICAL BACKGROUND

Biodiversity can be considered a public good, although it often shows mixed characteristics: most aspects of biodiversity are characterized by non-rivalry and non-excludability while in the case of marketed goods and services derived from biodiversity rivalry and excludability prevails (Ostrom,

2005; Bela et al., 2008). Moreover, biodiversity works at different levels, such as genes, species and ecosystems. This makes the valuation of biodiversity more complicated, and necessitates the value of biodiversity to be assessed at different hierarchical levels: from the value realized in market exchange through the total economic value to the potential value provided for humanity and the value stemming from the ability of biological diversity to maintain the long term stability of the biosphere (Gowdy, 1997; Bela et al., 2008; Nijkamp et al., 2008). Beside economic values, ecological and social/psychological values (Nunes and van den Bergh, 2001; Nunes et al. 2001; Straton, 2006) values – should be also taken into account.

Table 1 The classification of values derived from biodiversity



The BIOBIO project focuses especially on the ecological valuation of biodiversity which is mirrored by the fact that most of the indicators identified so far come from the biological domain. Our task was, however, to provide an alternative to ecological valuation. To this end, it is worth comparing economic versus psychological – or monetary versus non-monetary – valuation in more details, based especially on the study of Nunes and van den Bergh (2001). They identify nine general aspects of biodiversity valuation, which make it possible to compare different valuation approaches as follows:

Table 2 Aspects of biodiversity valuation (Nunes and Van den Bergh, 2001)

General aspects	**Economic valuation**	**Ecological valuation**	**Psychological valuation**
Perspective	Instrumental	Intrinsic	Intrinsic
Indicators	Monetary	Biological	Non-monetary (attitudinal)
Values	Direct and Indirect	Indirect	Direct and Indirect
View	Resource	Diversity	Resource and Diversity
Subject of valuation	Change	State and Change	Change and State
Geographical context	Local and Global	Local and Global	Local
Level of investigation	All	All	All
Approach	Reductionist	Holistic	Holistic
Participants	Expert and Lay	Expert	Lay and Expert

As the table above suggests, monetary valuation is based on the instrumental perspective which argues that biodiversity is used for instrumental purposes in terms of production and consumption, while non-monetary valuation accepts that biodiversity has a value on its own (intrinsic value). Both monetary and non-monetary valuation is able to take into account direct and indirect values of biodiversity (that is, values stemming from the direct use of biodiversity and values stemming from

the ability of biodiversity to provide options for direct use), although monetary valuation usually underestimates the indirect values. While monetary valuation usually grasps the value of biodiversity through the value of certain biological resources (e.g. endangered species), non-monetary valuation can focus on the variety of life as well. Economic valuation, as is based on neoclassical welfare economics, focuses on the changes of biodiversity when valuing it (e.g. WTP is based on the monetary compensation of a change). Psychological valuation, on the other hand, is able to understand the constant value perceptions people attach to biodiversity. Both monetary and non-monetary valuation can value the diversity of genes, species and ecosystems, although non-monetary valuation is hardly applicable at larger spatial scales but used mainly at the local level. Economic valuation applies a reductionist approach assuming that the total value of biodiversity can be disentangled into direct use, indirect use and non-use values. Psychological valuation, however, applies a more holistic approach focusing on the values lying in the integrity, stability and resilience of complex systems. Both monetary and non-monetary valuation involves participants from expert communities and the wider public, however, non-monetary valuation often has a clearer focus on public engagement and participation which might lead to social learning.

If we have a look at the philosophies behind economic and psychological valuation, further differences can be identified. Monetary valuation methods consider people who value biodiversity as consumers who are rational or boundedly rational and have perfect information; however, many studies have proven that these assumptions lead to distortion (e.g. protest answers in WTP studies) (Spash and Hanley 1995, Spash et al. 2009, Martín-López et al., 2007). Furthermore, economic valuation of biodiversity is based upon the aggregation of individual decisions (values) and often applies discounting, which takes on the problem of inter- and intra-generational equity instead of handling it (Martínez Alier 2002, Wilson and Howarth 2002). Psychological valuation, on the other hand, proposes a more comprehensive way of valuing biodiversity and the goods and services provided by it, because "when we focus on cultural, memory and linguistic variables we are appraising not only the intrinsic value of ecosystem services, but also their effects on human health or social structures, their aesthetic contributions, and their significance for future generations (O'Hara, 1996)" (Kumar and Kumar, 2008, p. 814). Table 3 summarizes the pros and cons for economic and psychological valuation of biodiversity:

