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Czech case studies using the Social-Ecological Systems concept to understand collective action as a factor in the provision of public goods and ecosystem services by agriculture (PEGASUS, EU H2020 project)

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KEY WORDS

Public goods, ecosystem services, collective action, factors of success of collective action

1. INTRODUCTION

The case studies were carried out under the EU Horizon 2020 project PEGASUS (Public Ecosystem Goods and Services from agriculture and forestry: Unlocking the Synergies), which is coordinated by IEEP London. The motivation for the project was an ongoing decline in provision of public goods and ecosystem services in environmental and social domain on agricultural and forest land in EU, despite quite substantial public support in the relevant areas. The aim was to investigate different mechanisms of public goods and ecosystem services provision beyond the provision with the public support. It was revealed, that most of the case studies on provision of public goods and ecosystem services were characterised by carrying out collective actions by actors involved or at least by attempts to start such activity (source: the outcomes of the case studies carried out under the PEGASUS project¹). This article is focused on the outcomes of the Czech case studies, presents results of the assessment of the factors of success of collective actions, and also the capacities of stakeholders to carry out the collective action for public goods and ecosystem services provision.

The main research question behind this part of the study was: What were factors supporting and what factors preventing the collective actions for provision of public goods and ecosystem services (with public goods characteristics)?

As an example of factors are level of trust and willingness to cooperate, which are reported significantly lower in EU New Member States (NMSs) than in EU Old Member states (Frane 2006; Uslander 2003). The main difference between these countries is, that NMSs (including the Czech Republic) experienced decades of communist regime after the Second World War.

1.1 Brief characteristics of the case studies

CZ-1 Biodiversity rich meadows in White Carpathians, East Moravia

This specific locality is a part of the Landscape Protected Area Bílé Karpaty [White Carpathians] and the main value is on dry biodiversity rich meadows. Significant part of the grasslands is on slopes, sometime the fields are small, with trees and shrubs, therefore difficult to manage, and the usual yield is very low. These are reasons why the grasslands are endangered by abandonment which could lead to loss of biodiversity. These meadows host a

¹ A brief characteristics of case studies could be found on the project website: <http://pegasus.ieep.eu/case-studies/list-of-case-studies>

high number of protected species (e.g. high number of orchid species) and are internationally recognised for its value. Meadows with reasonable size and good access are now managed mainly because of a sufficient support under Common Agricultural Policy. The locality was already nearly lost some 20-30 years ago and many young trees were cleared during the last decades (high costs of the restoration project were covered mainly with public money support). The recovery of the site and following management was carried and initiated by the local non-governmental organization (Czech Union of Nature Protection). Recent management of the site is a collective action of this organization, state organizations under Ministry of Agriculture and Ministry of Environment and the local farmers (Pražan, Konečná 2016). The attempts were carried out to initiate the collective action on local/regional level between farmers and representatives of protected area administration.

CZ-2 Birds and amphibians support on wet meadows, East Bohemia

Wet meadows in surrounding of the historical town Josefov used to be managed with the aim to produce fodder to cattle and the management was already rather extensive there, but the old irrigation system was not in function for decades and some particular farm operations were not suitable for the bird - waders' protection. Two non-governmental organizations recreated irrigation system, agreed a suitable water management regime with all stakeholders and helped to the local farmers to involve in the Agri-environmental Schemes. Further activities were building of small pools for waders and amphibians on purchased land. The costs of the facilities were covered by a public support (from the Ministry of Environment) and for the support of proper extensive management of grassland (from the Ministry of Agriculture). The land purchase is ongoing with funds from inhabitants and private donors interested in the project. Main public goods and ecosystem services are biodiversity, especially bird species linked to wet meadows, educational value, and also water quality and quantity (as secondary effect) (Čámská, Šejnohová, Pražan 2016).

CZ-3 Restoration of forest: guided succession, North Bohemia

It is a project, where the results of the effort will be seen in a long term. The leading non-governmental organization bought with finance from private donors a part of the commercial damaged forest with corresponding species structure and managed it in a way to convert it to semi-natural forest (with national financial support and with financial support of interested inhabitants).

