Assessement of economic benefits linked to organic and low input farmland in 4 BIOBIO case study areas

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Assessment of Economic Benefits Linked to Organic and Low Input Farmland in 4 BioBio Case Study Areas

Final Version of Report

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Executive summary

This report (BioBio Deliverable 3.4) gives a detailed overview of the non-monetary valuation of biodiversity carried out in four countries (France, Hungary, Italy and Uganda) and provides a comparative analysis of the results. We selected the focus group methodology to carry out this task because this method is useful to understand the way of thinking of a group of people, and because earlier research projects also applied this method successfully. We involved only farmers in the research (and did not involve 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. Two focus groups were organized in each country to get to know how organic and conventional farmers perceive biodiversity, what kind of values they attribute to biodiversity, and how they define the range of beneficiaries who enjoy the positive effects of biodiversity. Focus group data gathered in this research are more suitable for the comparison of organic and conventional focus groups than for a cross-country comparison due to the limited size and other specificities of the sample.

Our results suggest that 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 the philosophical and spiritual commitment of farmers. Genes' diversity is hardly mentioned by farmers. Focus group results show a difference between the perception of organic and conventional farmers. Organic farmers tended to have a more complex and philosophical approach to biodiversity, and they were relatively unified in this aspect. Conventional farmers showed larger heterogeneity in this aspect: 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 view of biodiversity. Differences in the philosophical background of farmers affect also how they attribute values to biodiversity.

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 (this was the most frequently mentioned type of value). Economic value has also an important role especially in conventional focus groups; although in most cases the economic value is not strongly related to biodiversity but to farm management. In this respect, biodiversity is seen as having both positive and negative effects on the farm, and farmers tend to value biodiversity by comparing its contribution to the costs and benefits of farming. This cost-benefit approach is often in conflict with the strong ethical and social values attributed to biodiversity. It may happen that farmers truly respect nature and attribute 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.

Focus groups helped us experience that scientific concepts become inherently value-laden when we put them into the local context, which warns us that the subject of valuation is reinterpreted by the participants during the process. 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. Our findings reinforced also that monetary valuation methods have certain limits in biodiversity valuation, because they restrict the range of benefits and probably underscore the importance of biodiversity, because it is partly rooted in the philosophical and spiritual background of farmers which cannot be measured in monetary terms.

1. Introduction

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 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 four case study areas (in France, Hungary, Italy and Uganda).[1]

Ecological values of biodiversity can be grasped in a comprehensive way by biodiversity indicators, while market-based (monetary) valuation methods are useful to assess the private monetary benefits biodiversity provides (Nunes and van den Bergh, 2001). However, many public benefits which are often expressed in social/psychological value categories are difficult to monetize or describe with ecological indicators. To draw a complex picture on the multiple values attached to biodiversity, we applied a non-monetary assessment methodology. Non-monetary assessment can best be carried out by qualitative research methods, of which we have chosen the focus group method combined with a visual exercise and a concept mapping task. A total number of eight focus group discussions were planned in the late autumn and winter of 2010/11 in the four case study areas, six of them were run and analysed during this period, and another two (the Ugandan focus groups) were run and analysed during the summer 2011. Only farmers were involved in the research (general citizens were eliminated) partly because the existing literature provides already some findings on the perceptions of the general public, and partly because of time and resource constraints. In each case study area one group was dedicated to organic farmers and the other one to conventional farmers. Focus group discussions were transcribed and analysed according to the qualitative content analysis method (Marying, 2000).

This report (BioBio Deliverable 3.4) gives a detailed overview of the assessment process and provides a comparative analysis of the results. Objective 3.4 – "to evaluate the economic benefits of biodiversity for organic/low-input farming" (BioBio DoW, 2009 p. 41) – has been expanded here to include the non-economic benefits of biodiversity and is broken down into the following aims:

- to present the methodology and the process of the non-monetary assessment of biodiversity carried out in the four case study areas;
- to analyse and compare the results of the assessment process;
- and to critically revise the methodology applied for this assessment.

The report proceeds as follows. Introduction is followed by a brief explanation of the theoretical background and a priori hypotheses, and then the methodology used for data collection and analysis is detailed. Chapter 3 gives an overview of the general contextual

[1] This task originally aimed at comparing four European countries (France, Hungary, Italy and Wales) but due to external factors we finally decided to include a Ugandan case study instead of the Welch one.

information on focus groups, including the main characteristics of the research areas and the participants as well as the major circumstances of running the focus groups. Chapter 4 contains the comparative analysis. First we discuss here the comparability of results and the possible limitations. This is followed by the detailed analysis grouped along four key questions: (1) how do farmers interpret biodiversity; (2) what kind of attitudes can be identified from the discussions; (3) what are the benefits and who are the beneficiaries of biodiversity; and finally (4) what is the perceived role of farmers in preserving biodiversity (whether their practices are thought to threaten or protect biodiversity). The concluding chapter is divided into three parts: the first part answers the a priori hypotheses defined in the preparatory phase, the second part draws conclusions from the critical review of the methodology, whilst the third part offers some recommendations for science and policy.

2. Theoretical and methodological background

2.1. Theoretical introduction

Biodiversity can be considered a global public good, although it often shows mixed characteristics: most aspects of biodiversity are characterised 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, 2008; Nijkamp et al., 2008). Beside economic values, ecological and social/psychological values – or in other classifications instrumental and intrinsic values (Nunes and van den Bergh, 2001) – should be also taken into account.

We applied non-monetary valuation methods in order to expand the valuation of biodiversity benefits to the most comprehensive level. Reasons for applying this approach are the ability of non-monetary valuation to focus on the variety and complexity of life and to include the intrinsic value of biodiversity. Moreover, non-monetary valuation applies a holistic approach focusing on the values lying in the integrity, stability and resilience of complex systems; and often has a focus on public engagement, which might lead to social learning and conflict resolution (Nunes and van den Bergh, 2001). A further reason for choosing non-monetary methods comes from previous biodiversity valuation studies, which found that the term biodiversity and the related scientific concepts are not really well-known in local communities (Buijs et al., 2008). Valuation studies therefore often struggle with the distortion stemming from the fact that those who are asked to value the benefits of biodiversity are not really aware of what biodiversity is. Thus it is better to jointly conceptualize first what this term means and how it may relate to the everyday life of the research participants, and then ask them about the benefits. Empirical research experience (e.g. Fisher and Young, 2006) also suggest that discursive approaches which acknowledge and embrace the diverse views of the general public on biodiversity are required to improve public support for biodiversity management and to reduce conflicts.

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 / low input farmers have a more complex understanding (more solid knowledge) of biodiversity than conventional farmers.
- Hypothesis 3: During the discussions it is possible to develop a common understanding – acceptable for both farmers and scientists – of biodiversity.

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 4: Conventional farmers acknowledge more those benefits of biodiversity which can be realised in monetary terms (economic benefits), while organic / low input farmers acknowledge more the indirect (non-economic) benefits of biodiversity.
- Hypothesis 5: The more local the level of assessment is, the more benefits of biodiversity participants can perceive.

2.2. Methodological background

2.2.1. Data collection methods

To test our hypotheses described above we applied a mixed methodology for data collection. Basic data were collected from focus group discussions (one organic and one conventional in each country taking part in the research), but before the focus groups we conducted a short questionnaire with farmers already engaged in the BioBio project to collect some personal impressions (see in Annex I).[2] With this additional data collection technique we aimed to detect whether participants used different arguments and knowledge base when they were asked personally or within the group. However, as the range of farmers invited to the focus group went beyond the BioBio sample in some case study areas, we could not use the questionnaires for a proper comparison but rather as an additional source of background information about farmers' way of thinking.

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

[2] The questionnaires were conducted together with the farm survey carried out within Task 3.2 in order to minimize the time efforts required from farmers (our questions were inserted into the survey as an introductory part only in those case study areas which were designated to the non-monetary assessment).

questions (Barbour, 2007). 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 (for the whole guideline and hand outs see in Annex I):

- 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 (how biodiversity changes over time and space).

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 (this is also required to make the data comparable). Thus, we run a pilot focus group in August 2010 to test the guideline and to see the method working. The pilot focus group was organised in Hungary with low-input (but not organic) farmers who run their farms near to the research area but who were not taking part in the BioBio project earlier. As the discussion was scheduled during the high season on the fields, participation remained low (from the 12 invited farmers 9 agreed to come but finally only 3 of them showed up). The main lessons learnt reinforced that (1) the visual exercise is good for starting the discussion as it brings the topic closer to participants, (2) the whole guideline requires almost 2 hours to complete, and (3) the language used should be non-scientific as much as possible. The pilot focus group was transcribed and was used further to test the method of analysis and to develop the coding agenda used later for analysing the texts. First-hand experiences from the pilot focus group were shared during the one day long workshop we organised for participating researchers to discuss and refine the methodology (see the programme in Annex II). The workshop allowed to "taste" how group dynamics works in a concept mapping exercise, and provided some insights into qualitative content analysis by using sequences from the pilot focus group. Based on the discussions we had on the workshop, the focus group guideline and the coding agenda were finalized. Because Ugandan colleagues could not take part on the preparatory workshop an extra meeting was held in April 2011 in Padova, Italy, where Italian and Hungarian colleagues helped the Ugandan team to learn more about the methodology and discussed thoroughly the guideline.

2.2.2. Data analysis

Focus group transcription – as other qualitative data – needs special techniques to analyse. The two most typical analytic methods are content analysis (a bit closer to the quantitative tradition) and the grounded theory method (inherently qualitative). To analyse 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). 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.

Qualitative content analysis allows both inductive and deductive coding and category development, but how the categories can be defined is regulated through criteria of definition derived from theoretical background and research questions. We agreed to use the deductive content analysis (a priori coding) in order to make the results easier to compare. The process of deductive content analysis builds upon the idea that a coding agenda is developed from theory and previous results, which gives explicit definitions of each category and determines when and how a text passage can be coded with a category (Mayring, 2000). Then, the researcher works through the text by using this coding agenda, and simply looks up the codes in the text which were defined in the agenda paying also attention to the context of the codes. If there are considerably long passages of the text which cannot be coded according to the agenda but have useful (interesting) content, emergent codes and categories can be defined and added to the coding agenda (revision of categories).

Each team started data analysis by transcribing the focus group discussions (research groups were free to choose between doing the transcriptions by themselves and contracting somebody). The original idea was to transcribe the whole discussions and encode the text from the beginning – this way the comparison of the results of coding and the concept mapping exercise could serve as a source of triangulation. However, time constraints and the different level of existing experiences resulted finally in some divergence among countries (French and Hungarian focus groups were transcribed and analysed from the very beginning, while Italian focus groups were transcribed and coded from that phase when the concept mapping exercise was finished). Coding started with the transcribed data by reading the text carefully and looking up the predefined codes. It was again the free choice of researchers to use software for the analysis (NVivo® was suggested) or doing the analysis "by hand". 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 (see the detailed coding agenda in Annex III). 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 (see chapter 4.1). If it was necessary, further input or clarification was asked by participating researchers. In a few cases iterative coding was applied (e.g. Hungarian transcriptions were coded again with two codes – species diversity and preserving biodiversity – when we recognised that the logic French and Italian teams followed with these codes was different from that of the Hungarian colleagues).

3. General contextual information on the focus groups

3.1. The local context of focus groups

The focus groups were organised in three research areas within Europe and another one within Africa which show different land use characteristics: arable farming systems were studied in the Midi-Pyrénées, France; extensive grazing systems were chosen from the

Homokhátság, Hungary; vineyards were selected from the Veneto Region in Italy, and small-scale arable farming were studied in Kayunga, Uganda, which is one of the tropical countries of East-Africa lying on the Equator.

As the main contextual factors (such as the dominant farming system, the general agricultural situation, and the socio-economic characteristics of the communities included) can have an influence on how farmers think and act in the focus groups and which topics they bring into the conversation, we provide here a brief introduction to the four research areas (Table 1) based on the report "Delimitation of BIOBIO Case Study Regions and the Selection of Case Study Farms" (D3.1). The table also calls our attention to the fact that the farmers chosen to participate in the focus groups are often in special situation within their country (e.g. Hungarian farmers run their farm in a protected area and Italian farmers are high quality wine producers who brand and sell their own wine, which means that their ideas may differ from the general attitudes of "average" farmers), which reflects well the heterogeneity of farmers within and beyond Europe.

Table 1: Main characteristics of the research 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, when based on high quality products.
UG: Kayunga	Farming is done on small	No agri-environmental	The area is in Central

	acreages, usually less than 1 acre (~0.4 ha), using family labour hand hoe. There is both a lot of interspecific diversity and intraspecific diversity on farms. A plot can have as many as 5 crops intercropped; and a single crop e.g. bananas can have as many as 8 different cultivars planted by the farmer. Usually fruit trees are part of the farm lands, and although some of the fruits e.g. jackfruits are not purposively planted by the farmers they are protected and maintained once they establish in the fields. A farmer can have as many as 10 different crops planted or maintained on his plot.	schemes exist in the case study area.	Uganda, about 100km away from the capital city. Farming is the main source of income; only about 10% of the population is engaged in other employments in addition to farming. The main crops are pineapple and coffee for cash, maize, cassava, banana, sweet potatoe, rice, bean and groundnut mainly for food; but they are as well important sources of income.

3.2. General overview of focus group participants

3.2.1. Homogeneity of focus groups

The key aspect to homogenise the focus groups was farm type (organic or conventional), but also the farming system and the approximate size of the farms were roughly similar within the groups. However, we did not have the possibility to homogenise the groups according to age, gender and educational level because of the relatively small size of the sample. While age heterogeneity was not a decisive factor, differences in the educational background and gender seemed to influence the discussion (see more details in the next section). In France and Italy farmers who did not belong to the BioBio project were also invited in order to balance the relatively high refusal rate, but both the group dynamics and the preparatory questionnaire reinforced that belonging to the BioBio sample is not a determining variable.[3]

Organic focus groups showed homogeneity in the attitudes and general approaches of farmers (almost all of them decided to be organic because of personal/philosophical motivation), while conventional groups were more heterogeneous in this aspect. Especially the French conventional focus group showed conflicting approaches among conventional farmers. In this group some farmers have adopted alternative practices such as minimum tillage, direct sowing and cover cropping partly because they care about the impact of their practices on the environment (hence they showed more similarities with organic farmers), while other participants were pure intensive farmers who focused mainly on the utility biodiversity provides for their agricultural activity. The Hungarian conventional focus group was also interesting in this aspect: participating farmers run low-input farms partly because of the increasing costs of intensive production and partly because of the strong nature conservation rules in the region. Thus, their practices may be close to organic farming, but their attitudes are rather related to intensive production. In the Ugandan case differences between organic and conventional famers and especially among conventional farmers were less visible. Here both conventional and organic farmers were of nearly the same social status with approximately the same farm size. There was also less variation in the educational levels both within and across the groups. What is important, however, is how farmers decide to be

[3] We checked for instance whether the fact that a farmer has taken part in BioBio from the beginning has an influence on the first hand impressions about what biodiversity is or on the typical reasons for loving the area where participants live, but comparing the answers of BioBio and non-BioBio farmers within the Italian sample we did not find any significant discrepancy.

organic or remain conventional farmers. The first aspect is the cost and the requirements to become a certified organic farmer which limits some farmers to get into organic farming even when they seldom use chemicals or fertilizers. Organic farmers are also externally motivated to get into organic farming. Companies that are involved in buying organic fruit produce from certified organic farmers are the ones that take a leading role in encouraging farmers to be organic. Some of the conventional farmers mentioned that they would get organic if they were sure of the market. Therefore we pay special attention during the comparative analysis to figure out whether there is further differentiation within the conventional and organic groups of farmers appears in the participating countries; and whether it has a special influence on the discussion and the results.

3.2.2. Preparatory questionnaires: background information on participants

Before running the focus groups, we conducted a preparatory questionnaire (see in Annex I) with the organic and conventional farmers involved in the BioBio project (a total number of 38 questionnaires were filled in, and 29 questionnaires were analyzed in the three European countries, in Uganda only qualitative analysis was done).[4] The first two questions addressed the personal relationship of farmers to the case study area. Focus group participants in general showed quite large variance in the length of time they spent in the research area (either by farming or by living there). Hungarian and Ugandan farmers, however, were a bit different in this aspect: the majority were born and raised here and they inherited the farm from their parents. The time spent in the particular locality can have an influence on the local knowledge of farmers on species and habitats, and can also affect their personal attachment to the landscape. For example, when Hungarian farmers were asked in the questionnaire why they like living in the area, most of them referred back to their family roots (*"I was born here, everything links me here"*). Only farmers moving in the area later talked about the beauty of the landscape or the freedom of living and farming in the plain. In Uganda, participating farmers appreciated their place of living because of the fertile soils and the good weather that enables them to get good yields, and the ability of their area to support a variety of both crops and trees. Another reason given by some Ugandan farmers was the proximity to town and the available market for their produce. This is clearly different in the case of Italian and French farmers, who were attracted mostly by the heterogeneous hilly environment, the magnificent view, the natural beauty of the surroundings, the peaceful and colourful landscape. Only some of them accounted for the good territorial potential for agriculture (e.g. the good climate, the specific soil etc).