Table 3 The advantages and disadvantages of economic and psychological valuation

Economic (monetary valuation)	**Psychological (non-monetary) valuation**
+ Relatively cheap and quick	+ Addresses more dimensions of the value of biodiversity
+ Easily used in decision-making at any of the spatial levels (from local to global)	+ Deals with social equity and cultural / psychological aspects
+ Allows for a direct comparison with monetary values of alternative land use / development options	+ Supports conflict resolution
– Ethical questions concerning discounting and social equity questions	– Participatory / deliberative decision making processes are needed to apply the results
– Methodological questions concerning simplification, aggregation, homo economicus approach	– Relatively timely and costly
– Monetary indicators can point to the opposite directions as biological indicators	– Results can be ambiguous and used mainly at the local or regional level

Based upon the above comparison of economic and psychological valuation we propose a non-monetary methodology for assessing the benefits of biodiversity within the BIOBIO project.

A few studies have already investigated how biodiversity is perceived by people who are not scientists, although none of them focused directly on contrasting organic and conventional farmers. For instance, Lindemann-Matthies and Bose (2008) and Junge et al. (2009) described an on-site survey research where lay people were asked about their attitudes towards field margins. Soini and Aakkula (2007) conducted in-depth interviews with local residents and farmers to understand their interpretation of biodiversity on agricultural land. Other studies focused on the interpretations of the general public. For instance Fisher and Young (2006) and Buijs et al (2008) used focus groups to understand the mental constructs of biodiversity in three European countries, while Christie et al. (2006) combined focus groups, choice experiment and contingent valuation in order to value biodiversity in the most comprehensive way. The results of these investigations show that most people have a rich interpretation of biodiversity, although they use a terminology different from the language of science and they often link biodiversity to normative evaluations (Fisher and Young, 2006; Christie et al., 2006). Based on these findings we established the following a priori hypotheses linked to the local understandings of biodiversity:

- Hypothesis 1: There are no significant differences between the farmers' understanding of biodiversity and the scientifically based definition of biodiversity.
- Hypothesis 2: Organic farmers have a more complex understanding (more solid knowledge) of biodiversity than conventional farmers.

Previous research also suggested that despite biodiversity is appreciated (e.g. more diverse field margins are preferred to less diverse ones (Junge et al., 2009) it is difficult for people to conceptualize biodiversity and its benefits in the context of agriculture (Soini and Aakkula, 2007), because its benefits are perceived at a more general level (e.g. it is the basis of human life, it provides balance, it has aesthetic functions and creates a sense of place (Buijs et al., 2008). Thus we formulated the following hypotheses on the perceived value of biodiversity:

- Hypothesis 3: Conventional farmers acknowledge more those benefits of biodiversity which can be realised in monetary terms (economic benefits), while organic farmers acknowledge more the indirect (non-economic) benefits of biodiversity.
- Hypothesis 4: The more local the level of assessment is, the more benefits of biodiversity participants can perceive.

METHODOLOGY

DATA GATHERING

We used focus group as the main data collection method. Focus group discussion refers to interviews with a small group of people on a specific topic, when the aim of the session is to get to know the group's opinion on the research topic. In this case, group dynamics and interaction between the participants is as important as the answers given to the pre-defined questions (Barbour, 2007; Merton et al., 1956). Focus group method is proposed if the research addresses topics which are unfamiliar or sensitive to the participants, or if the researcher would like to involve powerless social groups. However, the particular reason for choosing this method was that focus groups provide a good occasion for participants to listen to each others' opinion, and form thoughts together on the issue under investigation, thus it is also useful to understand the process how participants conceptualize a scientific term with their own words and concepts. Based on the literature review

and previous focus group experiences, we divided the focus groups into four major parts and an optional fifth step:

- introduction (with their name and some information about their farm);
- a visual ice-breaking exercise (discussing photos taken in the area which represent different levels of biodiversity, e.g. soil biodiversity, species and habitat diversity);
- a concept mapping exercise (a creative and interactive exercise with a brainstorming phase about the concepts related to biodiversity and with a drawing phase focusing on the relationship between the concepts drawn from the brainstorming phase);
- moderated discussion about the causal links between farming and biodiversity (what are the effects of biodiversity to farming and vice versa);
- optional questions about geographical and time scales.