The main public good is biodiversity, because the core of the project was replacement of prevailing spruce species with autochthonous deciduous tree species and to diversify the forest structure. Long term, the intention is to cease most of the management measures and to let forest to its natural succession. The secondary public good is education of general public and regional forest owners.

1 METHODS

2.1 Analytical framework

The analytical framework for the case studies was agreed on the PEGASUS project level. The basis of the research was a literature review focused on institutional analysis, collective action theory, results of surveys on some key factors of collective action on national level (e.g. trust, signs of cooperation). As an analytical framework was used Social-ecological system (Figure 1) and subsystems of SES were analysed with aim to explain the outcomes of collective action or at least attempts for collective actions under action situation in pursuing provision of public goods and ecosystem services. The questions studied were based on adapted Social-ecological system subsystems (Ostrom and Cox 2010; McGinniss and Ostrom 2014): resource, resource unit, governance and policies, actors, action situation, and environment. The number of questions was too high (e.g. for biodiversity over 50 topics were questioned for the system assessment) for presenting them in detail in this article (source: methodology of PEGASUS project, not published). The set of questions was enriched by selected key factors important for successful collective action to increase the understanding of the action situation dynamics and success/failure factors (adapted from Ostrom 1990, Ostrom 2005).

1.1 Data collection

Three different initiatives were investigated using the case study approach. The first step was a deep desk research, completed by the reports about project history. Most of the information on Social-ecological system characteristics and factors important for success of collective action were collected in in-depth interviews and workshops with a participation of the key stakeholders. Workshops were organised on the case study level, where the case study findings were verified and in three national level workshops (one in the beginning of the case study research, two after it), where specific aspects of collective action for public goods and ecosystem services provision were assessed and discussed.

Topics and particular factors questioned during the interviews (short version):

Social, political, economic settings: as a context was for example collected an information on markets, political stability, and relevant technologies.

Resource system: the key characteristics of resource system was collected in order to get sufficient knowledge for assessment of the need for its maintenance, implication for property rights and managerial skills (e.g. size, location, productivity, clarity of system boundaries, predictability of system dynamics).

Resource unit: characteristics such as number of units, economic value, distribution, growth, mobility, and specific characteristics were questioned.

Governance system: especially different level of rules (e.g. constitutional, operational rules, monitoring and sanctioning), property right settings, governmental and nongovernmental organizations, networks.

Actors: several characteristics of actors were questioned, for example: number, location, their history and knowledge, socioeconomic characteristics, social norms (e.g. trust), leadership, value of public goods and ecosystem services for each actor, networking.

Action situation and its outputs: several processes were questioned such as decision making, coordination, harvesting, conflicts, lobbying, networking, monitoring and evaluation of outputs of action situation, investment activities. Activities used to assess outputs of the projects social and ecological performance were also questioned. .

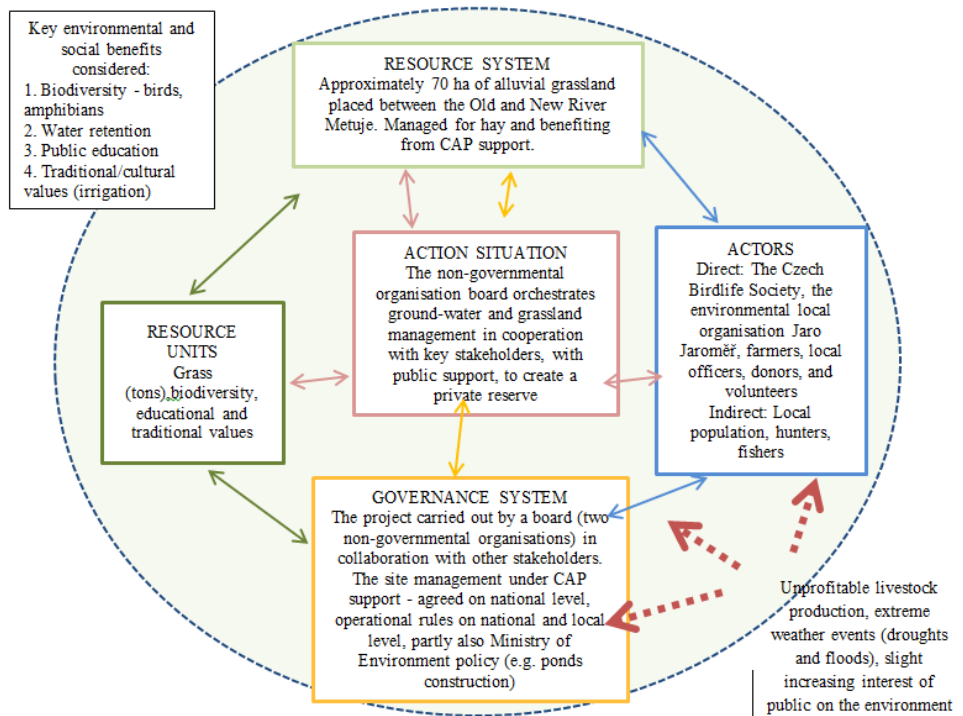
As the studied output of the action situation were public goods and ecosystem services and in brief their characteristics. In all cases the main public goods and ecosystem services were associated mainly with biodiversity and in addition there were significant benefits in education provision to public, and in one case study also the historical and cultural value was provided.