The third question of the questionnaire addressed the existing knowledge of farmers about biodiversity. As Figure 2 shows,[5] farmers linked the concept most frequently to the richness of species (e.g. *"The presence of many species and varieties…"* or *"Heterogeneity"* or *"The*

[4] In France and Hungary the survey was conducted among farmers participating in the BioBio project, while in Italy all focus group participants were asked during the survey. This resulted in a distortion within the sample of the survey: in Hungary and Uganda all focus group participants belonged to the BioBio sample and hence filled in the survey, in Italy all focus group participants filled in the survey also but some of them were non-BioBio farmers, and in France only those focus group participants filled in the survey who belonged to the BioBio sample (thus we miss the answers of the non-BioBio farmers participating at the focus group discussions). In the analysis we skipped the answers of those BioBio farmers who did not participate at the focus groups. Ugandan data were only processed in qualitative ways.

[5] We asked an open question to trigger as much associations on biodiversity as possible. Notes were taken to record the answers. During the analysis we grouped the answers into five categories (species diversity, habitat and landscape diversity, complex systems, human activities to protect biodiversity, natural and colourful environment, and no idea). If a respondent referred to more aspects of biodiversity at the same time, we noted the different aspects as distinct references (e.g. the following answer – "The number of animal and plant species, trees, grasses and insects. Biodiversity represents the full richness of life." – were noted as two references, one referring to species diversity and the other one referring to complexity.)

number of animal and plant species, trees, grasses and insects"); the two exceptions are the French organic and the Hungarian conventional group, where species richness was not a typical answer. The second most frequent answer – which was the dominant one in the French organic group and was also typical in the Italian groups – referred to biodiversity as a complex system (e.g. *"Integrity and complexity of the natural wild habitat"* or *"Symbiosis"*). Ideas related to biodiversity management (how to preserve biodiversity, what are the biodiversity friendly farming practices) were more popular among organic farmers (it was mentioned in each organic group once at least), while habitats diversity was mentioned relatively rarely. Four farmers (three of them were conventional farmers) could not give any explanation of the term and admitted that they did not know what biodiversity means. Another two farmers mentioned the beauty of the natural and colourful environment without any reference to the biological content of the concept. This shows that there is a lack of scientific knowledge among farmers – especially in Hungary – about the meaning of biodiversity (the six farmers who had no clear idea of biodiversity account for the 20% of respondents), which makes it difficult for them to link the concept to their real life experiences and local knowledge.

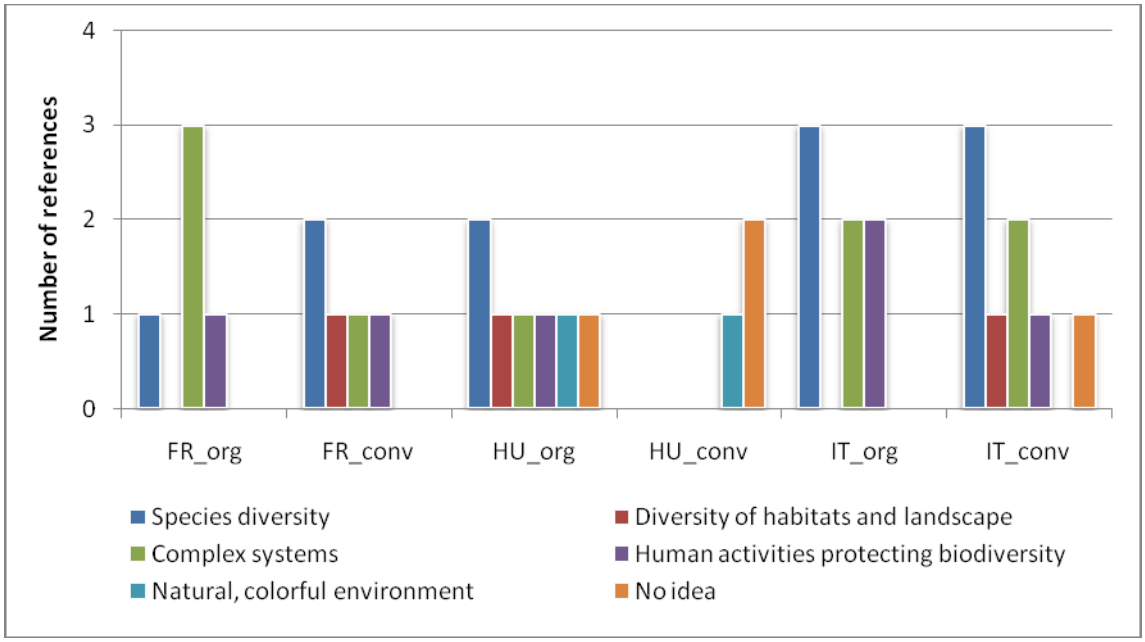

Figure 2: Individual interpretations of biodiversity (excepting the Ugandan data)

3.3. Running the focus groups

3.3.1. General management of focus groups

A pilot focus group was organised in August 2010 in Hungary, in order to test the methodology and the guidelines developed earlier. Because both the moderation and analysis guideline were improved after this event, data and results from the pilot focus group were not included in the comparative analysis. Some general information about the focus groups is indicated in Table 2.

Table2: General information about focus groups

Research area	Date	Place	Length	Participants	Comments
FR Organic	15-10-2010	City hall	120 min	8 farmers	3 people came from the same family farm, 2 of the participants were female.
FR	04-11-2010	City hall	140	11 farmers	One participant was an interested

Conventional			min		local inhabitant, one participant was late.
HU Organic	26-11-2010	Restaurant	150 min	7 farmers	2 people were from the same family farm, and 3 of the participants were female. Most of them have known each other earlier.
HU Conventional	24-11-2010	Restaurant	80 min	3 farmers	More farmers promised to come but finally they did not, probably because field works were postponed to late autumn due to weather extremes.
IT Organic	07-12-2010	University	120 min	8 farmers	More farmers were willing to participate but the heavy fog set them back. Participants represented 6 farms (3 of them external to BioBio).
IT Conventional	12-01-2011	University	90 min	6 farmers	2 female and 4 male farmers participated, 2 of them external to the BioBio project.
UG Organic	16-07-2011	Small room in the trading centre	105 min	8 farmers	Farmers came in time. It was a very lively discussion in spite of the hot climate inside the room. Both male and female farmers were present.
UG Conventional	16-07-2011	Small room in the trading centre	120 min	7 farmers	3 participants came late with one participant sending her 18 year old son to represent her. Both male and female farmers were present.

According to the table, the focus groups attracted 6-11 participants in general (excepting the Hungarian conventional focus group where only 3 farmers came), which fits to the methodological expectations. Both extremes – having too few or too many participants – put extra pressure on the moderator: in the first case it was difficult to encourage farmers to speak about their opinion and to trigger new ideas, in the second case it was uneasy to keep the focus (avoid small talks in groups of 2-3) and to give everyone equal opportunity to speak. The average length of the meetings varied between 80 and 150 minutes – the longer meetings usually included the lunch or dinner – with an average of 115, which is a bit longer than a "normal" focus group. However, the research group consciously decided to conduct a longer guideline in order to include the concept mapping exercise as one of the most important tools to get to know more about the general way of thinking of farmers about biodiversity.

3.3.2. Moderation and group dynamics

Most of the focus groups went on in a friendly and open atmosphere; people were usually talkative and were happy to share ideas, especially when they could talk about what they observed on their fields or how they did farming. Sometimes we could even reach a personal-philosophical level in the discussion when participants started to talk about family background, personal feelings and approach to life. Exceptions were the Hungarian and Italian conventional groups which started in a bit freezing mood. We can identify two reasons for this negative tone. On the one hand, there were some better educated participants in both groups (one in the Hungarian and three in the Italian group), who could dominate the discussion and probably made other participants feel a bit embarrassed for their lack of knowledge and weaker oral skills. On the other hand, the concept of biodiversity and thus the whole topic of the discussion were unfamiliar to the participants of the Hungarian and Italian conventional focus groups (they remained confused even after a clear definition and examples

were provided by the moderator), which made them uneasy to speak about their ideas. This was also the case in Uganda, where farmers could not easily comprehend the different aspects of biodiversity we were interested in. Careful moderation was able to release this atmosphere to some extent, but farmers remained more silent all along in these groups and sometimes the moderator had to stimulate participants personally to add comments.

We observed that in the organic focus groups participants were more willing to agree on the topics discussed and often reached consensus without the influence of the moderator. In the conventional focus groups, on the contrary, debate and disagreement was more frequent. This can be traced back to the differences in the participating farmers' general approach. In almost all of the conventional focus groups there were a few farmers who were thinking on converting to organic farming, or who remained conventional only because the certificate and the quality control is too costly. Their attitudes showed more similarities with organic farmers than with other ("real") conventional ones, which could trigger tensions during the discussions. However, it was nice to see how participants handled this situation – they were quite open to each other and accepted if somebody had a different opinion (e.g. in the Hungarian conventional group one farmer said that having different opinions is also a sign of biodiversity). Beside debate and agreement, other types of interaction were also present in the focus groups. Farmers asked questions from each other and often reinforced the opinion or knowledge of another participant. Although farmers were interested in the results of the field studies conducted on their farms and asked the scientists about this issue, it was not difficult to keep the role of the moderator during the discussion (farmers accepted the structure and aim of the discussion).

One more interesting aspect of the group dynamics could be the gender issue, although only the Hungarian organic focus group provided detailed information on this topic (in Uganda, where also more female farmers were present, no differences were observed between the male and female participants in activity). In the Hungarian organic focus group we found that female farmers had a different approach to farming and nature; they were more emotional, more sensual and paid more attention to the benefits of biodiversity related to health and family life. Male farmers often did not pay full attention when women were talking. Women often started their speech with *"sorry for telling my opinion"* which shows that they have a secondary position concerning the management of the farm (men are the leaders, women help them with administration). Women used to talk after each other. This shows that they felt uneasy to take over the discussion from men, but once one of them was brave enough to talk, others followed her.

Each focus group was moderated by a native scientist who was helped by colleagues (with organizing the meeting, introducing the project, taking notes and photos etc., and in Uganda to support personally the participants if any help was needed in clarification or self-expression). All the moderators had some earlier experiences with qualitative or participatory research, and the Budapest training gave all of them the same methodological background. The same focus group guideline was followed by each moderator (translated into native language), but there were some differences in the emphasis and time allocated to different topics according to the specific characteristics of the groups. In the Italian focus groups a computer was used to make the structure of the guideline transparent to participants and to show them the pictures. The French and Hungarian focus groups were organized in a low-tech way, only printed pictures, pencils and blank sheets of paper were used. The main challenges of the moderation were keeping the focus and provide all participants with equal opportunities to speak, while encouraging silent participants, avoiding small group discussions and balancing gender relations appeared only occasionally. A critical reflection about the used methodology is shared in the Conclusion (chapter 5.2).

4. General and comparative analysis

4.1. The comparability of results

The data collected from the focus groups allows for a twofold comparison: comparison across countries and along the conventional-organic dimension. As an initial step of the analysis we first check whether there is any characteristic pattern of divergence among the frequency of codes (the total number of references coded with the same code). The semi-quantitative analysis of frequency data is used here to shed light on the major differences and similarities between the focus groups, which can help focusing on the qualitative analysis. Frequency analysis is not intended to explain causal relationships; indeed, the small number of focus groups and overall participants and the differences within coding makes it impossible. Following the overview of basic statistical data we discuss the possible sources of distortion stemming from data collection and analysis that can influence the results. This helps us define the appropriate level of comparison.

4.1.1. Basic statistics

We used 20 a priori codes and a few emergent codes for the qualitative content analysis (see the full list with detailed descriptions and references of codes in Annex III). Emergent codes were built into the comparison if they were used by more than one team, but even in this case we checked first if they are used to refer to the same content by all teams. Based on this comparison, some emergent coding categories were renamed (sometimes merged or split up) and standardized as follows:

- **biodiversity as a nuisance**[6] (in IT and UG focus groups this included also the costs and the negative effects of biodiversity) = negative effects of biodiversity (HU focus groups) = economic values code (FR focus groups) was used originally to code these references but costs and other negative effects were sorted out into the category of negative effects of biodiversity;

- **preserving biodiversity** (HU focus groups) = preserving biodiversity (individual and collective level together) (FR focus groups) = good farming practices enhancing biodiversity (IT focus groups) = good farming practices that enhance biodiversity (UG focus groups);

- **complex systems** (FR focus groups) = complex systems (HU focus groups) = complexity and system approach (IT focus groups), not mentioned in Uganda;

- environmental policy (IT focus groups) = policy and nature conservation codes together (HU focus groups), not mentioned in Uganda;

- farming (HU focus groups) = organic farming and biodiversity (IT focus groups).

Figure 3 shows the number of references coded with the globally most frequent codes,[7] while Figure 4 represents the relative frequency of codes (the percentage of the number of references of a given code compared to the total number of references coded in the same text) across the different focus groups. Both graphs indicate that the frequency is highly variable both within countries and between countries. Some codes got into the list of most frequent

[6] Codes written with bold letters were included in the statistical comparison, while codes written with normal letters were used in the country-specific analysis.

[7] The six globally most frequent codes cover at least 50% of the total number of references in each focus group, while the remaining 14 (plus the inductive codes defined from the text) were much less frequent and showed a huge variance along the different groups. Thus we focused our analysis mainly to these six most frequent codes.

codes because they were highly overrepresented in one or two focus groups (e.g. the ethical/social value which was overrepresented in the French organic focus group or preserving biodiversity in the two Ugandan focus groups), while others gained relatively similar importance across the different groups (e.g. economic value). Some codes show clear differences by the organic-conventional aspect, for instance in most countries ethical/social values are more frequent in the organic groups than in conventional ones.