Because focus groups were run in different national contexts and participating researchers had slightly different scientific and methodological background, we put strong emphasis on establishing a common ground about the methods and techniques to apply. We run a pilot focus group in August 2010 and organized a one day long workshop where researchers from participating countries could discuss, test and refine the methodology. Still some limitations of the used methodology have to be acknowledged. First of all, as most farmers had already been involved in the BioBio project, they met earlier with scientists and could change ideas about the environmental performance of their farm. Thus they may have become more aware of biodiversity than the average farmers within the case study area. Second, farmers taking part in the focus group discussions are not necessarily representative for the case study region and still less typical within the whole country, especially because their farms are usually specialized. Third, the limited time and resources did not allow us to carry out a detailed contextual analysis, only a few major data were collected beside the focus groups in a preparatory questionnaire. And fourth, in spite of the efforts to harmonize methodological skills, data still show some clear differences among countries, related mainly to coding, which makes cross-country comparison more difficult. Hence, the gathered focus group data are more appropriate to compare the perceptions of organic and conventional farmers, while the comparison of data across countries would be more risky and would weaken the explanatory power of the study.

Analysis

Focus group transcription – as other qualitative data – needs special techniques to analyze. The two most typical analytic methods are content analysis (Stemler, 2001) and the grounded theory method (Charmaz, 2006). To analyze our focus groups we used a method in between: qualitative content analysis. This method was developed in order to merge the advantages of the two others mentioned above. It examines the themes and main ideas of the text (main content), the context information (latent content) as well as the formal aspects of the material, but without extensive quantification (Mayring, 2000; Elo and Kyngäs, 2008). We chose this analytical approach because the replicability of the method is a key to produce more easily comparable results from case study areas (helps cross-country comparison), but at the same time its interpretative nature allows to take into account the country level specificities during the analysis (reflects the context-dependency of data). Furthermore, the systematic process of coding and categorization helps levelling off the differences in researchers' experiences with text analysis.

For the analysis of the text, an a priori coding agenda was developed. Once the focus groups were carried out and the transcriptions were prepared, researchers started the analysis by coding the text by reading it carefully and looking up the predefined codes. During the analysis participating researchers could share ideas and improve the process continuously (e.g. if technical assistance or procedural advice was needed). Once the coding was finished, researchers were asked to fill in the coding agenda with typical references and explanations about the contextual and attitudinal characteristics of the code. The filled-in coding agendas were used as the main source of data for the comparative analysis. To check the comparability of the results we contrasted some codes (the references coded by the same codes) and run some basic statistics on coding frequency. In a few cases iterative coding was applied.

THE SAMPLE

Altogether six focus groups were organized (four more focus groups will be carried out hopefully this summer, two in Wales and two in Uganda), in each participating country one focus group was dedicated to organic farmers, and another one to conventional farmers. The research areas show considerable heterogeneity within Europe: arable farming systems were studied in the Midi-Pyrénées, France; extensive grazing systems were chosen from the Homokhátság, Hungary; and vineyards were selected from the Veneto Region in Italy. More information about the case study areas is shown in Table 4.

Table 4 General contextual information about case study areas

Research area	General agricultural situation	Agri-environmental measures	Socio-economic background
FR: Midi-Pyrénées	Mixed crop (main crops are wheat, maize and sunflower) – livestock (mainly cattle) systems. Farmers in the Biobio project were chosen in arable systems. The average size of farms is 45 ha, but there is a huge variance (14-200ha). Within the sample half of the organic farmers sell directly, while conventional farmers all belong to cooperatives. Yields are significantly lower in organic farms.	The majority of organic and conventional farmers (within the sample) have no agri-environmental measures.	The CS is intermediate between favoured and less-favoured regions. CAP subsidies have helped maintaining cattle farming. Agrofood production chains are present but landscape is also attractive for residential development. The proximity of Toulouse provides a market for organic production.
HU: Homokhátság	Extensive grazing system mainly for livestock production, often with old Hungarian varieties (Hungarian Simmental and Grey cattle). The average farm size is 5 ha for individual farmers and 502 ha for agricultural entrepreneurs (regional data, 2007); the average farm size in the sample is 155 ha. Cooperation among farmers is quite rare.	Agri-environmetal payments contribute largely to the farm income, typical for both organic and conventional farmers. Agri-environmental measures are often complemented with special nature protection measures issued by national park.	A less developed region within Hungary; few working opportunities besides farming; special settlement structure with living farms (homesteads) and often with underdeveloped infrastructure.
IT: Veneto	Organic and conventional vineyards. The proportion of the production area of Controlled and Designation of Origin and Guaranteed Designation of Origin wines is high. Within the sample farm size varies between 10 and 30 ha.	Organic and conventional farmers (within the sample) have no agri-environmental measures.	The areas are among the most developed in the region. Agriculture, anyway, is far less rewarding than other economic activities. Wine production stands out for its high profitability.

