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Success stories in landscape management for functional biodiversity: an assessment from 5 west-European countries

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Abstract: Within IOBC, a small scale inventory was made to collect success stories in landscape management for functional biodiversity. Five projects from different European countries were analysed to define the indicators in the people, planet and profit domains being seen as important for success. Projects primarily related to functional biodiversity focused on indicators relevant for farmers, with direct pest/natural enemies assessments and pest management costs and savings considerations at the field and farm level. Projects with a broader emphasis on biological conservation in the countryside often took into account functional biodiversity aspects, but related mostly to a wider range of actors and at a landscape level. Since landscape management for conservation reasons is quite successful it is argued to bring functional biodiversity in line with biodiversity conservation strategies.

Key words: functional biodiversity projects, pest control, sustainable agriculture, biodiversity conservation, criteria for success

Introduction

Agriculture can be regarded as the most important determinant of the landscapes of the European countryside. Local physical conditions and human traditions resulted in a variety of landscapes and created a wide range of conditions for biodiversity. Only plant and animal species adapted to dynamics of agriculture can survive or will even be enhanced. However, since agriculture production has been boosted for world markets, using high quantities of inputs, we have a de-linking of food production and biodiversity. The intensive land use had a dramatic impact on landscape quality and biodiversity. Today, in countries like the Netherlands only 2-3% of the area of an arable farm can be regarded as a semi-natural habitat, such as ditches and hedgerows (Manhoudt & de Snoo, 2003).

Over the last decades, many attempts have been made to enhance the quantity and quality of semi-natural elements left in the countryside. Most mentioned reasons for the improvement of such habitats are: 1) to contribute to nature conservation (food, shelter, migration habitats of plants and animals, including rare species); 2) to improve environmental quality (buffer strips to prevent pesticides and nutrients contamination) and 3) to promote the aesthetic values of the countryside. Finally, such landscape features can also enhance functional biodiversity for farmers, for example related to pest control.

Over the years much progress has been made with respect to the above three motivations for semi-natural habitat management: within the scientific community applied and fundamental research is being carried out and debates are going on about the effectiveness of the measures developed and the implementation of strategies. Within society EU and national regulations such as agri-environmental schemes have been implemented, farmers collectives established and a wide range of actors is involved. Here habitat management is really in the core business of sustainable rural development. However, related to the topic of landscape management and functional biodiversity the progress seems to be much more limited. Therefore, in this contribution we would like to identify current success stories of landscape management for biological control.

Approach

Call for success stories

An inventory was made among senior scientists of the Working Group Landscape Management for Functional Biodiversity to collect examples of successful projects regarding landscape management for functional biodiversity within Europe. Besides the collection and description of the projects the following questions were of interest: 1) what means success for the projects? 2) how can this success be measured? and 3) what are the critical factors that made the project into a success?.

We received success stories from 5 European countries. We then specifically addressed representatives from other European countries for further examples, but did not obtain results that matched the criteria of both technical and social success. Written accounts of the success stories were provided by the authors, either in the 4-page format of the present IOBC-wprs Bulletin (Boller, 2006; Burgio et al., 2006; Mante & Gerowitt, 2006; Van Alebeek et al., 2006, this volume), or previously published material (Powell et al., 2004; Jacot & Bosshard, 2005). A workshop was convened on 22 March 2006 at Leiden University to present, analyze and compare the accounts. All authors of this paper attended the workshop.

Analysis

The success stories were analyzed from two angles. The first focused on how to define and measure success. Here the success stories were reviewed in terms of the three domains of sustainable development: people, planet and profit. It was hypothesised that the planet dimension would be well covered, although indicators might vary slightly; the profit dimension would have received some attention, but clearly less than the planet dimension; and the people dimension would be virtually non-existent. The second angle addressed spatial scale. At which scales were the different success stories evaluated: field, farm, region? Can we claim a contribution to science from our work and generalize local experiences to other locations and scales?

Results and discussion

Success indicators

From the analysis of the different case studies it became clear that three of the projects have a direct focus on the enhancement of functional biodiversity (United Kingdom, The Netherlands and Switzerland: mainly the vineyard success story *cf.* Boller, 2006). The projects of Italy and Germany and the Swiss EFM project (*cf.* Jacot & Bosshard, 2005) primarily focus on biological conservation in the countryside and, in the case of Italy, also on reduction of agricultural inputs. In Table 1 the results of the self-evaluation by the involved researchers is presented. In the *people domain* the three projects focusing on functional biodiversity used acceptance of the

technology by farmers and advisors as criteria for success. The German and Italian projects with a focus on biodiversity conservation emphasized the number of farmer and stakeholder groups involved. Only in the projects in Germany, Switzerland and the United Kingdom were actors other than farmers or the general public seen as important targets for success.