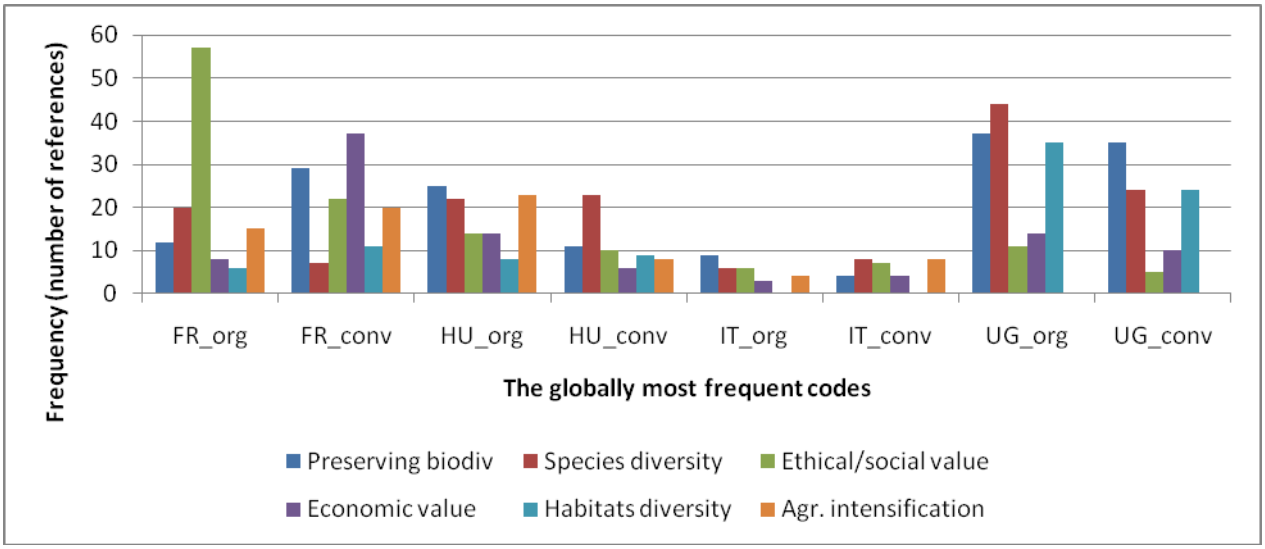

Figure 3: The globally most frequent codes within focus groups

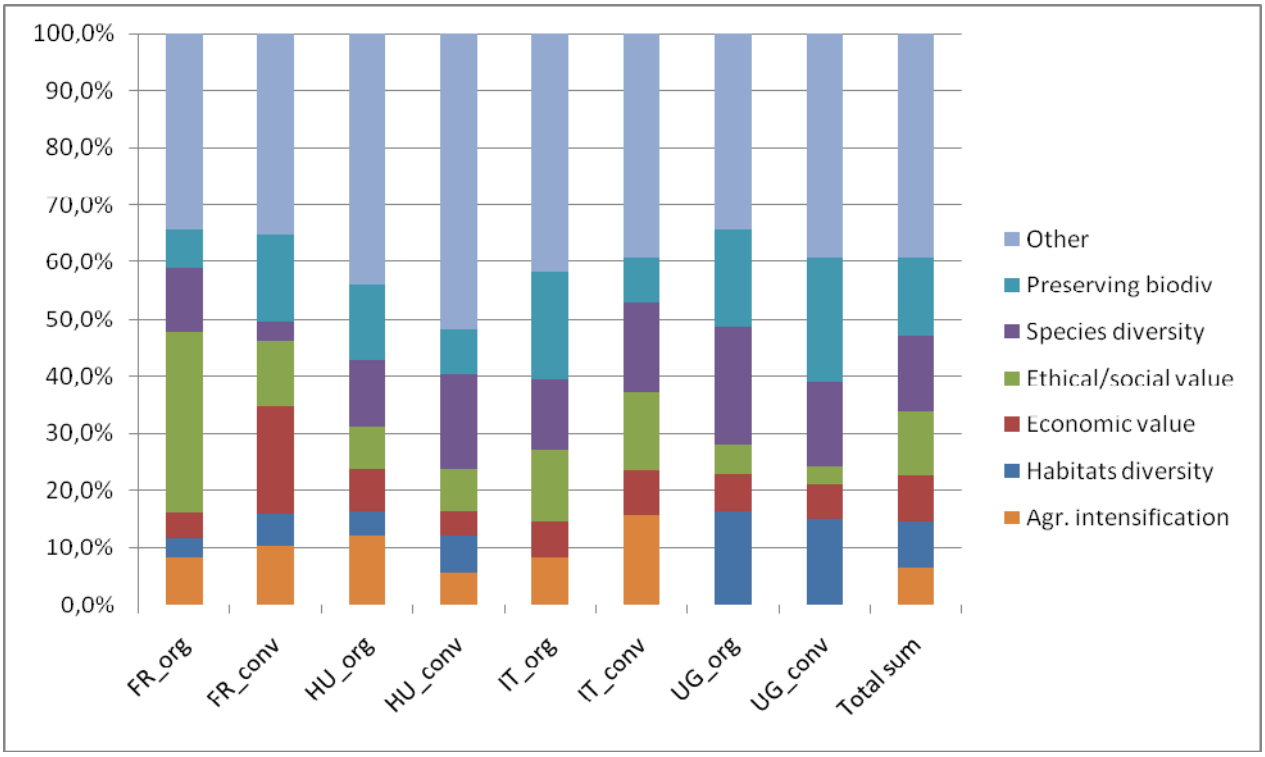

Figure 4: The relative frequency of the globally most frequent codes

The huge variance among the groups can be traced back to several reasons. Differences in the moderation or the coding can have a strong impact on the frequency of codes. For instance, the diverging patterns between the Italian focus groups and the rest might be traced back to methodological differences, namely to the fact that the first half of the Italian focus group discussions (the visual and the concept mapping exercise) were not transcribed and coded, thus the codes account only for half of the discussions. The difference in the number of

participants may also affect the results (the higher number of participants may imply that the same topic is raised several times during the discussion when participants agree with each other or reinforce the other's opinion, thus the frequency of the same code increases).[8] Another reason can be that focus group participants are embedded in different socio-economic and environmental contexts, and these contextual specificities might be reflected by the different frequency of certain codes.[9] Differences seem especially large between the European and the Ugandan focus groups. Without the Ugandan results, the list and the rank of the six most frequent codes are different. For instance, social/ethical value is the most frequent code and complexity also appears among the six most frequent ones if the Ugandan data are filtered. On the contrary, the codes of preserving biodiversity, species diversity and habitats diversity are overemphasised in the Ugandan focus groups, presumably because farmers face much larger species diversity and richer habitats than in Europe. The existence of context-specific differences is further reinforced by the fact that the European data indicate larger homogeneity across and within groups if the Ugandan results are filtered. This shows that the possibilities to compare the European and Ugandan results are limited.

Figure 5 reinforces that there is no characteristic pattern of divergence when we compare the ranks of the most frequent codes between countries. In this graph the black line signs the ranks of the globally most frequent codes from the highest rank to the 6th rank, while the coloured and dotted lines signs the ranks the codes received in different focus groups. All codes show a great variance (indeed, some of them appear in the list only because they were overrepresented in one or two focus groups). It is also important to see that in the European countries organic and conventional focus groups run in the same country often move in the opposite direction. Although in Uganda there is less divergence between organic and conventional groups in the ranks of the most important codes, there were much more references in the organic, than in the conventional group, which shows that biodiversity is a more important (and more valuable) concept for organic farmers. All these observations hold forth interesting results from the comparison of conventional and organic focus groups.

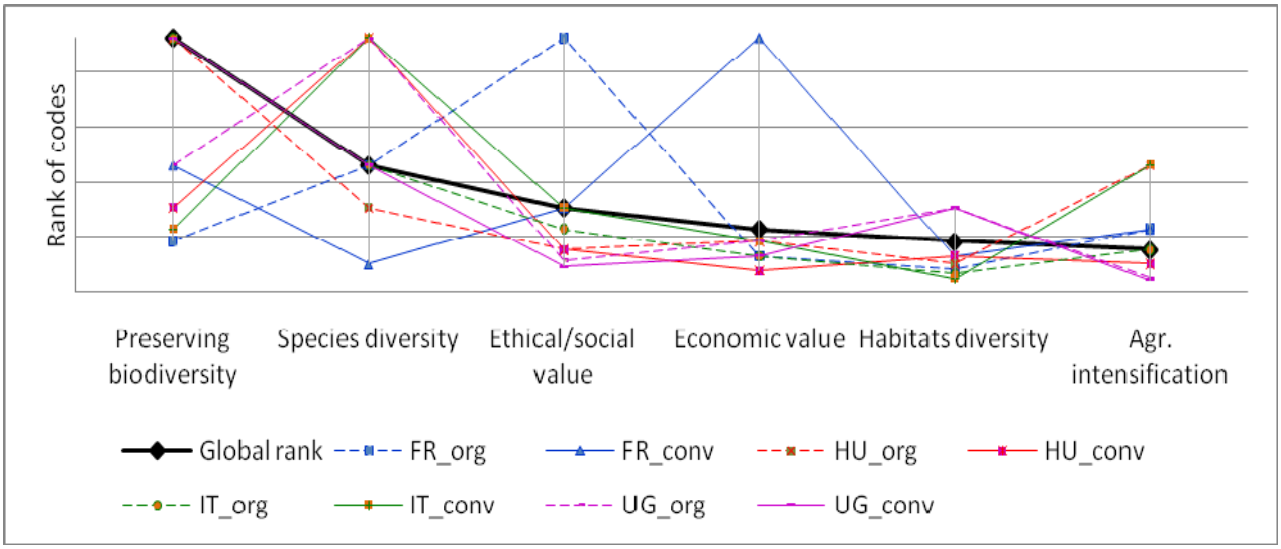

Figure 5: The variance of the rank of codes which are the globally most frequent within focus groups

[8] One possibility to overcome this problem is to normalize the coding frequency for the number of participants. However, due to the differences in the group dynamics (moderation) and in the coding, it is difficult to filter out the exact effect of the number of participants (especially because moderation and coding may either balance or strengthen the effect of the growing number of participants).

[9] We checked with ANOVA analysis whether the differences in coding frequency are linked to the countries or to the organic/ conventional aspect, but we did not find statistically significant relationships.

Figure 6 compares the frequency of codes along the organic/conventional divide and illuminates that a few codes have clearly different importance for organic and for conventional farmers (e.g. ethical/social value, species diversity and complex systems are more frequent in organic focus groups while economic benefits, ecosystem services and biodiversity as a nuisance are more often referred in conventional focus groups). This again suggests that the comparison of the attitudes and knowledge of organic and conventional farmers can reveal some key differences between the two groups.

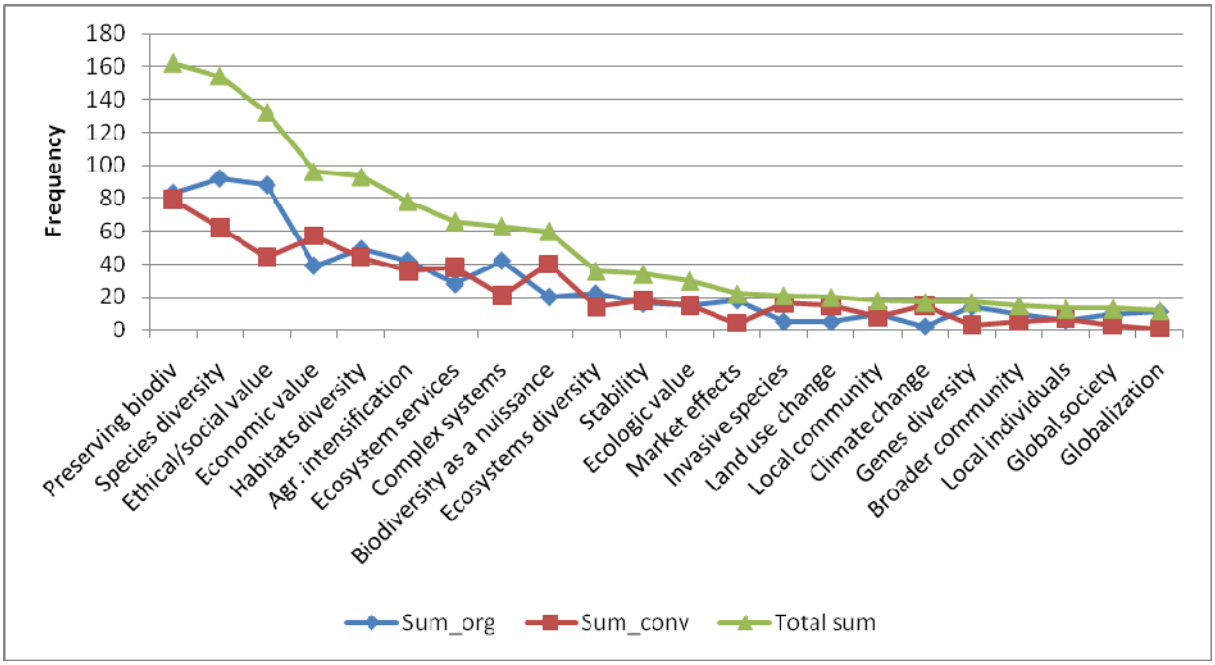

Figure 6: Comparing the frequency of codes between organic and conventional focus groups

4.1.2. The validity and generalisability of results

Research design and sampling in qualitative research has an important role to make results comparable, because the heterogeneous social-cultural contexts into which the case studies are embedded as well as the researchers themselves can strongly influence the results. The possible sources of bias are thus the following: 1) bias stemming from the different contextual factors, 2) bias stemming from the recruitment of participants and 3) bias caused by the uncontrolled use of methodology.

4.1.2.1. Contextual bias

The social-cultural context of the research may affect farmers' general attitudes and knowledge, their willingness and ability to take part in group discussions and share ideas, the main challenges faced in their agricultural activity etc. One of the strengths of qualitative analysis lies in its ability to conceptualize the relationship between results and their context, although this kind of studies needs a larger sample within participating countries and a comprehensive analysis of the contextual factors. The limited time and resources for this task did not allow us to carry out a detailed contextual analysis, only a few major data were collected beside the focus groups. Thus, cross-country comparison in our case would lead to uncontrolled distortion and speculation because we are not able to check the direct/indirect effects of contextual factors on the heterogeneity of results.[10] Socio-economic and cultural

[10] For instance the limited interaction within the Hungarian conventional focus group compared to the French and Italian examples could be explained by the disruption in democratic tradition and open discourse, but simple reasons such as the oral ability of participants or the unfamiliarity of the concept in focus can also be accused for

differences between the European countries and Uganda makes the cross-country comparison even more difficult, and the highly variable results of the coding frequency analysis (see chapter 4.1.1.) suggests that the Ugandan results should be interpreted in a somewhat different way.

4.1.2.2. Recruitment bias

As we described earlier, the majority of farmers participating in this focus group research were already involved in the BioBio project, while some farmers were invited to the discussions from outside. Within the BioBio project the main selection criteria were the type and intensity of farming within the given case study region in order to measure and compare biodiversity indicators appropriately. This means that BioBio 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 specialised (from France only arable farmers, from Italy only wine producers, from Hungary only animal breeders and from Uganda only small-scale crop producers were included in the focus groups, without providing an overlap of farm types across countries). This is clearly showed by the Ugandan example, where BioBio participants were averagely better off than the rest of the community members. The organic farmers who were involved in the Ugandan study were those who had previously been selected by pineapple exporters. These farmers therefore had to have sizeable land, the minimum education and the zeal and some expertise to manage the crop.

Moreover, as farmers were involved in the BioBio project, they met earlier with scientists and they 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. In some focus groups non-BioBio farmers were also invited if they fitted to the selection criteria of running the same type of farm within the same case study area. Although their self-selection may also result in some distortion (those farmers came who were more interested in biodiversity or who already practiced alternative ways of farming), their participation in the discussions could balance to some extent the distortion stemming from the original BioBio sample.

Bias stemming from the recruitment could be best reduced by running “control” focus groups, that is, focus groups with non-BioBio farmers, both organic and conventional ones. Generalisability of the results could be further enhanced if all the different farming types would be addressed through different focus groups in each case study area. Thus, a possible future improvement of our research could be to enlarge our sample and organise focus group discussions for organic and conventional farmers who run different types of farms (arable crops, vineyard, and animal husbandry).

4.1.2.3. Methodological bias

When we designed the focus group guideline and the process of analysis we put strong emphasis on minimizing the distortion stemming from the fact that participating researchers had a quite heterogeneous background and experience with qualitative research. Although running focus groups is not the easiest way to collect standardized data, we unified the structure of the focus groups and the list of photo subjects, and limited the independent choice of researchers to context dependent issues (such as supporting the group dynamics or wording

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such a phenomenon. Without checking the validity of the possible explanations with empirical results, we cannot give an appropriate answer in this aspect.

the questions).[11] The choice of the qualitative content analysis method, and especially deductive coding, was also led by the claim of enhancing the comparability of results, since the process of analysis can be more systematic and replicable by using an a priori coding agenda. The level of standardisation was increased further during the preparatory workshop where we discussed in details the focus group guideline and the coding agenda, and we experimented with these techniques in simulations. Beside these efforts, our data show some clear differences among countries, related mainly to coding (coding density is smaller and the length of the coded sequences is shorter in the Italian case than in the French and Hungarian focus group transcriptions, while Ugandan coding density is higher than the European average) which makes cross-country comparison more difficult.

4.1.2.4. Delimitation of the results

The basic statistical data and the overview of the possible sources of bias both reinforce that **focus group data are more suitable for the comparison of organic and conventional focus groups**, while the comparison of data across countries would be more risky and would weaken the explanatory power of the study. The reasons which reinforce that we focus the analysis on the comparison of organic and conventional farmers are the following:

- in each country both the organic and the conventional groups are embedded into the same socio-cultural context (distortion stemming from the different local context can be minimized);

- in France and Italy both focus groups involved non-BioBio farmers beside farmers belonging to the original sample of the project, while in Hungary and Uganda only BioBio farmers took part in the focus groups (non-BioBio farmers participated in the Hungarian pilot focus group but we did not build in the results of this discussion into the comparative analysis);

- in each country both the organic and the conventional groups were moderated by the same person in the same way (distortion stemming from the different moderation technique can be minimized);

The comparative results of this focus group research are valid mainly for BioBio farmers in the four case study regions, and can be generalized to the case study areas with some restrictions (based on the typicality of farmers taking part in the focus groups). However, results that are based on group dynamics and interaction among farmers may provide important insights for focus group research in general, and for qualitative biodiversity studies in particular.

4.2. Results of the comparative analysis

4.2.1. Interpretation 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 picture representing the landscape level generated many ideas and

[11] In the Ugandan case there were some context-specific issues which required specific moderation. For instance the moderator had two supporting colleagues, one of whom was responsible for helping the participants in understanding and expressing themselves (this was atypical in the European focus groups). The mind map was also prepared in a somewhat different way: in lieu of the individual brainstorming the moderator asked the opinion of participants and wrote down their ideas. Due to socio-economic and cultural differences, some of the tasks worked differently in Uganda then in the European case studies, e.g. the photo subjects were not interpreted by farmers as it was intended.

recalled positive feelings in the ice-breaking phase (especially in the Italian and Hungarian focus groups), which suggests that people are attracted the most by the scenic view of the diverse and open horizon, but can also indicate that this picture was the most familiar to farmers. The photo representing soil and earthworms was also an important topic of discussion in the French and Hungarian groups, despite being the least favoured picture in the Italian groups. An important difference between the organic and conventional groups was that conventional farmers regarded the photos more from a rational point of view (at least in the Hungarian and French case) as they talked about the benefits of earthworms and insects or the costs caused by certain species or pests, while organic farmers had a more complex and philosophical argumentation. This was again different in the Italian case where farmers expressed feelings and attitudes rather than rational arguments for or against certain pictures. Similarly, the Ugandan participants could not easily relate the pictures to the different ways of explaining biodiversity, thus they used feelings rather than rational arguments when they talked about the pictures.[12] Therefore we can draw two interesting questions from the visual exercise, which can help us deepen and enrich the comparative analysis: 1) what is the most appropriate level of addressing biodiversity (is it really the landscape level or was it overemphasised here because of the visual character of the exercise)? and 2) do farmers use feelings or rather rational arguments when they talk about the importance of biodiversity?