Farmers running their farms in the chosen BioBio case study areas were invited; most of them had already been participating in the BioBio project, while some of them were outsiders. We excluded

general citizens, partly because the existing literature provides already some findings on the perceptions of the general public, and partly because of time and resource constraints. Focus groups attracted 6-11 participants in general (the total sum was 43). The average length of the meetings varied between 80 and 150 minutes.

DISCUSSION

PERCEPTIONS OF BIODIVERSITY

One of the main aims of the focus groups was to understand how farmers frame the concept of biodiversity, thus we dedicated the ice-breaking visual exercise and the concept mapping exercise to this aim. The discussions reinforced that biodiversity is pretty much related to the everyday life and farming practices of farmers: they often talked about the methods they apply on their farms and the approach they have to agriculture (organic farming, simplified ploughing techniques and nature friendly practices on the one hand, and intensive agriculture on the other hand) in relation with biodiversity. Farming can either support or threat biodiversity, thus farmers thought they have personal responsibility. Biodiversity was sometimes transformed into the social life by them (it was seen as a human being, or it is applied to conceptualize the contradicting opinions etc.). This shows again that biodiversity is not an independent, purely scientific concept for farmers.

Among the different manifestations of biodiversity species diversity was the most frequently addressed, but the coverage of the fragments coded by species diversity was not so high (often only really short fragments – one or two words – were coded). This implies that species diversity (beautiful or rare species, the number and abundance of species) is easily remarkable for farmers, thus it can be used to express their observations and experiences in the easiest way, especially if the concept of biodiversity is not so much embedded into their mental models. The following references reinforce that species diversity is related to personal experiences and observations from everyday farming activities:

> "There are different types of worms: some are in the ploughed layer, others live in deeper layers." (FR_org)
> "The cattle used to graze the lower, watery parts. A few years ago they trod down the grass completely. The year after there were so many orchids that I went through the field with closed eyes, I did not want to trample down them." (HU_conv)
> "When I think of my vineyards, I think also about the fauna." (IT_conv)

However, it is not species diversity which means the essence of biodiversity to farmers. Especially in organic focus groups, but also in conventional groups, complex systems were mentioned quite frequently referring to the mutual interactions within nature which make life possible. Biodiversity was often identified with these interrelations (or as a prerequisite for them), although interactions were not named or conceptualized by farmers in an exact way, they were rather mystified. This suggests that farmers conceptualize biodiversity as mysterious and universal interactions within nature: biodiversity is more than just the diversity and richness of species; it is a complex phenomenon that is essential for life. Moreover, biodiversity and life are often synonymous: life gives rise to biodiversity, and the other way around, biodiversity allows life to evolve.

> "It is a mystery." "Life cannot be explained, it is very difficult to explain. (…) Life is relationship." (FR_org)
> "The basis of biodiversity is the complex relationship between plants and animals; those real and natural relationships which indicate the mutual dependency of flora and fauna." (HU_org)
> "I see biodiversity as the possibility for nature to grow in all the possible ways." (IT_conv)

The concept of biodiversity as a complex system is often linked to the landscape level: the complexity of nature and the interactions within nature are placed into the landscape as the appropriate geographical scale where natural interactions happen and where they are easily observable. This may explain also why the codes referring to landscape and ecosystems diversity are relatively rare. The following references underpin the relationship between complexity and landscape (ecosystem) diversity:

> "The components of biodiversity are the plants, the associations of plants, the puszta (grassland) itself in a complex way. The puszta unifies everything, the plant, the animal, the soil." (HU_org)
> "Everything is linked together. What we see, what we don't see, our practices and the different habitats." (FR_conv)

Genes' diversity was the less frequent code within the manifestations of biodiversity category. If it was mentioned at all, it was linked to the different breeds or varieties farmers have on their farm. These local breeds and varieties were more closely related to preserving the agricultural traditions than to the diversity of the genetic characteristics of species. This implies that it is difficult for farmers to conceptualize the invisible and hardly observable manifestations of biodiversity.

Organic farmers were more familiar with the term of biodiversity, while conventional farmers (at least in some focus groups) struggled with conceptualizing the term. Moreover, organic farmers are more aware of the complex nature of biodiversity and approach biodiversity from a holistic, spiritual viewpoint. Conventional farmers identify biodiversity more with species diversity and relate it more directly to farming, which shows a rather utilitarian approach. Nevertheless, this relationship may be traced back to other variables (e.g. lack of knowledge) too.