In the *planet domain* functional biodiversity aims of the projects in the United Kingdom, Switzerland (vineyard project) and The Netherlands are clearly reflected. Success indicators of these projects are the enhancement of beneficial organisms and a reduction of pest populations. In the projects of Germany, Italy and the Swiss EFM project the nature conservation aims are dominant. Here the most important success indicators are related to the enhancement of specific species groups (plants etc.).

In the *profit domain* the functional biodiversity projects of the United Kingdom, Switzerland (vineyard project) and The Netherlands focus their success indicators on the reduction of pesticide use and reducing costs from pest control measures. However, also in the projects of Italy and Germany issues concerning the reduction of pesticide use and the costs related to pest management control strategies are being mentioned as important for success. In four of the projects the incorporation of the management measures into agri-environmental schemes and subsidies is mentioned. It is interesting that the cost-benefits in economic terms of the change in landscape management for other stakeholders in the countryside (related to for example rural development) is not mentioned as an important success indicator by any of the projects.

Spatial scale and generalisation

Analysis of the scale at which the PPP indicators were applied (Table 2) showed that the projects with a direct focus on functional biodiversity are centred around the field and farm level. Only in the Netherlands is the landscape/region level taken into account (including other actors than farmers). The projects that are primarily dealing with biological conservation do have a certain focus on the landscape/region level combined with a farm (Italy) or field level (Germany) approach. We also analyzed the extent to which projects paid attention to scaling out, i.e. addressing actors at the same scale outside the projects, and scaling up, i.e. extrapolation to scales higher than the one in the projects. It appeared that while scaling out was general, scaling up was only being addressed by projects in Switzerland and the United Kingdom.

Functional biodiversity and conservation biology: partners or opponents?

It should be mentioned that the analysis presented here could only be seen as a first step in evaluating success stories in landscape management for functional biodiversity. Therefore, the results presented first and foremost serve the purpose of initiating discussion.

The case studies which have been analyzed show that in all projects all three domains are being investigated. The people dimension is much more studied than initially expected. The projects primarily related to the functional biodiversity first of all have a focus on indicators relevant for farmers: acceptance by farmers, direct pest/natural enemies levels and pest management costs and savings at the field and farm scale. Projects with an emphasis on biological conservation in the countryside often also take into account functional biodiversity aspects, but mostly related to a wider setting: the landscape level and different stakeholders involved. Since the enhancement of landscape management for biological conservation reasons is rather successful, it can be questioned how the more classic functional biodiversity approaches can learn from this success. If we can bring functional biodiversity under the umbrella of a wider biological conservation aim or even in line with sustainable development of the countryside, for example by including more stakeholder groups and not limit our efforts to the farm level only, we might be more successful. In that case we should be aware that although it is mentioned that in most cases there is a win-win situation between both approaches, there may also be some trade offs. For example, should new established field margins be sown with crop species or

endemic plant species? This type of questions should be addressed in both the IOBC framework and with representatives from other stakeholders.

Table 1. Self-evaluation of projects in which Functional Biodiversity played a role in the objectives - identifying the most important success indicators per domain of sustainable development. For details on projects see text (UK = United Kingdom, CH = Switzerland: vineyard & EFM-project, NL = Netherlands, I = northern Italy, D = Germany).

	Indicator	UK	CH	NL	I	D
People	Acceptance of functional biodiversity by farmers	+	+	+		
	Acceptance of functional biodiversity by agricultural advisors	+				
	Number of farmers involved			+	+	+
	Network of stakeholders		+			+
	Acceptance by public		+			
	Influence on policymakers	+				
Planet	Reduction of pest populations	+	+	+		
	Increase of beneficial arthropods (abundance or diversity)	+	+	+		
	Reduction of water / soil contamination			+	+	
	Increase of plant diversity		+		+	+
	Increase of insect diversity		+			+
	Increase of bird diversity				+	
Profit	Reduction of pesticide use	+	+	+	+	
	Cost/benefit analyses of different pest control strategies	+		+	+	+
	Cost/benefit of landscape management			+		
	Cost/benefit of ecological compensation areas		+			
	Obligations in plant plots from pesticide compensation					+
	Subsidies		+			+
	Integration into biodiversity schemes	+			+	
	Promotion of small companies	+				

Table 2. Hierarchical level at which success indicators were applied in the projects described in the text, distinguished for the domains: o = People indicators; × = Planet indicators; + = Profit indicators.

	United Kingdom	Switzerland	Netherlands	Italy	Germany
Field/crop		o			
	×	×	×	x	×
			+		+
Farm	o	o	o	o	o
	×	×	×	×	
	+	+	+		
Landscape/region			o	o	o
			×	×	
			+	+	+

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