4.2.1.1. Concept maps in the French focus groups

Concept maps give a graphical representation of the concepts farmers linked to biodiversity, and show clear differences among the different groups. The French concept maps are really dense and complex compared to the pictures drawn in other countries. This indicates that biodiversity is understood by participating farmers and is deeply embedded into their conceptual frameworks (because they can link it to many other aspects of life). Organic and conventional concept maps have; however, different messages (see Figure 7 for a comparison). The **organic concept map is pervaded by a strong philosophical/ethical commitment.** Here the starting point to define biodiversity was the richness of life. Ethical/social values (e.g. beauty, creativity, culture) and ecological values (equilibrium, adaptability) are attached to biodiversity. Biodiversity is often treated as a human being, which has to be respected (because of its mystery and universality). Normative aspects of the discussion referred to respect, communication and protection of biodiversity. No practicalities (e.g. direct effects of biodiversity on agriculture or vice versa) were put onto the map; and neither species nor landscape diversity was addressed directly – the map remained at a higher philosophical level. The **conventional concept map**, on the contrary, **was much more problem oriented and linked to practical issues** (mainly to farming and its local context). Species diversity was written down explicitly on the map (notes were taken such as: more trees, earthworms and bees, multitude of species etc.), and was linked to complex issues (e.g. equilibrium, sustainability, complementarity etc.) through soil. Soil (and the maintenance of soil diversity) had a special importance here (probably because some farmers practiced zero ploughing), which indicates also that biodiversity gains its significance through its direct relationship with agriculture. A considerable part of the map contains notes on human activity: especially the role of agriculture in biodiversity protection and the economic, social and policy context of agriculture (e.g. working force, administration problem, awareness) was emphasised. The map reflects a problem-oriented approach: the word “problem” appears five

[12] The overrepresentation of feelings and emotions within the argumentation can also be the effect of the visual technique we applied, because the pictures represented well-known and loved scenes from the close surroundings of the farmers. For instance in the Hungarian focus groups farmers started to talk about whose farm was on the pictures, how far is that from their own farm, how the scene changed due to the extreme weather this year etc. But this was the exact target of this exercise: to bring the topic closer to participants and to find the personal links to this issue.

times and draws a circular relationship between biodiversity → farming → contextual factors of farming → biodiversity.

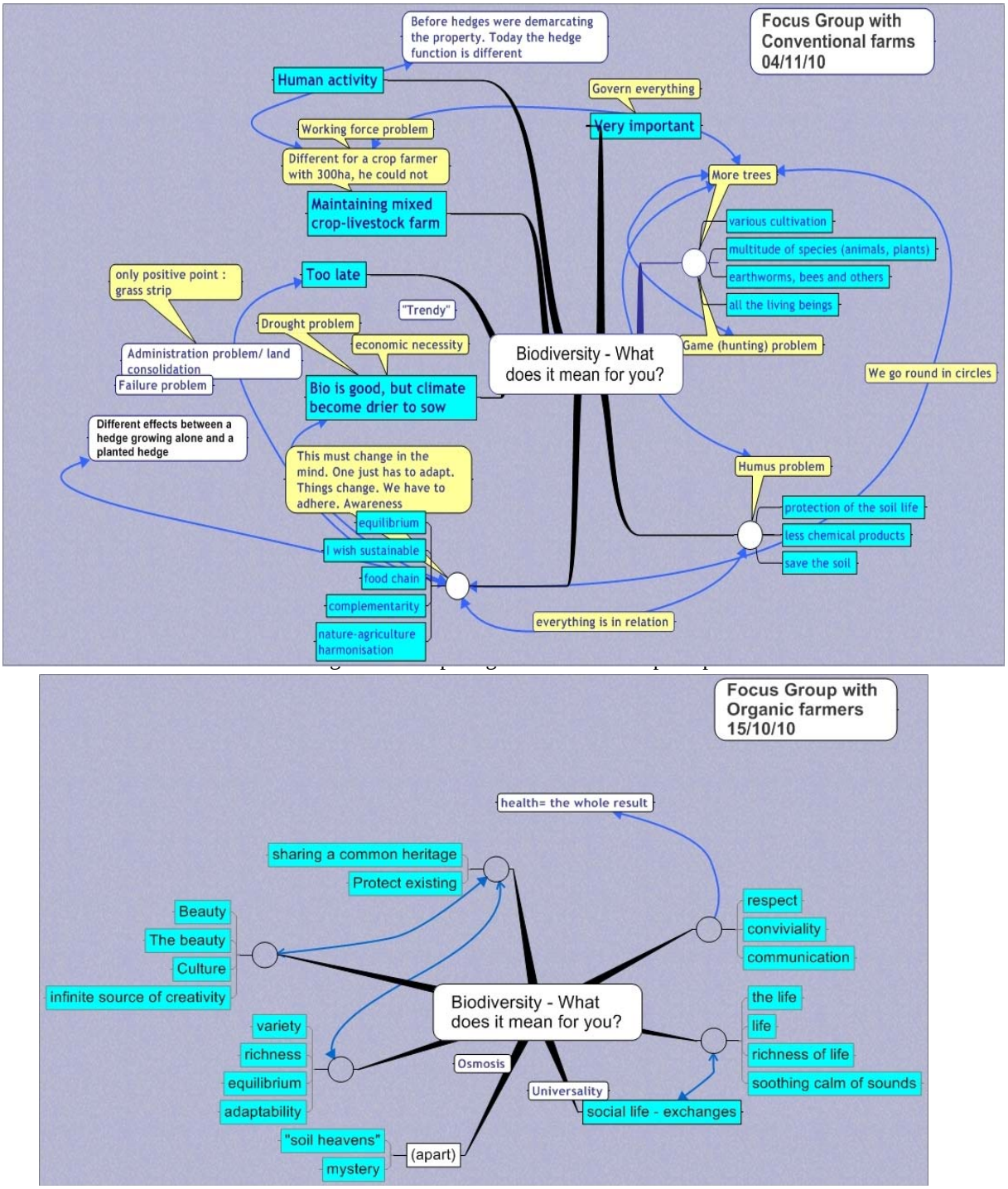
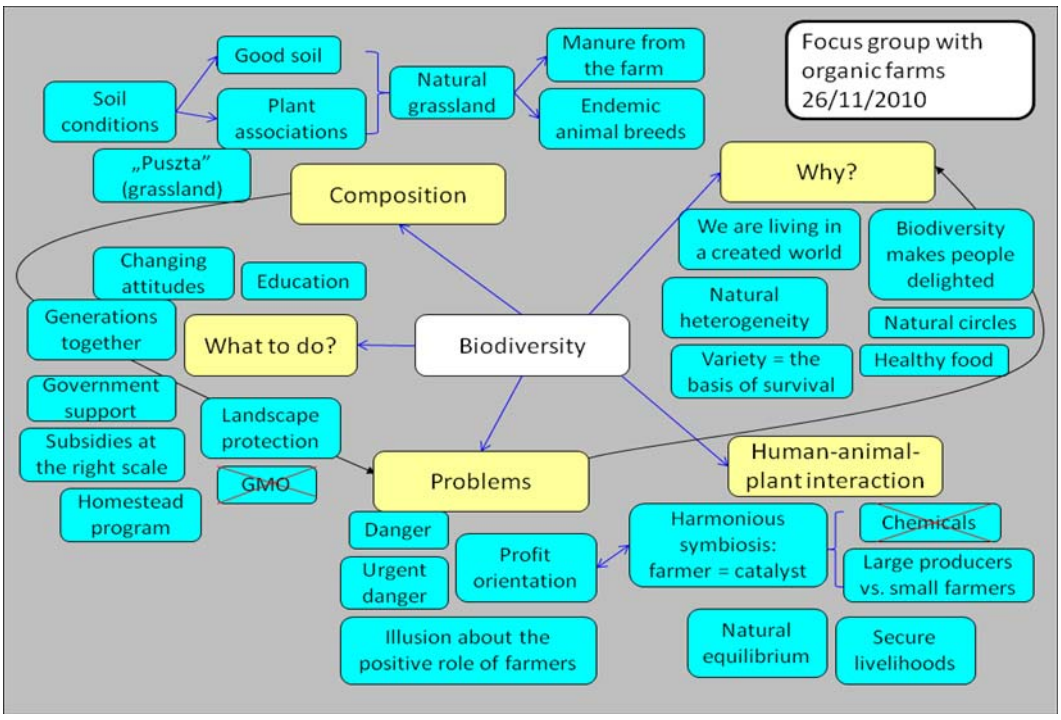


Figure 7: Comparing the French concept maps

4.2.1.2. Concept maps in the Hungarian focus groups

The Hungarian concept maps were different both in their focus and their scope (see Figure 8). Organic farmers were energized by this task and centred their notes on five main issues: the complex nature of biodiversity; how biodiversity appears; why it has a key importance; what are the problems endangering biodiversity; and what should be done to protect biodiversity. It is worth noting that in this focus group the landscape level was addressed directly – the

"puszta" (grassland) is the main geographical unit where biodiversity can be perceived – and it was linked to complexity (mutual interactions between humans, plants and animals). It is also worth noting how **philosophical and more problem oriented approaches were balanced during the discussion of organic farmers**. When they explained the importance of biodiversity, they mainly referred to ethical and philosophical reasons (e.g. the basis of surviving, natural circles, biodiversity makes people delighted, we are all living in a created world etc.) and assigned an inherent value to biodiversity. However, they were also aware of the real life problems threatening biodiversity (profit orientation, agricultural intensification), and they searched for possible solutions. This navigated the discussion into a more practical problem-solving/planning phase which triggered issues like personal responsibility, education and raising awareness in small groups, and the responsibility of policy. Conventional farmers, on the other hand, struggled with this task: it was difficult for them to link the concept of biodiversity to their general ways of thinking, partly because the whole issue was a bit unfamiliar to them (even after the moderator gave a definition of biodiversity) and partly because the setting was strange for them. They mentioned very few concepts which addressed mainly the services that can be drawn from biodiversity (e.g. pollination, decomposition, food provisioning) and the mutual interactions within nature (e.g. food network, dependency), but neither species nor landscape diversity were mentioned explicitly. They put further notes on human intervention and land use rules onto the concept map, because these have an influence on biodiversity. This suggests that **Hungarian conventional farmers had a more practical view on biodiversity and they could link the concept to their everyday life mainly through its benefits** (and the costs related to biodiversity protection).



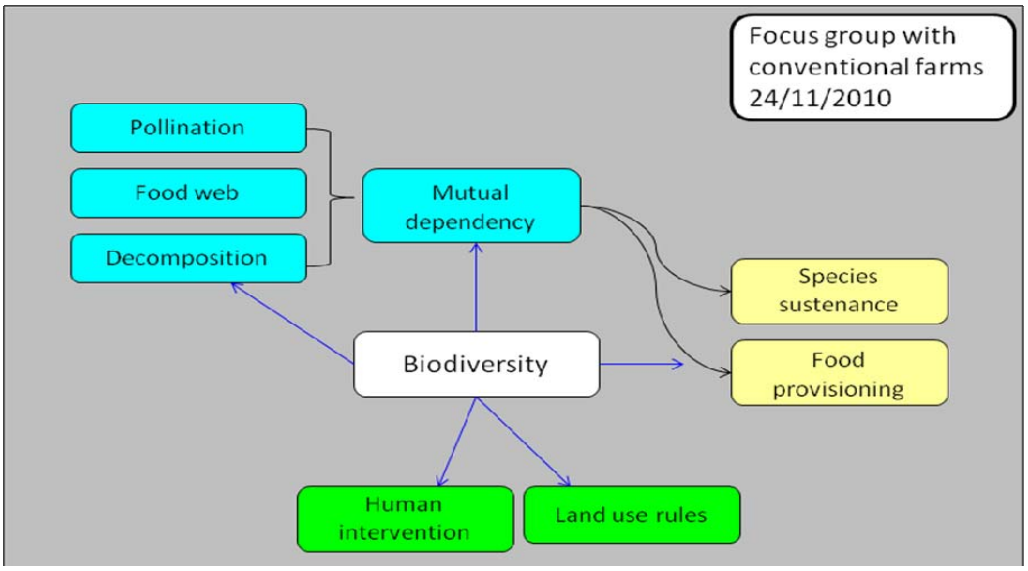


Figure 8: Comparing the Hungarian concept maps

4.2.1.3. Concept maps in the Italian focus groups

In Italy, organic farmers actively took part in the exercise and were very interested to see how the relationship between their keywords created new meanings. **Biodiversity was associated by organic farmers with life itself, and both species diversity and complexity was linked to it.** In their view a set of natural elements (water, soil, air etc.) provides the basis for the existence of wildlife, and topsoil ("humus") makes the direct connection between natural elements and wildlife. Wildlife was associated with biodiversity and was marked with richness, diversity and otherness. This latter group of concepts was associated further to the keywords "dynamic" and "equilibrium" referring to the mutual interaction within ecosystems (they continuously evolve but at the same time they stay in equilibrium), which is the key process to maintain biodiversity and life. The lower part of the picture refers to human perceptions and feelings (often rooted in spirituality). Participants expressed that the dynamic natural system affects human perception on nature and enhances our awareness. On the one hand, the increasing sensitivity and awareness leads to respect and a willingness to take care of nature. On the other hand, it helps people to perceive the complexity, harmony and beauty of nature, and improves the sense of being and the spiritual life of humans. Actions to preserve biodiversity were related to human sensitivity and curiosity. Although conventional farmers struggled with the task of interpreting biodiversity, finally they adapted a similar approach as organic farmers and linked biodiversity to life through richness, complexity and the variety of animals, plants and environments. However, it was an important difference that conventional farmers related biodiversity directly to utility and usefulness for agriculture. The relationship between biodiversity and agriculture is dual: agricultural utility provided by biodiversity justifies nature protection on the one hand, while on the other hand biodiversity contributes to human life through the value adding activity of agriculture. This indicates, that **despite conventional farmers had a complex approach to biodiversity, they interpreted the concept from a more utilitarian point of view** (emotions and feelings were addressed only by two female farmers). Figure 9 shows the comparison of the organic and conventional concept maps in Italy.