ATTITUDES

None of the codes related directly to biodiversity (genes, species, landscape and ecosystem diversity, complex systems, stability and ecosystem services) showed a negative attitude. Typical adjectives in the fragments coded with these codes are:

- traditional, special, rare, natural, diverse, different, oneness, richness → relating to the different manifestations of biodiversity, to the variance within nature;
- complex, coherent, infinite, essential, very well functioning, perfectly working, adaptive, well-regulated → relating to the natural interactions and their healthy functioning;
- idyllic, beautiful, intimate, serenity → relating to the aesthetics stemming from biodiversity;
- good, useful → relating to the use value of biodiversity;
- delighted, conscious, curiosity → relating to the feelings of farmers, to their well-being and their role in maintaining biodiversity.

The above attributes indicate that positive opinions and feelings are attached to biodiversity from both an aesthetic and an interaction oriented viewpoint. Attributes linked to the different manifestations of biodiversity are more neutral, but even in this case the reference to tradition, speciality and rareness shows certain value commitment. Feelings and emotions were more likely referred by farmers than rational arguments when they talked about biodiversity. Rational viewpoints were more frequently addressed only when they talked about the direct links between their farming activity and biodiversity. Beside these general statements we could observe that attitudes of organic and conventional farmers were slightly different.

Within organic focus groups (especially in France and Hungary) debate over the positive role of biodiversity was rare. It was more typical that organic farmers reinforced each others' viewpoint and attributed a strong existence value to biodiversity.

> "The animals are my friends. Therefore I cannot chase them away." "Weeds are there to show us that the field lacks biodiversity." (FR_org)
> "We are living in a created world, and biodiversity must be the miracle of creation. We can take part in this creation through our activity, through farming. And this motivates me exceedingly." (HU_org)

Conventional farmers were more contested in this aspect. Although they acknowledged the importance of biodiversity, they also talked about its negative effects (e.g. weeds, pests, growing costs). They differentiated between useful, neutral and harmful species, thus beside their feeling and emotions, rational arguments were also raised. They tended to express their attitudes towards biodiversity by appraising biodiversity protection (typical in Hungary and Italy).

> "To keep rabbits one has to love them." "Rabbits feed on field borders, they eat everything." (FR_conv)
> "I don't agree that the red footed falcon plays the role of environmental doctor. It doesn't bother whether its victim is ill; it is driven by its stomach. It captures the rabbit, the pheasant or the quail. From the point of view of the national park it is useful, because the pheasant is not endemic. Nature conservationists are happy if the falcon eats pheasant." (HU_conv)

This indicates that conventional farmers tend to have a more instrumental (rational) view on biodiversity, while the majority of organic farmers refer to feelings and emotions, personal values and identity when they talk about biodiversity which shows the importance of ethical considerations in farming and biodiversity management.

BENEFITS OF BIODIVERSITY

Ethical and social values were addressed in all discussions regardless of the nationality or the type of the farm run by participants, and were ranked among the five most frequent codes in each focus group (without asking participants directly about this aspect). This shows the remarkable importance of the ethical/social aspect when farmers talk about the relationship between their farm and biodiversity, and justifies the use of non-monetary approaches to capture these holistic values. Ethical and social values seem to be universal in the sense that farmers attributed these values to both species diversity and the complex systems approach. However, it is also important to see that ethical and social values are really diverse in their focus. Based on the coding agenda we categorised this value aspect as follows:

- *Aesthetic value* – diversity makes the landscape beautiful and colourful, creates a sense of place, and delights / fascinates people:

> "This is an idyllic picture: homestead with grassland, hay bales, bushes and cattle. … This landscape touched me, because these woody patches make this landscape so intimate." (HU_org)
> "We are influenced by the aesthetic characteristics of the environment." (IT_conv)
> "It is a fascinating world that of the plants which inhabit our farms and fields." "It makes my farm beautiful." (IT_org)

- *Lifestyle or life philosophy*: biodiversity is associated with freedom and tranquillity, respecting biodiversity means to live a more conscious life, makes you feel more comfortable and enhances your spiritual life and self-awareness:

> "It's a way of life to live with each other and live a better life." (FR_org)
> "This is an element of stimulus that makes you feel alive." (IT_org)

- *Bequest value* – biodiversity is a heritage, it is important to show biodiversity to the next generations and to teach children about the importance of biodiversity:

> "We were raised in this diverse landscape, we got used to it. It would be strange if this diversity didn't exist." (HU_conv)
> "I want to be able to show and teach this to my grandchildren." (HU_org)
> "The children need to know the natural world." (IT_conv)

- *Existence value* – all creatures have the right to live regardless of their use value, nature (biodiversity) has to be respected because it can be perceived as a human being, farmers can cooperate with her but can also harm her:

> "Nature and I have to work together." "I see Nature like a living person." (FR_org)
> "We should respects the natural cycles, the natural equilibrium of the nature. When we do not comply with that, we cause harm to the biodiversity." (IT_conv)

The existence value of biodiversity brings us to the next value category – ecological value – as it emphasises the importance of biodiversity from a non-human point of view. Ecological values express that biodiversity is important as the basis of all forms of life on Earth, and especially human life. Sometimes farmers acknowledge also that we do not know exactly how biodiversity works (mystery), or what creatures depend on a tiny species or an unknown natural interaction, but this lack of knowledge is a further reason for not harming biodiversity. This suggests that the ecological value is attached mostly to the complex systems approach and appears mainly in focus groups where complexity was addressed (typically in organic focus groups). Since recognizing the ecological values requires a deeper consciousness (and probably a higher level of ecological knowledge) it is not surprising that this code was much less frequent than ethical/social values or economic values.

The third type of value is the economic value attached to biodiversity, which was a relatively frequent code in both the organic and the conventional focus groups. The economic value of biodiversity includes all the benefits that are provided by biodiversity and can be realized in monetary terms. It is mentioned in a direct manner as the ecosystem services linked to biodiversity (e.g. the food on our table, pollination or biological control provided by certain species), or as the money spent by tourists who were attracted by the diversity of the area.

> "Somebody pays for being able to spend a few days in these surroundings." (HU_org)
> "The locust has various benefits. It has a nice smell when it is flowering, it produces honey, it is perfect firewood, and it is beautiful for furniture. All of its parts can be used for something." (HU_conv)
> "People can find biodiversity everyday on their table." (IT_conv)

However, in most cases the economic value is not strongly related to biodiversity but to farm management. Sometimes biodiversity is seen as an added value in the products, that is, the product is appreciated more by consumers if it comes from a farm that preserves biodiversity. It is more typical, however, that biodiversity is regarded as providing certain benefits (e.g. fodder to animals, pollination service, worms that decompress the soil etc.), but also generating costs (e.g. fighting against weeds) and causing profit loss (e.g. because wild animals feed on the produce).

> "The grassland is valuable because the cattle can suffice. The composition of the grassland is good, because the cattle like it." (HU_conv)
> "The landscape, other than being nice, it is also useful to my work and sustenance." (IT_conv)

Thus, farmers have to build their decision of running a more or less diverse farm on a cost-benefit analysis. They have to take into consideration if the market will pay for their increasing costs (which depends on the awareness of consumers), or the state will compensate their efforts through subsidies (which depends on policy processes), or they have to cope with the situation independently. This suggests that it is not biodiversity itself which has an economic value for farmers, but farming practices (which either maintain or harm biodiversity) has costs and benefits which have to be considered if farmers want to live on their farm. On the one hand biodiversity is an input for their activity (and as other inputs, it increases the production costs), on the other hand it is a result of their activity (and as other outputs, it may have an added value that can be built in the price of their products), and their management task is to balance the two sides.

> "I regard biodiversity as a problem of birds that eat the grapes, and wild-boars that threat the vineyard. (…) It is a continuous fight, a very hard fight." (IT_org)
> "If we get paid to maintain nice the hilly landscape, we will do that." (IT_org)
> "We have to make a compromise between economics and biodiversity." (FR_conv)

The inherently utilitarian approach suggested by the analysis above is conflicting with the great importance of ethical/social value, but this does not necessarily mean that one of the statements is false. Indeed, we think that the utilitarian approach entered the discussion because farming is the main source of income for the participating farmers, thus their livelihood – even as biodiversity – depends on their management practices. It may happen that farmers truly respect nature and attribute a strong existing value to biodiversity, but at the same time they have to make a compromise in order to provide a safe livelihood. This can result in cognitive dissonance (the confrontation of ethical considerations and real life decisions) which has to be resolved somehow. This happens when French conventional farmers accuse farmers' education for not teaching the proper ways of soil management, when Hungarian conventional farmers refer to old farming practices and traditional ecological knowledge that were better adapted to local circumstances than nature conservationist rules nowadays, and when Italian farmers blame the consumers because they do not pay for the added value of pro-biodiversity farm management due to lack of awareness. And perhaps it is also the cognitive dissonance which drives farmers to search for solutions and discuss the possibilities of preserving biodiversity.