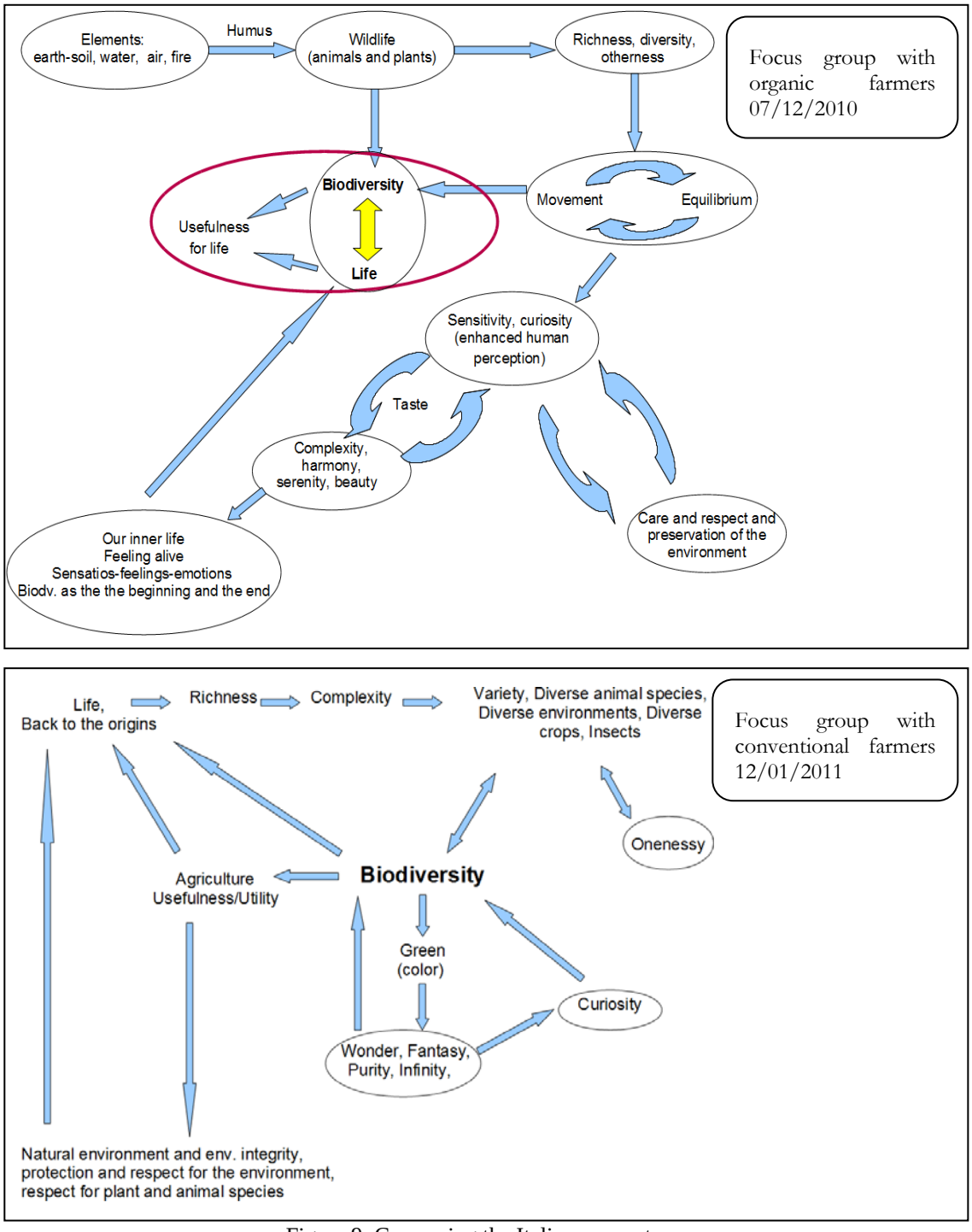
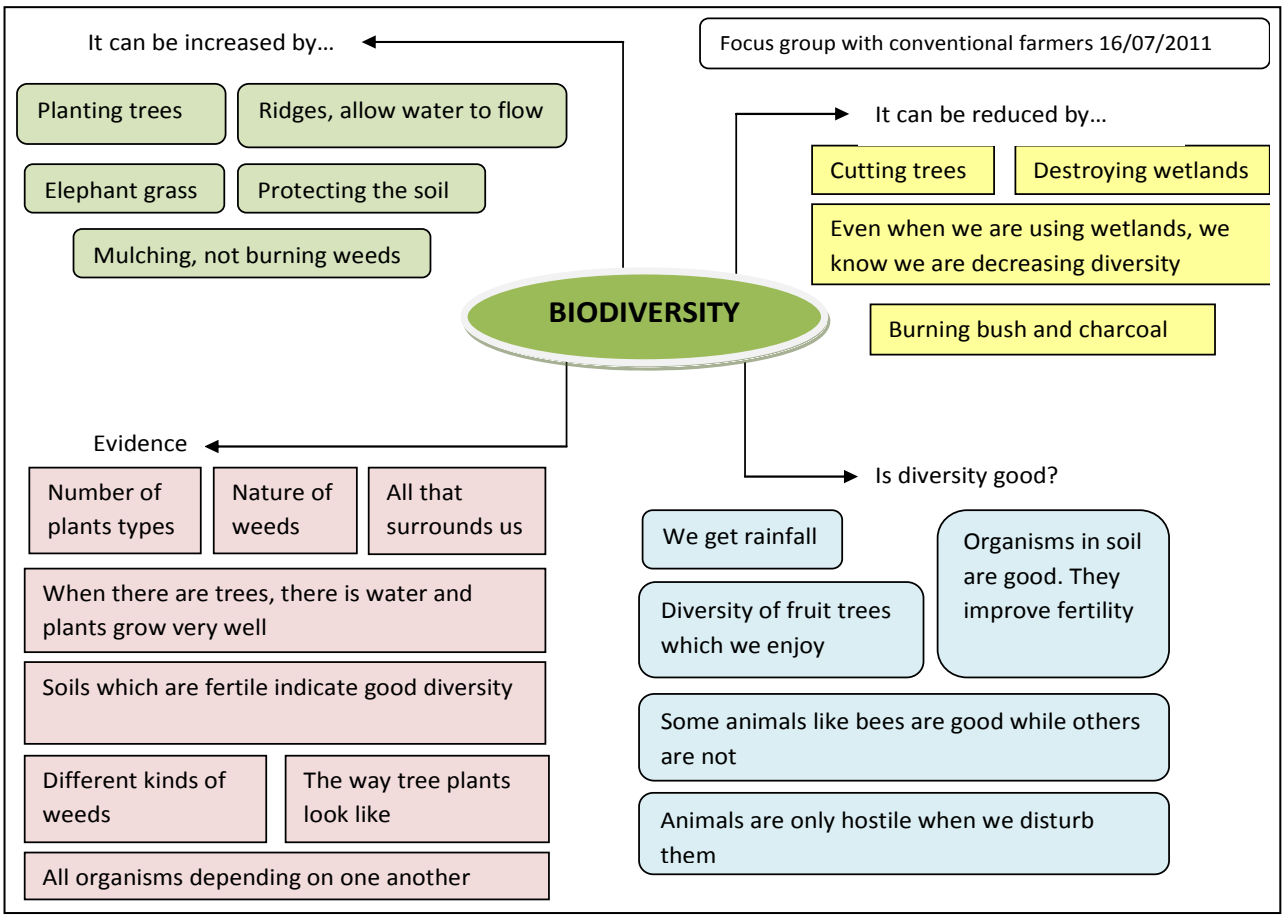


Figure 9: Comparing the Italian concept maps

4.2.1.4. Concept maps in the Ugandan focus groups

In the Ugandan case study, the construction of the concept maps was more guided, the term biodiversity could not be easily understood and literacy levels of the participants were low. When the word biodiversity was written in the centre of the chart and participants were asked to explain what they understood about it, there was no response until they were guided. The concept maps were thus constructed proposing the following discussion topics to generate responses: evidence/ indicators of biodiversity, how it can be increased, what reduces it, perceptions on diversity.



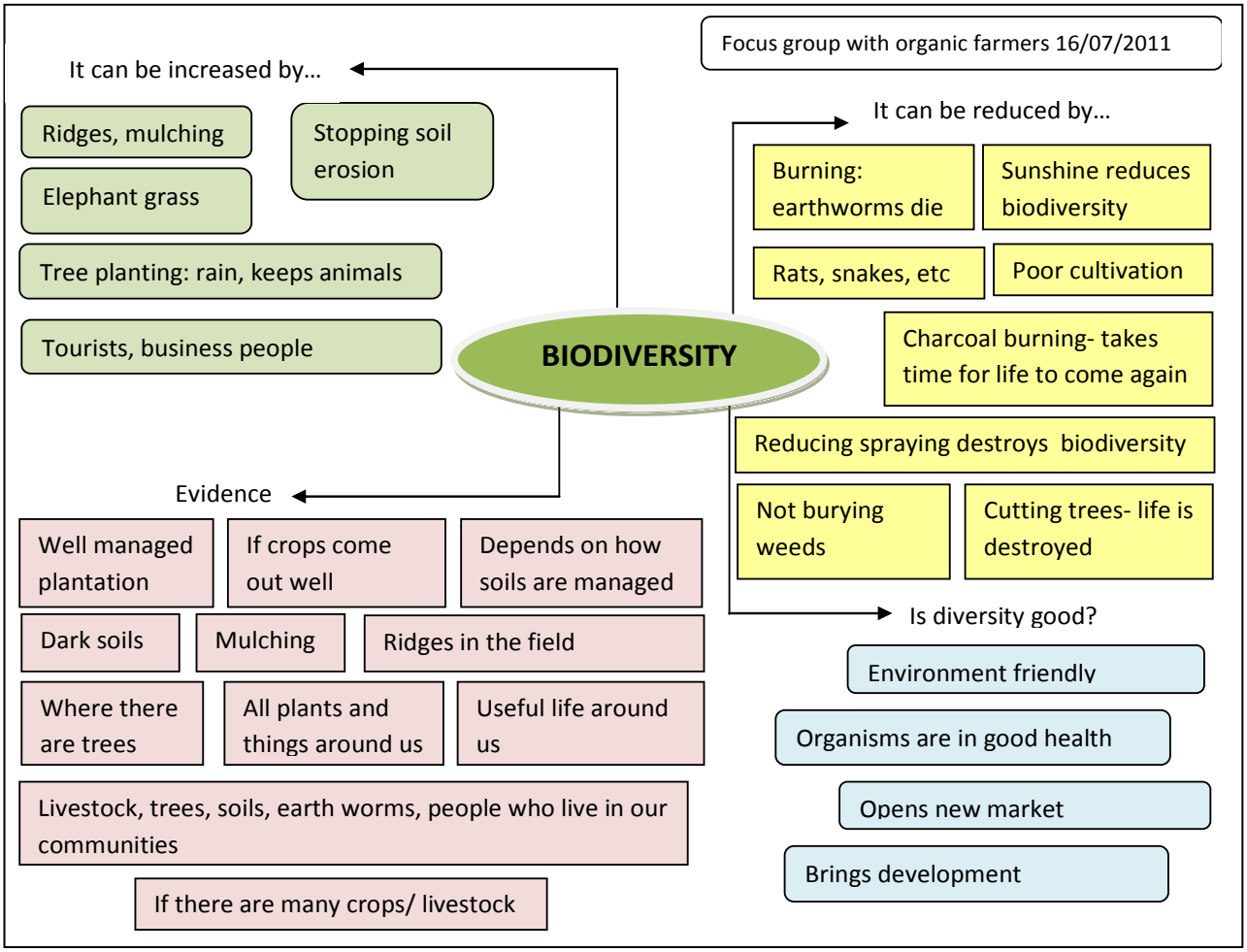


Figure 10: Comparing the Ugandan concept maps

4.2.1.5. The representation of different levels of biodiversity

We can deepen the above analysis with results from the coding agenda. Among the different manifestations of biodiversity species diversity is the most frequently addressed, but the coverage of the fragments coded by species diversity is not so high (often only really short fragments – one or two words – are 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 (if the term is unfamiliar to them). 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)

> "When there is biodiversity you will have many small animals on the farm like the red ants, wasps, spiders, termites and many bees." (UG_org)

However, it is not species diversity which means the essence of biodiversity to farmers. Especially in organic focus groups, but also in conventional groups (excepting the Ugandan focus 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 only exception is Uganda, where participants of both focus groups were much aware of the habitat diversity in the area. This was because of the natural richness and the large number different habitats that can be presented on the same plot of land. 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)
>
> "Our area is good: we have the water, the different soils which support different crops, and we can grow various crops, coffee tress, bananas and beans in the same plot." (UG_org)

Genes' diversity was the less frequent code within the manifestations of biodiversity category (for example in Uganda none of the focus groups mentioned it). 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.

Key messages:

- Biodiversity is pretty much related to the everyday life and farming practices of farmers: they often talk 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 they have personal responsibility (see more details on this issue in section 4.2.4).

- Biodiversity is sometimes transformed into the social life (it is 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.

- It is easier to conceptualize biodiversity if it can be linked to personal experiences and observations. This is why the diversity of species is an important concept if we want to describe biodiversity to farmers who are not so familiar with the scientific term.

- However, the essence of biodiversity for farmers – especially for organic farmers – is not the richness of species, but the mutual interactions within nature which form the basis of life. They do not fully understand these interactions because of being mysterious and universal, but their complexity and universality provides a strong ethical and philosophical reason for preserving biodiversity. This suggests that farmers have a rather holistic view of biodiversity.

- Organic farmers are more familiar with the term of biodiversity, while conventional farmers (at least in some focus groups) struggled with conceptualizing the term. This is reinforced by the preparatory questionnaire which found that some conventional farmers (mainly in Hungary and to a lesser extent in Italy) had no idea of what biodiversity means.

- Organic farmers are more aware of the complex nature of biodiversity and approach biodiversity from a philosophical and 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.

- Landscape and ecosystem diversity is contradictory: the visual exercise showed that the diversity of the landscape is important for farmers mainly for its beauty, but during the discussions the landscape level was related mainly to the complexity issue and was mentioned less frequently. This suggests that the landscape is regarded by farmers as the geographical scale where natural interactions happen, and where people also become a part of the natural system.

4.2.2. Attitudes towards biodiversity

After having a clear picture on how farmers conceptualize biodiversity we can turn to the attitudes they showed when they were talking about it. None of the codes related directly to biodiversity (genes, species, landscape and ecosystem diversity, complex systems, stability and ecosystem services) had a negative judgement. 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.

4.2.2.1. Different attitudes in the French focus groups

In the French organic focus group the general attitude was rather positive, even when the discussion turned to invasive species. Farmers used words such as *"respect"*, *"humility"* and *"my friend"*, which suggest that they attribute a strong non-economic, existence value to biodiversity. Thus, nothing can be thought as bad in nature – for instance, if weeds appear on the field, this signs that the farmer did something wrong (weeds are not blamed but the farmer).

> "The animals are my friends. Therefore I cannot chase them away." "Weeds are there to show us that the field lacks biodiversity." (FR_org)

Within the conventional focus group farmers tended to recognize the importance of preserving biodiversity either for its economic use value (good for farming activities) or for its ecological value, but they seemed to disagree about what exactly to preserve and how to preserve. In their view not all species are good for farming. For example conventional farmers agreed that worms are useful for the soil, but the utility of other animals (e.g. birds and rabbits which can destroy the field borders or feed on the produce etc.) raised more questions and led to a debate on the role of these species and the ability of the ecosystem to regulate their populations. Weeds were regarded as definitely bad by them.

> "To keep rabbits one has to love them." "Rabbits feed on field borders, they eat everything." (FR_conv)

4.2.2.2. Different attitudes in the Hungarian focus groups

In Hungary, organic farmers attached lots of personal feelings and memories to biodiversity, they linked it to health, beauty, freedom, tranquillity and family ties. In their perception they

are also part of nature and depend upon biodiversity (as all human beings). However, farming provides them with the possibility of influencing biodiversity either to positive or to negative directions. That is why they think that they have a strong personal responsibility in protecting biodiversity.

> "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)

Attitudes of conventional farmers were not so obvious. Since participants struggled with conceptualizing biodiversity, they linked it mainly to farming and nature conservation. Therefore, they projected the attitudes they had towards these intermediary concepts to biodiversity, and then mixed them up with the attitudes they attached to biodiversity directly. For example they linked positive adjectives to certain rare species (e.g. orchids) or to the landscape as a whole, but when we asked them about how biodiversity affects their life their first association was the negative impact of nature conservation on their farm activities (that is, all the sacrifices they are obliged to make in order to protect biodiversity). It was also characteristic that they differentiated between species according to their use value: weeds were unfavoured in all circumstances (even if a species is protected), while useful plants were favoured regardless of being protected or invasive. This blending of attitudes was typical for all the conventional farmers; none of them had conflicting attitudes with the others.

> "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)

4.2.2.3. Different attitudes in the Italian focus groups

Italian organic and conventional farmers show fewer differences in their attitudes. Both groups acknowledged that biodiversity has to be preserved even if biodiversity sometimes represents a challenge for farming. Arguments for protecting biodiversity were the respect of nature because of the existence value of traditional domestic species and the aesthetics of the diverse environment (addressed mainly in the organic groups), the goods and services provided by biodiversity to humans (the direct utility derived from biodiversity through agriculture mainly from the point of view of conventional farmers), and the negative changes within biodiversity which threatens the health of agro-ecosystems and the viability of farming. Positive feelings and emotions were attached to landscape diversity, which echoes the importance of ethical and social values of biodiversity. However, it is worth noting that the attitudes towards biodiversity often appeared closely related to human actions, namely to biodiversity protection. While organic farmers addressed here more general issues (awareness of consumers and policy makers), conventional farmers focussed on agricultural practices (namely on the compromise between yields/costs and biodiversity protection). In this respect the Italian results show some similarities with the Hungarian experiences, although it is important to recognise that Hungarian conventional farmers regarded biodiversity protection as a must (an obligatory sacrifice), while Italian farmers expressed their respect and acknowledgement to biodiversity through their commitment to preserve biodiversity (although protecting biodiversity is also a question of costs and benefits for them).

> "I see biodiversity in a positive way, even the day to day confrontation with the problems related to biodiversity. For instance the birds that eat the grapes in your vineyards and the hives in your vineyards are still pleasant things. (…) That forces you to improve your management skills." (IT_org)
>
> "I see biodiversity as the possibility of nature to grow in all the possible ways. In my place, I get surprised to see in which incredible places species can growth. I get very surprised and

wondered…" "Certainly there is a feeling for the landscape. (…) Often we search for that, at least, that's for me." (IT_conv)

4.2.2.4. Different attitudes in the Ugandan focus groups

In Uganda, both organic and conventional focus group participants had a positive attitude toward biodiversity. Everybody started his argument with the expression 'it is good', and later followed by a 'but' for those who had a point on it being negative. There was a lot more response from the organic group which expressed positive attitude on biodiversity; and organic farmers seemed to wholesomely appreciate biodiversity as good without thinking about it critically. Even those organic farmers who chose to become organic due to market factors, have moved on to appreciate the value of biodiversity especially in maintaining decomposers in the soil. Both groups, however, pointed out that some species are important while other species are a nuisance. An example given was the ants. Whereas some ants decompose the organic matter, others destroy crops, are disease vectors or keep biting farmers when they work in their gardens harvesting coffee and pineapples.