> "At school we learnt that deep ploughing and chemical use gives better yields." (FR_conv)
> "These rules are completely contradictory with the peasant logic, with traditional practices. (…) These restraints have no positive effects on nature." (HU_conv)
> "I find it difficult to make people appreciate this resource." (IT_ogr)

When we compare the organic and conventional focus groups, we realize that organic farmers value biodiversity mainly for its ethical and social value, while conventional farmers refer to economic benefits (and costs) more frequently. For example in the French organic focus group participants did not seem to develop any economic reasoning or costs-benefit analysis regarding biodiversity. They thought it normal that biodiversity should be respected and preserved because it is the essence of life. They argued that because human beings are part of the complex system, we are all completely dependent on biodiversity and the other way around. They derived mainly non-economic benefits from biodiversity: ecological benefits, but also ethical and social benefits, in terms of mutual learning and respect. Economic benefits derived from their organic production systems were considered secondary (value-added products, breed goats for making cheese), and even negative when they scandalized farmers who converted to organic farming under governmental financial incentives.

Hungarian organic farmers linked ecologic and ethical/social values directly to biodiversity, but they mentioned economic values only indirectly, through the intermediary code of farming. Although they seemed to be aware of realizing economic benefits (income) by the help of biodiversity, this value aspect was debated among them. On the other hand, the ethical and social values as well as the ecological value of biodiversity was a unifying issue, nobody debated that biodiversity has to be preserved based on these values. Italian organic farmers also attached ethical and social values to biodiversity because of its beauty and spirituality, and when talking about the economic side, they agreed that consumers and policy makers lack the awareness and thus underscore the value of biodiversity.

Comparing this pattern to the conventional focus groups we find that the majority of conventional farmers focused on the benefits and costs stemming from preserving biodiversity on their farm, or emphasised the added value biodiversity gives to their products. Only those farmers addressed ecologic and ethical/social values, who were planning to convert to organic farming or who were doing organic without certification (or in the Italian conventional group, the female farmers). This suggests that the differences between the values farmers attach to biodiversity may be traced back to differences in their belief system and philosophical background, which is significantly distinct in the case of organic (and other environmentally friendly) farmers and truly conventional farmers. It would be interesting to study more the sociological literature on organic farmers in order to test the relevance of this observation.

HOW TO PRESERVE BIODIVERSITY

Both the above analysis and the frequency of codes suggest that preserving biodiversity was an important topic for all focus groups. Each group acknowledged that biodiversity is in danger due to several reasons. Among the threats to biodiversity, agricultural intensification was mentioned the most frequently, which implies that intensive agriculture is seen by farmers as the biggest threat. However, we think that the significance of agricultural intensification was overemphasised also because focus group participants were all farmers who recognised their direct effect on biodiversity through farming. Beside agricultural intensification invasive species and market processes were mentioned relatively frequently in the focus groups. However, it is worth noting that while market effects were regarded as real threats due to their negative impact on farming activities (forcing farmers to make compromise between economics and biodiversity), invasive species were rather seen as a form of biodiversity (and not as a threat to biodiversity). Invasive species (e.g. Ascplepias syriaca, Ambrosia artemisiifolia, Robinia pseudoacacia) were mentioned in the focus groups as the result of natural processes (even if human interventions triggered these processes) which need continuous efforts to control and thus increase the costs of production. This means also that farmers can (and should) work against invasive species, although their responsibility is limited. Other threatening factors, such as the effects of globalization, land use change, climate change and population growth remained marginal. This suggests that the global processes scientists accuse mostly for the loss of biodiversity are less visible at the local level. Farmers tend to recognize mainly those threats which they can control or which have a direct effect on their everyday life; that is, their knowledge and awareness anchor them to the locality and make them a bit indifferent to the global context.

The role of famers – whether they maintain or threaten biodiversity through their farm management – was debated in almost all focus groups. In general, farmers expressed their respect towards nature

and regarded their activity as contributing to biodiversity protection. The more alternative agriculture they practice, the better impacts they think to have on biodiversity. It is also important that the positive impacts on biodiversity are not related solely to organic farming (organic farmers can also harm nature) but to the conscious decision of the farmer to use alternative (more environmentally friendly) practices. However, we also observed that the adoption of alternative farming practices depends on different determinants – ethical (one's belief), social (impact on local community and other's perception), economical (costs-benefits of changes in practice) and institutional determinants (learning practices, governmental incentives) – which are not equally important for farmers.

Farmers made a distinction between individual and community based (policy oriented) actions to maintain biodiversity. Individuals – farmers as they are themselves – can contribute to biodiversity protection by avoiding the use of pesticides and chemicals, protecting the soil, withstanding to continuous increase of productivity and showing a good example to other farmers. These choices depend on personal intentions and awareness, but are also influenced by the broader social and economic environment. That is why they think that society as a whole, and policy in particular, has a key role in biodiversity protection through awareness raising, education and subsidies.

> "We would need training on the life in the soil." (FR_conv)
> "There are problems (concerning biodiversity) which should be solved at the local level; this is subsidiarity. But the government has also responsibilities in deciding the level of decision making and support." (HU_org)

However, farmers also admitted that present-day policies and administrative regulations often fail to protect biodiversity. For instance, criticism towards the actual regulations were so crucial in the Hungarian focus groups (especially among conventional farmers) that a new coding category had to be established to incorporate all the ideas referring to overwhelming bureaucracy, regulatory problems, national park administration and nature conservation in general. The current policy was blamed not only for its negative socio-economic effects (e.g. the increasing production costs or the overcomplicated regulations), but also for its unclear impacts on the environment. Italian farmers accused policy makers for not acknowledging the efforts organic farmers made to preserve biodiversity, and urged agricultural and environmental policy makers to establish policies that favour the environment because this would directly benefit the citizens. French conventional farmers also criticised administrative regulations and the legislative framework of farming (e.g. agricultural education) for not preserving biodiversity – the only regulation they acknowledged as an effective tool for biodiversity protection was to leave grass strips on arable fields.

CONCLUSION

To sum up the results of our study, let us turn to back to our initial hypotheses and see whether we can formulate sound answers to them.

The first hypothesis about having no differences in the perceptions of farmers and scientists cannot be reinforced by the focus group results. Farmers are heterogeneous according to their knowledge and belief system which influences their understanding of biodiversity; hence there is no single interpretation of biodiversity among them. Although farmers' understanding of biodiversity has overlapping elements with scientific definitions (e.g. in terms of species and habitat diversity), it reflects a more holistic and value laden approach which lacks certain aspects of the scientific interpretation.

The second hypothesis about the difference between the perceptions of organic and conventional farmers can be partly reinforced by the focus group research. Organic farmers within our sample tended to have a complex and holistic approach to biodiversity, and they were relatively unified in this aspect. Conventional farmers, on the other hand, showed larger differences: those who practice alternative agriculture had an approach more similar to the one of organic farmers, while those who run more intensive farms shared a more rational (more utilitarian) view of biodiversity.

The third hypothesis about the differences between how organic and conventional farmers realize the benefits from biodiversity cannot be reinforced based on this study. Our results suggest that farmers – regardless of being organic or conventional ones – attribute a mixture of values to biodiversity. Ethical and social values are important for all of them, while the economic value approach is more dominant in the conventional focus groups. When the economic side of biodiversity is discussed, economic values are often in conflict with ethical/social values, resulting in cognitive dissonance.

Finally, the fourth hypothesis about the relationship between the level of assessment and the range of benefits farmers realize can partly be reinforced. Generally speaking, those farmers who had a more holistic, philosophical view on biodiversity acknowledged the global benefits of biodiversity beside benefits realized at the individual and local level. On the contrary, those farmers who had a lack of knowledge on biodiversity or approached biodiversity from a more utilitarian point of view were not really aware of those benefits of biodiversity which can be realized at broader geographical scales.

Besides answering the initial hypotheses, two more messages can be drawn from the study concerning methodological issues. Focus groups helped us experience that scientific concepts become inherently value-laden when we put them into the local context. In any kind of valuation, which involves local stakeholders and focuses on a scientifically defined phenomenon, the subject of valuation is reinterpreted by the participants. Hence, scientists should be aware of the various contexts of valuation and should understand how participants conceptualize the subject of valuation before choosing the appropriate method of valuation. Focus groups were also able to unfold the richness of valuation approaches and the wide range of benefits farmers attach to biodiversity. Ethical and social values, economic values and ecological values were mentioned in almost each of the groups, and different beneficiaries were addressed by farmers. Our findings suggest that monetary valuation methods may have limits in biodiversity valuation because they may restraint the range of benefits and probably underscore the importance of biodiversity, since farmers attribute also non-monetary values to biodiversity which are difficult to express in monetary terms.

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