"Biodiversity gives us life. We want it but it also wants us." (UG_org)
"From what we can see, biodiversity adds life to our gardens and increases our income." (UG_org)
"If there is more diversity, crops grow well and even us people, we do not get many diseases." (UG_org)
"Some ants are important but some are a nuisance. Some help our crops to grow while others destroy them." (UG_conv)
"Biodiversity improves soil fertility as each plant and animal improves soil fertility in one way or another." (UG_conv)
"We know if there are many weeds, the soil is good. But weeds choke our crops and it is hard to pick them by hand; that's why we spray them." (UG_conv)

Key messages:

- Farmers in general had positive attitudes towards biodiversity. Biodiversity was often linked to personal feelings, emotions and memories, and talking about these personal impressions was usually a pleasure for farmers. Rational arguments appeared more frequently when farmers discussed the links between farm management and biodiversity protection.
- 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.
- 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).
- 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.

4.2.3. Benefits and beneficiaries of biodiversity

As the main part of the valuation process we analysed the value of biodiversity from two points of view: the type of values assigned to biodiversity by farmers, and the range of beneficiaries who enjoy the different values of biodiversity.[13]

4.2.3.1. Ethical and social values

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 six 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. The only exception is Uganda, where ethical and social aspects were not really frequent (in the conventional it was the 10th most frequent code, in the organic group it gained the 8th rank). Moreover, in Uganda the ethical values were linked mainly to crop productivity and fertile soils, and not directly to biodiversity. 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)
  "The world would be very strange without biodiversity, it would be grey." (HU_conv)
  "Smells of flowers call our senses." (FR_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)
  "We like our area because we have different crops and trees, and crops and our land looks green all through." (UG_org)
  "Flowers are nice to look at. They make the environment nice" (UG_conv)

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

  "This is a whole lifestyle, a life with more freedom, with more tranquillity. We can sleep at open windows." (HU_org)
  "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)
  "Biodiversity is good because it improves the health of the people because of medicine we get from plants" (UG_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)

[13] We use the term „values of biodiversity" to refer to different value components attributed to biodiversity by farmers. Biodiversity can be valuable not only because it provides direct or indirect benefits (e.g. ecosystem services, income, spiritual well-being etc.) to people, but also because it has an inherent value (existence value, ecological value). Thus the term value is used here as a broad and general category to define why biodiversity is important and worth being protected, while the word benefit is used to express the values attached to biodiversity on a more utilitarian basis.

"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)
"Monkeys are disappearing and our grand children may not see them" (UG_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:

"I don't mind these flowers. There is enough place on the grassland for them too." (HU_conv)
"Nature and I have to work together." "I see Nature like a living person." (FR_org)
"We should preserve also the domesticated varieties, plants and animals; we should aim at creating a "Noah's ark" effect." (IT_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)
"It can be good if we are taught how to replace the diversity we have lost" (UG_org)

4.2.3.2. Ecological value

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, and rarely in the Ugandan 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.

"Diversity is necessary to have photosynthesis and to feed the soil." (FR_org)
"All species are useful to some extent. Perhaps it is not useful for me, but it can be important for another insect or a flower." (HU_conv)
"Biodiversity is the key for the survival of the landscape and also of humans. This is true for individuals, for countries, for the whole global World." (HU_org)
"All the organisms, big or small, need each other to live." (UG_conv)

4.2.3.3. Economic value

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)
"Biodiversity is good because it brings development as it opens up new markets" (UG_org)

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). In the Hungarian conventional focus group farmers talked a lot about this aspect. Their discussion reinforced that the most valued species/components of biodiversity are those which can be used directly in the farm, these are followed by species providing indirect benefits (ecosystem services) which are not monetized, then those species come which caused neither benefits nor harms, while species causing damage to the farm are the less favoured.

> "The grassland is valuable because the cattle can suffice. The composition of the grassland is good, because the cattle like it." (HU_conv)
> "Biodiversity improves soil fertility as each plant and organism improves soil in one way or another. It also ensures food security as each crop is harvested at different time of the year thus having food all the year round." (UG_conv)
> "We should earn huge revenue from 500 hectares of grassland, but we cannot talk about it." (HU_org)
> "I have to think of operational costs all the time." "Yields are lower (if alternative practices are used)." (FR_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)
> "I cannot have small fields because these cost more in fuels and chemicals." "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 in Europe organic farmers value biodiversity mainly for its ethical and social value, while conventional farmers refer to economic benefits more frequently (Ugandan focus groups show a different pattern, thus they are analysed separately according to this aspect). 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. This point of view appeared clearly when farmers underscored the "utility" of invasive species. 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 European 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.

In the Uganda case study, on the other hand, the organic focus group mainly related the economic value to the benefits of farming organically or to having various crop types which diversifies the household income source. With the organic principles of not using fertilizers and chemicals, farmers argued that more diversity is supported and they as well get market for their produce that is produced organically. Another indirect argument on the economic value was the improvement of the soil fertility brought about by the numerous fauna and flora which eventually supports crop production and hence increased household income. Tourism was also mentioned as a direct economic benefit of maintaining biodiversity. The conventional group had limited response on this but they as well pointed out that biodiversity encourages various crops being planted which diversifies the household's income sources and

they as well mentioned that biodiversity improves the soil which supports crop production and thus higher output and incomes.

4.2.3.4. Beneficiaries of biodiversity

It is not surprising that the economic benefits and costs related to biodiversity were mainly accounted at the farm level – these are the values which are experienced most directly by individual farmers. Aesthetic values (the enjoyment of the beauty of biodiversity) also appear at the individual level. Although farmers do not seem really conscious, they recall personal memories and feelings when they talk about this value aspect, which means that they themselves enjoy these benefits of biodiversity. When farmers talk about the local community as potential beneficiaries of biodiversity they often show negative attitudes. In most groups farmers agreed (regardless of being organic or conventional) that the members of the local community are not really aware of biodiversity, indeed, sometimes they laughed at farmers because of practicing alternative ways of farming.

> "Sometimes the people living here don't realize that they are living in a fairy garden." (HU_org)
> "… (T)hose who say that my fields are dirty." (FR_org)
> "My father thinks that I was crazy when I stopped corn." (FR_conv)

Broader community and the global society appeared as beneficiaries of biodiversity only in those focus groups where ethical and social values as well as ecologic values were overrepresented. This means that those farmers (mainly the organic ones) who have a philosophical approach to biodiversity are more aware of its global and long term significance (the intra- and intergenerational aspects of biodiversity protection). In the Ugandan focus groups, for instance, global aspects were almost never mentioned. Most of the responses pointed to the individual farmers being the beneficiaries of biodiversity. Little was mentioned about its value on the broader community or globalization except the organic group which mentioned its importance to research.

> "This will become more and more important as cities are growing. We have to maintain the escape routes where people from the cities can have a rest." (HU_org)
> Organic agriculture is like alternative medicine for the World." (FR_org)

Key messages

- Ethical and social values of biodiversity seem to be an important aspect when farmers talk about the benefits provided by biodiversity; this was the third globally most frequent code in the focus groups. Aesthetic value, value attached to the lifestyle or life philosophy, bequest value and existence value is mentioned by farmers. Ethical values are attributed to species diversity and the heterogeneity of the landscape but also to the complex systems view on biodiversity.

- Ecological values are mentioned less frequently and are mainly linked to the complex systems approach of biodiversity.

- Economic values are related to biodiversity in a more indirect way: economic benefits and costs are important factors in farm management decisions, and biodiversity has an impact on both the benefits and the costs. Farmers tend to value biodiversity by comparing its contribution to the costs and benefits of farming, because farming is the key source of their livelihood. Thus sometimes they are forced to make a compromise between biodiversity protection and economic viability.

- The cost-benefit approach to biodiversity is often in contradiction with the ethical and social values approach. Farmers may respect biodiversity and attribute an existing value to

it; while at the same time they should take into consideration the economic viability of farming. This may cause a cognitive dissonance, which is resolved either by blaming the contextual factors of farming or by searching for further actions to protect biodiversity.

- Benefits (and costs) of biodiversity are more easily observable at the individual (farm) level and the community level. The broader community and the global society appear among beneficiaries only in those focus groups where ethical and ecological values surpass economic values.

- Organic and conventional focus groups are different if we compare the dominant approach of farmers towards the value of biodiversity. In the European focus groups organic farmers tend to respect biodiversity because of its ethical and social values, while conventional farmers use economic reasoning more frequently. There is a group of farmers in the middle – those who are conventional because they miss the certificate but run an (almost) organic farm in reality – whose perceptions are closer to organic farmers than to true conventional farmers. In Uganda, however, organic farmers mentioned the economic values more frequently, while conventional farmers were less aware of this aspect of biodiversity. This may indicate that Ugandan organic farmers have a more market-oriented approach to farming than conventional farmers, whose farming activity is rooted mainly in self-subsistence.

4.2.4. 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, and in some focus groups farmers already estimated the decline of biodiversity going on recently (e.g. in Uganda, organic farmers estimated that biodiversity could have been reduced by 45% in the past few years). 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. In the Ugandan focus groups, for example, the decline in biodiversity was related to the use of chemicals, burning, wetland reclamation, but also to weather changes (season changes, prolonged drought, and floods). 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.[14] Beside agricultural intensification invasive species and market processes were mentioned relatively frequently in the focus groups. In Europe, market processes were accused for biodiversity loss due to growing intensification and the extension of monocultures, while in Uganda, external market forces were seen as important factors to promote organic production systems which were strongly related (often directly linked) to high biodiversity. It is worth noting in the European cases 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 (personal responsibility in the expansion of weeds was addressed mainly in the French organic focus group). Other threatening factors, such as the effects of

[14] As the role of farmers was debated in the focus groups in relation to agricultural intensification, we will discuss this issue below in more details.

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 (excepting the Ugandan case). 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. For instance in the Ugandan conventional focus groups farmers pointed out that the use chemicals is not good for biodiversity, and although chemical use increases the costs of production, they are forced to use chemicals and fertilizers to ease family labour.

> "Farming has a positive effect on nature. For example cattle gnaw the weeds, it eats even ambrosia." (HU_conv)
> "I just sew with mixed grass species." "We don't use chemicals." (FR_org)
> "To be organic helps to preserve biodiversity." "By halting the use of agrochemicals, we favour biodiversity." (IT_org)
> "We need to preserve biodiversity by reducing use of chemicals like inorganic fertilizers, herbicides, and pesticides because even those who make these chemicals no longer want to eat crops on which such chemicals are used." (UG_conv)
> "The natural pesticides used by organic farmers can harm biodiversity." (IT_conv)

Farmers often thought that there is a huge divide between them and intensive agricultural producers. Especially in organic focus groups outsider farmers who run conventional (intensive) farms were seen as threatening biodiversity, while participating farmers saw their role more positive. For instance in the French organic focus group no conflicts were detected within the group, but there were some violent critics regarding intensive agriculture. The difference seemed to be unreconcilable between the two worlds, as it has to do with one's values and deep understanding of the world. In the Hungarian organic focus group participants stigmatized intensive producers also by name.

> "They should not be called farmer but industrial producer. They are not farmers, they belong to another category. It is completely useless to talk to them about biodiversity. They should be tackled in a completely different way." (HU_org)
> "In the past there was a very intensive agriculture. Nothing grows anymore on these fields." (FR_org)

However, there were a few farmers in almost all of the groups who brought some self-reflection into the discussion and raised the direct personal responsibility of farmers in the loss of biodiversity. In conventional focus groups farmers tended to recognize that some of their practices did harm nature, although they also emphasised that market processes or other disfavouring contextual factors (e.g. agricultural education) forced them towards this direction.

> "I have to use agrochemicals, because I need to get a product of good quality." "I have to control the pests and insects, and this affects biodiversity." (IT_conv)

> "We didn't learn alternative practices in agricultural institutes. We learnt about agriculture but not about agronomy." (FR_conv)
> "I feel very uncomfortable with our practices: one says something today and will do other things tomorrow, just to show off." (FR_conv)

Hungarian conventional farmers seem to be the exceptions, because they could not see significant differences between the effects of low-input and intensive agriculture on biodiversity, thus they would run more intensive farms if they would be able to do that. However, even in this group one of the farmers stated that nature would function perfectly without the interventions of farmers, and that negative natural processes were often induced by humans.

> "Where the state cooperative used fertilizers in the past and overgrazed the land, now there is enormous amount of orchids." "We are doing extensive agriculture because we cannot afford pesticides and fertilizers." (HU_conv)
> "Nature is made very well (…) it works perfectly without humans. Humans are the ones who can ruin this system. – But we have to intervene, for example in the case of weeds! – Yes, but weeds were brought in by us. Neither asclepias, nor ambrosia came here alone, but humans brought them. It is the human being who intervened and caused the problems." (HU_conv)

It is remarkable that even organic farmers, who have a strong philosophical intention and try to take care about biodiversity as much as they can, are aware of the uncertainty about the effects of their farming activity.

> "I had the illusion that the extensive farming – that I undergraze the grassland – does not harm nature. I had the illusion that what I am doing is good, until Karcsi (a botanist colleague in BioBio) came and explored my fields. We hedged earlier some small plots, where nobody, no humans no animals can enter. And botanists were exulting when saw these parts. Grey cattle, horse, sheep are of no avail. We are harmful enough with these practices, if we compare our plots with the untouched areas." (HU_org)

This shows a great openness and self-reflectivity, but probably has its roots in the personal background of farmers and does not show a general societal change of getting more aware of the impact we have on nature. Nevertheless, this self-reflection helped farmers to express their ideas about the things to do to preserve biodiversity.

European 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 (Ugandan farmers emphasised only this aspect, that is, certain farming practices such as mulching, establishing hedge rows, stopping bush and charcoal burning etc. can enhance biodiversity). 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.

> "This topic is quite large and should be made public." (IT_conv)
> "We would need training on the life in the soil." (FR_conv)
> "We have to organize trainings in ecology for farmers." (FR_org)
> "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.

Key messages:

- Farmers realized mainly those threats to biodiversity which can be controlled by them or which influence them directly. The most important threat was thus agricultural intensification, which was followed by invasive species and market effects. Global processes such as climate change and population growth seemed much less visible at the local level, excepting Uganda, where climate change was directly addressed.

- Both organic and conventional farmers thought that they have an important role in biodiversity protection, because their farm management practices have a strong influence on nature. Farmers in general regarded their activities as rather favouring biodiversity even if they admitted that some of their practices can harm nature.

- Mostly intensified agriculture was blamed for the loss of biodiversity. Participating farmers – and especially organic farmers – clearly distinguished themselves from "industrial producers" who degrade the natural environment. Participating farmers affirmed that the use of less environmentally friendly practices is usually due to external factors (e.g. market mechanism). This reinforces the cognitive dissonance hypothesis for the European focus groups, but not applicable for the Ugandan results.

- In both organic and conventional focus groups there were some farmers who brought into the discussion self-reflectivity. This helped the groups to think more on the possibilities of biodiversity protection.

- Both individual and community responsibility were addressed in the discussions, and actions were urged such as education, awareness raising, discussion with other farmers and showing good example, etc. However, present-day policy was criticised in most of the focus groups for its failure of protecting biodiversity effectively.

5. Conclusion

5.1. Reviewing the initial hypotheses

Hypothesis 1: There are no significant differences between the farmers' understanding of biodiversity and the scientifically based definition of biodiversity.

The first hypothesis 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 (often philosophical and spiritual) approach which lacks certain aspects of the scientific interpretation.

Farmers taking part in our research show an understanding of biodiversity similar to scientists when they define biodiversity through the diversity of habitats and species, although there are more differences when they refer to the notion of complex systems. They frequently mention the richness and diversity of species when they are asked about biodiversity, and often link these issues to their personal observations and experiences. This indicates that species diversity is easily understandable because it is the most visible form of biodiversity. Habitats or ecosystem diversity is addressed a bit less frequently and is related to the heterogeneity of the local landscape and the variability of environmental elements (such as soil types, relief, climate etc.), which are again perceived and directly experienced at the personal level. The complex system approach, on the other hand, builds upon the philosophical and spiritual standpoint of focus group participants, and reflects a strong value commitment (biodiversity has an existence value). Biodiversity is seen essential for human life (biodiversity and life are often synonyms in the focus groups) and is linked to nature in a rather general way without conceptualizing the exact relationships or processes within nature – rather it is mystified and explained in philosophical terms. Another significant difference between the farmers' understanding of biodiversity and the scientifically based definition of biodiversity is that focus groups participants hardly mention genetic diversity. In the Hungarian focus group genetic diversity was mentioned only in relation to the variety of local breeds, while in France, even when farmers talked about the "infinite small", they had in mind small animals such as worms and bees. This indicates that the less visible part of biodiversity is the most unknown by farmers. Finally, we have to admit that there was a significant group of farmers who struggled with conceptualizing biodiversity and could not link the term easily to their everyday life or farming, even when they were provided with a scientifically based definition by the moderator. This suggests that for those who were not familiar with the term earlier it takes time to understand and embed the concept of biodiversity into their everyday thinking and practice.

The fact that our focus groups could not reinforce the first hypothesis has a general message which is valid beyond the scale of our case study research. Farmers are heterogeneous in their knowledge and belief system even within small case study areas. If the interpretations of biodiversity differ within our sample due to the differences in knowledge and philosophical/spiritual background, the differences may grow at larger geographical scales. This means that we should not assume that farmers have the same interpretation of biodiversity (or nature) within one country or across and beyond Europe, and warns us that standardized valuation methods that build upon a unified concept of biodiversity may fail to address the heterogeneous approaches farmers have towards nature and biodiversity.

Hypothesis 2: Organic farmers have a more complex understanding (more solid knowledge) of biodiversity than conventional farmers.

The second hypothesis can be partly reinforced by the focus group research. Organic farmers within our sample tended to have a complex and philosophical 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.

In France, organic farmers referred to complex systems and life support when they talked about biodiversity in the focus groups, and attributed ecological and ethical/social values to it. Conventional farmers were, however, divided into two groups. Some conventional farmers have adopted alternative practices, such as zero-ploughing, direct sowing and cover cropping,

not only for economic reasons, but also because they care about the impact of their practices on the environment. These farmers may share the same interpretation of biodiversity as organic farmers. On the other hand, a few participants within the conventional focus group were pure intensive farmers, who acknowledged the utility of biodiversity for their agricultural activity. They might have a simpler understanding of biodiversity in the sense that they perceived biodiversity only as a production support and only from a cost-benefit point of view. In Hungary, organic farmers seemed to know more about natural processes and had an own understanding on biodiversity. They talked about biodiversity in a holistic way and attached this concept to several aspects of their life (not only farming but family, health etc.). Conventional farmers, on the contrary, had problems with conceptualizing biodiversity which refers to certain lack of knowledge. Moreover, there was a clear difference between their attitudes: while organic farmers had an inherently positive attitude to biodiversity, conventional farmers linked biodiversity to nature protection which recalled bad memories and gave a negative connotation to the word in several parts of the discussion. In Italy, organic farmers seemed again to have a complex and holistic understanding of biodiversity, which is related closely to spiritual well-being and self-awareness. Conventional farmers also admitted that biodiversity is important to protect, although they regarded biodiversity mostly through the lenses of farming and acknowledged the utility of biodiversity from the point of view of their agricultural activities. In addition, some of the conventional farmers did not know what this term means exactly, and suffered with the concept mapping exercise. In Uganda, neither organic nor conventional farmers could easily understand and use the term biodiversity. However, organic farmers addressed much frequently the decrease of biodiversity and the agricultural methods and practices that can be used to halt the loss of biodiversity. Conventional farmers themselves related biodiversity to organic farming indicating that harmful farming practices and biodiversity is in contradiction.

Our findings reinforced that there are significant differences among farmers' knowledge and understanding of biodiversity; however, these differences cannot be fully explained by the organic and conventional divide. Other factors, such as the type and intensity of farming, the socio-economic and administrative-political context of farming, the educational level and age of farmers may influence whether farmers apply a more philosophical or a more rational point of view of biodiversity. Our sampling may also have an effect on these results, because farmers taking part in the BioBio project may be more familiar with the concept and may be willing to "meet the requirements of the scientists" (that is, they may attribute more value to biodiversity because of the normative effect of the research). Nevertheless, our results suggest that farmers have competing interpretations of biodiversity – a more philosophical interpretation and a more rational/utilitarian one – which can be partly traced back to the differences in their belief systems and therefore seems to be incommensurable. Further research is needed to understand how these competing interpretations evolve and influence the farming activity and everyday life of farmers.

Hypothesis 3: During the discussions, it is possible to develop a common understanding – acceptable for both farmers and scientists – of biodiversity.

The third hypothesis cannot be fully tested based on our results, mainly because of the lack of data. The analysis suggests that the majority of farmers enjoyed the joint conceptualizing exercise and were interested to see how a more complex picture emerged from the concept maps. However, some focus groups showed also that differences in the personal background of farmers (either in their philosophical commitment or in their educational level) may hinder the development of a common understanding of biodiversity.

The third hypothesis could have been tested by comparing the results of the preparatory questionnaire (especially the third question about the personal understanding of biodiversity)

and the concept maps. If there were significant improvements in the complexity of understandings developed in the focus groups comparing to the individual interpretations, we could say that group discussions led to collective learning. However, due to the mixed sampling procedure (running the questionnaires with BioBio farmers but inviting farmers to focus groups beyond the project sample) there is a mismatch between the two samples of farmers which makes the comparison useless. Nevertheless, group dynamics within focus groups provides some hints about the learning processes among farmers. The French focus groups showed that three groups of farmers can be distinguished (as described above: pure organic farmers with philosophical approaches, conventional farmers with great sensitivity to environmental issues, and pure conventional farmers). Organic farmers and progressive conventional farmers share rather similar ideas about biodiversity, while the approach of pure conventional farmers is significantly different. Because the difference in their understanding of biodiversity goes beyond their preferences and refers to their belief and value system, the development of a common understanding seems almost impossible among them. The Hungarian conventional focus group provides another example for the limitations of the joint conceptualization of biodiversity. In case of conventional farmers the concept of biodiversity seemed too abstract to be used as a working concept that is able to structure the thinking of participants. Thus, not only enhancing their knowledge, but even discussing the topic was a difficult task to carry out in the focus groups. Ugandan focus groups showed also a similar situation. On the other hand, organic focus groups in each country showed that participating farmers are enthusiastic in sharing ideas and creating a common understanding of biodiversity.

Based on our experiences, we can assume that collective learning and the development of a common understanding is easier if farmers share the same philosophical background, and if the concept under discussion is familiar to participants. If these requirements are not met, not only learning, but even discussion may become difficult. This also underlines the importance of proper sampling and creating as much homogeneous groups as possible when one conducts a focus group study. Further research is needed to reinforce that focus groups provide adequate opportunities for collective learning on biodiversity.

Hypothesis 4: Conventional farmers acknowledge more those benefits of biodiversity which can be realized in monetary terms (economic benefits), while organic farmers acknowledge more the indirect (non economic) benefits of biodiversity.

The fourth hypothesis has to be rejected. 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. The Ugandan results suggest further that market orientation of famers may also have an influence on how they appreciate the economic values of biodiversity.

Ethical and social values were attributed to biodiversity in each focus group, regardless of whether the participants were organic or conventional farmers (this code was the third most frequent code globally, and was among the top six codes in each focus group excepting Uganda). This shows that farmers respect biodiversity not only from a utilitarian point of view (because it is useful for their farm), but also because biodiversity is beautiful and because living organisms have a right to live. Ethical/social values and ecological values were often linked when farmers expressed that biodiversity is important because it is essential for human life and for all forms of living on Earth. This indicates that the concept of biodiversity is part of a holistic view participating farmers developed concerning the complex relationship between nature and society. Beside ethical/social values and ecological values, economic

values were also frequently mentioned in the focus groups, especially in conventional focus groups. Economic values were linked to biodiversity in a rather indirect way: economic benefits and costs are important factors in farm management decisions, and biodiversity has an impact on both the benefits and the costs. Farmers tend to value biodiversity economically by comparing its contribution to the costs and benefits of farming, because farming is the key source of their livelihood. The cost-benefit approach to biodiversity is often in contradiction with the ethical and social values approach (farmers directly acknowledge this when they refer to the compromise between protecting biodiversity and the economics of their farm). Farmers may respect biodiversity and attribute an existing value to it; while at the same time they take into consideration the economic viability of farming. This may cause a cognitive dissonance, which is resolved either by blaming the contextual factors of farming or by searching for further actions to protect biodiversity. We could observe two main differences between organic and conventional focus groups: 1) in conventional focus groups farmers spent more time on discussing the costs and benefits of adopting environmentally friendly practices, and 2) biodiversity was rather seen by conventional farmers as having also negative effects, while in organic focus groups the existence value and the positive effects of biodiversity were put forward. The general approach of farmers to biodiversity (more philosophical versus more utilitarian) had a strong influence on their valuation, as observed in the French focus groups. Those farmers who had a more utilitarian approach to biodiversity tended to realize more the economic benefits provided by biodiversity, while those who had a more philosophical/emotional view attributed rather ethical/social value and ecological value to biodiversity.

Analyzing the validity of the above statements, we have to admit that the overrepresentation of ethical and social values may be influenced by the sampling and the chosen method; that is, participating at the BioBio project from the beginning may foster the farmers to discuss more holistic issues on the focus groups. Moreover, there were slight differences across countries concerning the importance of monetary values. For instance, in Italy and Uganda both focus groups addressed the economic side of pro-biodiversity farming and mentioned biodiversity as a nuisance in farming, and also Hungarian organic farmers discussed biodiversity in relation to the viability of farming. This suggests that external factors – such as the type of farming (in vineries it is more difficult to fight against pests), the general economic situation within the case study area (the low income level may force farmers to produce cheaper and more intensive products), and the market orientation of farmers – could have a strong influence on the range of values farmers attribute to biodiversity. The Ugandan case reinforce this context-dependency: here organic farmers put relatively large emphasis on the economic values and both groups pointed out that market processes help organic farming and therefore the preservation of biodiversity. This is, however, can be traced back to the fact that in Uganda organic farmers are more market oriented (they produce for European markets and have a better income situation) than conventional ones (whose farming activity stems from self-subsistence farming).

Hypothesis 5: The more local the level of assessment is, the more benefits of biodiversity participants can perceive.

The fifth hypothesis seems to be roughly reinforced by the results of the analysis, although some diverging patterns can also be found. 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.

The focus group results reinforced that benefits (and costs) of biodiversity are more easily observable at the individual (farm) level and the community level. The broader community and the global society appear among beneficiaries only in those focus groups where ethical and ecological values surpass economic values. This observation is in line with the perceptions on the threats to biodiversity. Global threats, such as climate change and population growth, where hardly mentioned by focus group participants when they talked about the state of biodiversity, they rather focused on those threats which they could influence or which had a direct impact on their farm. This suggests that biodiversity is perceived mainly at the local level, where personal observations and experiences help farmers to assess and adapt to the ongoing ecological changes. Opening towards the global role of biodiversity needs a strong value commitment and perhaps a higher level of education.

Table 3: Summarizing the key findings of the research

Hypothesis	Answer	Explanation
H1 about having no differences in the perceptions of farmers and scientists.	Rejected.	Farmers most frequently address species and habitat diversity. Complexity is an important component of the meaning of biodiversity which is often linked with philosophical issues. Genetic diversity is hardly mentioned.
H2 about the difference between the perceptions of organic and conventional farmers.	Partly reinforced.	Organic farmers tended to have a complex and philosophical approach to biodiversity, and they were relatively unified in this aspect. Conventional farmers 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 view of biodiversity.
H3 about the development of a common understanding of biodiversity.	Not tested.	Due to lack of data we cannot actually test this hypothesis. Our assumption is that differences in the personal background of farmers (either in their philosophical commitment or in their educational level) may hinder the development of a common understanding of biodiversity, even if farmers enjoy the discussion and learn from each other.
H4 about the differences between how organic and conventional farmers realize benefits from biodiversity.	Rejected.	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.
H5 about the relationship between the level of assessment and the range of benefits farmers realise.	Partly reinforced.	Benefits (and costs) of biodiversity are more easily observable at the individual (farm) level and the community level. The broader community and the global society appear among beneficiaries only in those focus groups where ethical and ecological values surpass economic values.

5.2. Methodological insights

This exploratory study enlightened the way of thinking of farmers when a scientific term is in the focus of discussion. The focus groups helped us experience that scientific concepts become inherently value-laden when we put them into the local context, and that these terms cannot be detached from the lifeworld of the local stakeholders (in our case from the lifeworld of the participating farmers). This finding warns us that 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 during the process and values are attributed in close relation to their everyday life and personal experiences. 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 proved to be able to explore how a group of farmers cultivating the same landscape assess biodiversity at the landscape level. Group discussions also helped focus group participants to broaden their perspective on biodiversity, and to develop a common understanding of the concept which incorporates ecological, philosophical/emotional and utilitarian elements. Although we could not document and analyze further the collective learning process, we can assume that group discussions help to bring to the surface the competing values and interests of farmers. Focus groups were 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. Thus, our findings reinforced that monetary valuation methods have limits in biodiversity valuation, because they restraint the range of benefits and probably underscore the importance of biodiversity since farmers attribute also non-monetary values to biodiversity.

Our study shows clearly some limitations of the group based methodology. First of all, we have to admit that sampling has a strong impact on the discussions and hence on the results. In investigations like this, it is crucial to organize different focus groups for participants showing different characteristics in farming type, background and educational level, and it is also important to enlarge the sample to include the same groups from all case study areas. Contextual factors also have to be analyzed and taken into account during the comparative analysis of focus group results, especially if there are huge differences in the socio-economic and cultural context of the case studies. The standardization of the methodology has a key importance in providing comparable results, which necessitates clear guidelines which are accepted by all the participating researchers. Practicing the guidelines through pilot studies (especially in the case of qualitative content analysis) could also increase the validity of results. However, the used methods should always be tailored to the specific local requirements (e.g. in Uganda the concept mapping exercise would have been perhaps better to replace by visual and discussion based exercises due to illiteracy). A further limitation of the applied methodology is that professional and really careful moderation is needed to handle the conflicts reflecting existing asymmetry in power or education within the groups. The costs and resources required by this focus group research are summarized in Annex IV.

Future possibilities to improve and broaden the results of this study are the following. The qualitative content analysis can be improved by doing the coding in parallel (cross-country check). Iteration within coding would be also useful (that is: once the transcriptions are coded researchers should cross-check the codes and if major differences are found, they can go back to the text and refine coding). These improvements could enhance the reliability of results, but require significantly more time and resources. Some of our findings need to be checked and reinforced based on the sociological literature, which shows that this kind of research requires an interdisciplinary approach. It would also be interesting to extend the sample and organize more focus groups in each country, because this would help to discover more the country-specific features. Perhaps some differences among the groups stem from the different farming system, thus it would be interesting to do focus groups in different countries with farmers running the same type of farms (arable land/vineyard/grassland).

5.3. Recommendations

This research was designed to understand how farmers conceptualize biodiversity and what values they attribute to biodiversity. A specific aim of the research was to compare the knowledge and attitudes of organic and conventional farmers towards biodiversity. As we stated earlier, most of our results are valid for the focus group participants. However, based on our findings we can formulate some recommendations both for the remaining phase of the

BioBio project, and for other researchers and/or policy makers who would like to involve farmers in the valuation of biodiversity.

1. Based on the various "definitions" farmers gave to biodiversity and the wide range of concepts they linked to this scientific term, we can propose some lay-indicators of biodiversity which are easily observable for farmers and which provide visible signs of the diversity of their farm. These lay-indicators could be the following:
    - diversity of the landscape – the number of mosaics within their farm and in the broader surrounding;
    - colours of the vegetation on the farm (the more colourful environment indicates higher diversity);
    - the health of the soil (smelling and touching the soil, seeing worms in soil);
    - the number of different breeds/species brought into production;
    - the presence of some keystone or umbrella species on their farm.

2. Perceptions of biodiversity by organic farmers are quite similar from one country to another one. More differences are observed among conventional farmers across countries. This affirms that the "conventional" label hides the heterogeneity of farmers, and hides also the differences within their perceptions. This may also suggest that being a "real" organic producer can be traced back to strong ethical considerations and to one's belief and identity, regardless of the general socio-economic context, mainly in Europe. More research is needed to investigate this assumption and to improve biodiversity valuation studies, especially if results are aimed to be expanded beyond Europe.

3. The differences between farmers' perceptions on biodiversity may be strongly influenced by their individual background (knowledge, commitment, philosophical approach). Based on the differences between organic and conventional (more intensive) farmers in this aspect, we can assume that it will be easier for organic farmers to understand and handle biodiversity indicators elaborated by scientists.

4. Following the previous recommendation, we assume that providing clear information (understandable for lower educated people) and training (in particular collective training where experiences can be shared) is important to give to conventional (more intensive) farmers a minimum background to understand issues related to biodiversity. It is not possible to change one's values and beliefs in the short term. However, it may be possible to bring conventional (more intensive) farmers to protect biodiversity by giving them sufficient information to develop satisfactory costs-benefits analysis.

5. The results suggest also that beside monetary incentives, the consciousness and awareness of farmers is an important driver of pro-biodiversity farming. Thus, policy makers should pay more attention to awareness raising and to the stronger involvement of farmers in designing and achieving pro-biodiversity policies.

6. 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. This shows the remarkable importance of the ethical/social aspect when farmers talk about the relationship between their farm and biodiversity, and underlines the importance of using non-monetary methods for biodiversity valuation, which are able to grasp the wide range of values farmers (and perhaps other stakeholders) attach to biodiversity.

We think that the findings of this research proved that qualitative methods may provide interesting results which help to improve biodiversity valuation and policy. However, our

results are limited (both in their geographical scale and in their context dependency), mainly because of resource constraints. Thus, there is a need for more research in order to broaden the scope of the findings and to deepen the understanding of the local context.

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Annex I: Guidelines

Open questions for the farm questionnaire

1. How long have you been living and farming here?

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2. Do you like living here? Why? (If needed, please specify: What do you like in this landscape? What do you think valuable in this area?)

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3. Could you tell me what first comes to your mind when you hear the word: biological diversity or biodiversity?

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Focus group guideline

1) **Introductory round**: ask participants to briefly introduce themselves with their names, and with a few words about their farm. Ask them also (and note) if they have already been participating in BIOBIO or they are newcomers. *(Estimated time required: 5-10 minutes)*

2) Put the **pictures** onto the table and tell that the photos were taken in the case study area. Ask: What do these pictures mean to you? What pictures do you like the most? Please explain why you chose that one. Be sure that everybody can tell his/her opinion! *(Estimated time required: 15 minutes)*

   Agreed list of photo subjects (visual example from the Italian focus groups):
   - **Landscape diversity**: picture showing the diversity of habitats
   - Wild flowers: one picture showing a **field margin with flowers**, one picture showing a **protected flower species**
   - Animals: one picture showing a **"neutral" bird species** (neutral means that it is neither harmful nor useful for the agricultural activity), one picture showing a typical but not so well-known **insect** of the case study area
   - **Soil types**
   - **Earthworms**
   - Optional pictures: crops diversity (picture showing the diversity of produced crops), native breeds / landraces typical in the case study region, woody vegetation within the landscape (trees, bushes, tree lines etc.), mix of species: e.g. sheep and cattle grazing together or a mosaic of different crops produced

3) **Have you ever come across the term biodiversity** or biological diversity? If not, give a brief explanation. Which words and concepts come to your mind when you hear this term? Give post-it cards to participants and ask them to write down the first few ideas coming to their mind. Then ask participants to draw a **concept map** by using the post-it notes they written previously. *(Estimated time required: 30 minutes)*

   Give a **flipchart paper** and markers to the participants, and put biodiversity in the middle of the paper. Ask participants to write down the connected concepts, and to draw lines and arrows to symbolise the relations between the connecting concepts.

   If **new terms** emerge during the discussion, use additional post-its to include them too in the scheme.

   Optional task: How can you relate these words and concepts to the pictures on the table? Please find the place of the pictures on the concept map!

4) **How does biodiversity influence your farm?** How does biodiversity influence your everyday life? (If answers are not detailed, ask: Why do you think so? Could you give an example? etc.) *(Estimated time required: 15 minutes)*

5) **What are the effects of farm management on biodiversity**? How do you influence biodiversity through your farming practices? If answers are not detailed, ask: Why do you think so? Could you give an example? etc.) *(Estimated time required: 15 minutes)*

6) Optional topics:

   Geographical scales: How important is biodiversity for your community? How important is biodiversity to human beings in general? *(Estimated time required: 15 minutes)*

   Time scales: Have you realized any changes in biodiversity? Do you see these changes as positive or negative changes? *(Estimated time required: 15 minutes)*

7) **Closing:** Would you like to add anything? Thank you for being here and sharing your opinion with us. It was really valuable for our research. *(Estimated time required: 5-10 minutes)*

   Feedback: We are going to analyse this discussion together with similar discussions held in four different EU countries. We would like to give you some feedback on the results of the comparative analysis of the discussions. Would you like to receive this feedback report by post or by e-mail? Could you provide us with your postal/e-mail address for this reason?

   Acknowledgement: We will write a research report and a scientific publication which will partly build upon this discussion. We would like to acknowledge your contribution in these publications. Do you agree with mentioning your contribution by your name in the acknowledgement, or do you prefer to stay in anonymity?

Annex II: Workshop program

BioBio ECCT focus group training

9th September 2010, Budapest, Országház street 21

The training has two main aims: the first is to discuss the proposed methodology and to formulate the final version of the guidelines which is acceptable for everyone; the second is to provide a deeper insight into how group-based methodologies work in real life. The training is organised into three sections, as follows:

8.20 – 10.00 Section 1: Discussing and testing the focus group methodology

- feedback from partners on the proposed focus group methodology, general questions and answers concerning the methodology
- experimenting how group based methods work: creating a mind map within the group

- reflecting on the group experiment: how participants feel about group based methods, how participants feel about the mind map exercise, how moderation work etc.

Coffee break

10.15 -11.45 Section 2: Discussing the focus group guideline
- short description of the planned guideline and the experiences we gathered through the experimental Hungarian focus group run in summer 2010
- questions and answers focussing on the guideline and on the facilitation of the group work key points to decide:
    - list of potential participants (only farmers or inhabitants too),
    - list of photo subjects (see the methodological guideline)
    - remuneration of participants
- tips and tricks for moderators

Lunch break at 12.00 in Pierrot Café

13.15 -14.30 Section 3: Discussing the guideline for the analysis and future plans
- short description of the logic of qualitative content analysis and the reasons to choose this type of analysis, presentation of the planned guideline
- illustration on how qualitative content analysis works: showing examples from the analysis of the experiential focus group material (from step to step, showing examples for using software, too)

Coffee break

14.40 -16.00 Section 3 continued
- questions and answers focussing on the proposed guideline key points to decide:
    - a priori hypotheses (see the methodological guideline and Felix's e-mail)
    - coding agenda (see the methodological guideline)
    - task division between partners (who should do the analysis)
- future plans and closing comments:
    - time schedule for the final report
    - joint publication based on the empirical material (who wants to participate, who should lead the work, where to publish etc.)
    - establishing the link between focus groups and the KIPA technique proposed to apply in WP4 Task 4.5

Annex III: Coding agenda

CODING AGENDA (filled in with examples from the French, Hungarian and Italian focus groups)					
	Code	**Definition**	**Typical narratives**	**Context** (knowledge /opinion/ feeling)	**Attitudes to biodiversity**
C1. Manifestation of biodiversity	Genes	The diversity of genetic characteristics within the genetic makeup of a species, e.g. the existence of many different land races or varieties of the same species within the area.	HU_org: We aim at keeping traditional local breeds. Even the dogs are traditional Hungarian varieties: Puli and Komondor.	HU_org: Knowledge: farmers are familiar with old breeds and varieties typical in the region	Positive
	Species	The number of species and their relative abundance (rareness or commonality) in the area as a visible sign of diversity.	IT_org: If you let the nature being, there you can find lots of different species of plants	IT_org: Knowledge: there is a biodiversity loss	Positive

CODING AGENDA (filled in with examples from the French, Hungarian and Italian focus groups)					
	Code	**Definition**	**Typical narratives**	**Context** (knowledge /opinion/ feeling)	**Attitudes to biodiversity**
	Habitats	The wide range of different habitats present in the area as a visible sign of biodiversity.	FR_org: Many different brambles, but also oak and poplar trees, it's the beginning of forest	-	Positive
	Ecosystems	The variety of different ecosystems in the area as a visible sign of diversity.	FR_org: Unploughed natural grassland is an example of great diversity	-	Positive
C2. Functions of biodiversity	Stability (resilience)	The capability of an ecosystem to withstand shocks and rebuild itself – to stay in a relatively stable position in the long run.	IT_org: The ban of agrochemicals leads to an equilibrium among the insect species	IT_org: Knowledge: there are technical means to preserve the stability of the agroecosystem	Positive: we should act to preserve the health of agro-ecosystems
	Ecosystem services	Tangible and intangible benefits provided by ecosystems to society – especially those services which are based on biological diversity.	HU_org: The bees and blow-flies are all natural values.	HU_org: Opinion: only few ecosystem services were mentioned, perhaps because the discussion was more philosophical.	Positive
C3. Threats to biodiversity	Climate change	The effects of climate change on biodiversity.	Not mentioned		
	Population growth	The negative effects of population growth on biodiversity, e.g. loss of natural habitats.	HU_org: When grandpa dies, his land is inherited by the young generation. And what is the first idea of the youngsters? Let's sell it, and then spend the money! But it is not irrelevant who will buy the land	HU_org: Opinion: population is seen only from the local perspective, thus not population growth is the threat but the abandonment of farms. Feeling: it is important to keep these lands in good hands.	Negative
	Agricultural intensifi-cation	The negative effects of intensification on biodiversity, e.g. increased use of pesticides, changing soil composition, vanishing land races etc.	IT_org: I think that we produce too much	IT_org: Opinion: farmers think we are pushing too much on the production side and want to achieve high yield in the easiest way…	Positive, they are trying to adopt a more ecological way of farming…
	Market effects	Changing consumer demand, loss of agrobiodiversity	IT_org: This new consumption attitude gets stuck in our brain and eats our intelligence	IT_org: Opinion: consumers are not able to distinguish the quality of the products and the environmental impact of their choices , educate people are more aware of the issue	Positive: people should be more aware of the issue
	Invasive species	The negative effects of exotic species on the diversity of the area by threatening the survival of endemic, indigenous species.	HU_conv: The asclepias kills off forests, conquer whole forests. Forests disappear. – Yes, I saw, but I did not know so far that it happened because of asclepias.	HU_conv: Knowledge: partial knowledge about the negative effects of invasive species. Farmers put more emphasis on the effects invasive species have on farming.	Mixed: some invasive species (e.g. locust) are useful. Others are harmful for nature and for farming.

CODING AGENDA (filled in with examples from the French, Hungarian and Italian focus groups)					
	Code	**Definition**	**Typical narratives**	**Context** (knowledge /opinion/ feeling)	**Attitudes to biodiversity**
	Land use change	Land abandonment, converting agricultural land to urban or industrial land.	FR_org: Today, we don't see enough of natural grasslands	-	Negative
C4. Value of biodiversity	Economic value	Those value components which can be directly or indirectly realised in the market, which can be easily described in monetary terms. E.g. profit from selling agricultural products, income from eco-tourism, reducing costs due to less pesticide use etc.	IT_org: There are people aware of the added value that the organic management bring to the products	IT_org: Knowledge: people are willing to pay more for product that respect the environment, and farmers are also willing to invest in preserving the biodiversity, but their effort should be recognized.	Positive: biodiversity should be accounted for also in their products
	Ethical / social value	Those value components which are identified with the beauty of nature and diversity, with its contribution to the feeling of social belonging. Ethical considerations also belong to this code which state that biodiversity is valuable because every being on Earth has right to live.	IT_org: It is a fascinating world that of the plants that inhabit our farms and fields	IT_org: Feeling: biodiversity enhances the beauty of the place, and make people more self-aware of nature and themselves Unifying	Positive: biodiversity has an important ethical and social value
	Ecological value	Biodiversity is valuable and has to be maintained because we do not know exactly how it contributes to life on Earth. Thus ignorance, risk, poor scientific knowledge and complexity have to be taken into account in biodiversity related decisions.	HU_org: Biodiversity is the key for the survival of the landscape and also of humans. This is true for individuals, for countries, for the whole global World	HU_org: Knowledge: sporadic traditional local knowledge exists, which relates mainly to the harmony between farming and natural processes.	Positive
C5. Beneficiaries of biodiversity	Local individuals	Local residents – farmers – who realize the benefits of biodiversity at individual (farm) level.	HU_org: Yea, I am just running and organising all day round, and I am not able to realise this richness every day. Sometimes I have to find time to walk around the farm and to have a look at these values	HU_org: Feeling: when they are thinking about the benefits of biodiversity, they realise how lucky they are, although in the everyday routine these benefits are not so visible (at least directly).	Mixed
	Local community	The community of the settlement or the narrow region, those who benefit from biodiversity together (any of them can enjoy the benefits of biodiversity).	HU_org: Sometimes the people living here don't realise that they are living in a fairy garden.	HU_org: Opinion: local people are not so much interested in biodiversity and the benefits it provides. Outsiders can draw attention to the value of	Mixed: those participants are more aware of this who moved into the area.

CODING AGENDA (filled in with examples from the French, Hungarian and Italian focus groups)					
	Code	**Definition**	**Typical narratives**	**Context** (knowledge /opinion/ feeling)	**Attitudes to biodiversity**
				this diversity.	
	Broader community	People living or visiting the larger geographical region (country) who benefit from biodiversity.	HU_org: This will become more and more important as cities are growing. We have to maintain the escape routes where people from the cities can have a rest	HU_org: Opinion: the broader community will realise the importance of biodiversity (and will perhaps pay for maintaining it) in the future	Rather positive (expecting)
	Global society	The whole human population of the Earth that can enjoy the benefits (or at least some of the benefits) of biodiversity.	FR_org: I don't want to participate to destroy life of other people	-	Positive
Emergent categories	Biodiversity as nuisance	The perceived negative effects of biodiversity	IT_org: I live the biodiversity as a problem of the birds that eat the grapes, wild-boars that threat the vineyards	IT_org: Knowledge: crop loss and overwork to naturally control pests Nor conflicting nor unifying, all understood each other problems and point of views.	Mixed: Some farmers perceive it as possibly negative when thinking about pests.
	Complexity & system approach	The complexity of the interactions within ecological and environmental system and among environment and socioeconomic system, the need of an systemic approach	FR_org: Life is relationship.	-	Positive: complexity, mystery
	Cultural heritage & local traditions	The importance of the biodiversity as part of the local culture and tradition	IT_org: I have a great interest into the use of wild plants as food	IT_org: Feeling: sense of loosing local knowledge and traditions, also useful for the farm management	Positive: local knowledge and traditions should be saved
	Environmental policy	The effect of proper environmental polity in preserving and enhancing biodiversity both on farm and in the environment	IT_org: Policy makers could not care less about the territory	IT_org: Opinion: policy makers should care more about the environment, and this would benefit the citizens	Positive: agriculture and environmental policy should aim at preserving biodiversity
	Good farming practices enhancing biodiversity	The role of proper farming practices to preserve and enhance biodiversity	IT_org: Reduce to a minimum the use of chemicals	IT_org: Opinion: reducing the use of agrochemicals and adopting proper management techniques, preserving domestic varieties	Positive: to have more species we have to reduce the inputs, and adopt good management practices…

CODING AGENDA (filled in with examples from the French, Hungarian and Italian focus groups)					
	Code	**Definition**	**Typical narratives**	**Context** (knowledge /opinion/ feeling)	**Attitudes to biodiversity**
	Lack of public awareness	The difficulties to carry on proper farming practices, policy ad environmental management due to the lack of people awareness about the issue and its importance	IT_org: The importance of biodiversity is not understood by the people	IT_org: Opinion: citizens and policy makers are not aware of the problems and of the importance of biodiversity	-
	Organic farming & biodiversity	The effect of organic farming practices in protecting and preserving biodiversity	IT_org: Being organic helps to preserve biodiversity	IT_org: Opinion: organic farming can help to preserve biodiversity but this is not related to the label itself, rather to the right attitude of the single farmer	-

Annex IV: Costs and resources required by the research

Task	**Details**	**Number of working hours**		**Other costs (€)**	
		Average per country	**Total**	**Average per country**	**Total**
Recruitment	Discussing and getting the list of farmers	4.6	14	-	-
	First call	14	42	-	-
	Writing and sending the invitation letter	4.6	14	10	20
	Second reminding call	5.3	16	-	-
Preparing the meeting	Reserve the restaurant and arrange the necessary equipment (in Italy the buffet was prepared by researchers)	3.6	11	-	-
	Preparing the speech, pictures and questions	6.6	20	1,5	3
	Preparing the meeting equipment (tape-recorder, pens, post-its etc.)	3.3	10	47	140
Organization	Travelling (own car) (in Italy there was no travelling)	6	12	102,5	205
	Facilitating the meeting	13.3	40	-	-
	Lunch/Dinner/Buffet (in Hungary it was not accounted as working hour)	6	12	74	220
	Summary report	4	12	-	-
Analysis & report	Transcription (in Hungary transcription was contracted thus no working hours were accounted)	14	28	-	32 (Hungarian data)
	Coding and linking codes (in Italy this includes the learning and practicing the use of the software)	20.6	62	-	-
	Translating the concept-maps	4.3	13	-	-
	Reporting	21.3	64	-	-
	Comparative analysis and report	-	60	-	-
TOTAL		**Working hours: 430**		**Other cost: 620 €**	

The table includes the human resources and other costs required by six focus groups organized in three countries (in France, Italy and Hungary) because Welsh data are missing. The “Average per country” column indicates the average costs of two focus groups organized in the same country. Other costs do not include the procurement costs of the electronic equipment (e.g. video camera, camera, voice recorder, lap top) neither the amortisation costs,

because it is difficult to scale down these general expenses to two short events. Working hours were divided among senior and junior researchers working in the same research group, and certain tasks were assigned to PhD students (e.g. recruiting the farmers in Hungary, doing the focus group transcription in France, and helping the discussions with electronic equipments in Italy).