Characteristics of action situation and factors of success of collective action questioned in interviews (adapted from Ostrom 1990, Ostrom 2005):

- Demand for public goods and ecosystem services and effort in pursuing the appreciation of public goods and ecosystem services by general public
- Creation of links between actors and coordination and management
- Information sharing
- Knowledge of how to run the collective action
- Level of trust between actors
- Reciprocity
- Agreement on common rules
- Monitoring and enforcement of common rules
- Conflict resolution mechanism
- Monitoring of outcomes of the collective action
- Sharing the information on the outcomes of the collective action
- Availability of information about actors' preferences over reciprocity, trustworthiness, cooperation
- Leadership

These characteristics were questioned with the key actors (at least those, who were influenced by decisions stemming from the collective action.

Figure 1: Social-ecological system (McGinniss and Ostrom 2014) – an example from the case study “Birds and amphibians support on wet meadows”



Source: adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014

Because the relatively small number of stakeholders in each case study, the quantitative statistical methods could not be used. Each of the factors studied was assessed taking into account prevailing types of responses and the result was verified at the workshops with stakeholders in the case study areas and also on the national level.

The verifiability of results was based on data triangulation, especially consistence between data collected from different types of actors and literature was considered. Only one result of the interviews regarding a key factor – appreciation of public goods and ecosystem services in the White Carpathians area - was corrected according to the results of the local workshop. In rare cases, where the stakeholders’ opinions varied, it was recorded.

1.2 Case studies selection and approach

The final choice of case studies in the project level was made based on the analyses from project Work Packages 1-3 (theory-mapping-policy analysis), the results of which also fed into the further refinement of the final case study methodology. The objective of the selection process has been to strike the best possible balance and representativeness of the variety of agriculture and forestry situations in EU, as characterised by the criteria: 1. different farming and forestry system types and intensity of management; 2. various natural characteristics as well as social, cultural and institutional conditions; 3. diverse types of environmentally and

socially beneficial outcomes; 4. the current level of environmentally and socially beneficial outcomes provision and remaining potentials for improvement; 5. various types of mechanism used to incentivise the supply and demand of environmentally and socially beneficial outcomes: policy, market/private sector or non-governmental organization driven, or a mix e.g. policy impetus and private response; 6. different types of specific actions implemented as a result of the mechanisms: government-level action implemented by individuals, (bottom-up) local collective action involving various types of stakeholders, private actors-led action implemented by individuals, etc.; 7. potential of the cases as a model or best-practice, as expressed by an assessment of the transferability potential to similar land use systems; 8. the implementation status of the initiatives/mechanisms (K. Knickel et al. 2017).

The main drivers of public goods and ecosystem services provision are public financial sources in the Czech republic, both originated from the Ministry of agriculture and Ministry of Environment, few examples are driven from private sector. There are not many other ways of PG/ESS provision (beside joint production). The good practice examples are based mainly on collective actions usually initiated by few enthusiasts acting under some of the environmental non-governmental organization who built a network of local non-governmental organizations-public-private sources and actors. The proposed Czech case studies were selected from identified rare cases where somebody managed to overcome not so mature social capital and initiated collective action by involving several actors including general public to the project. The potential case studies suggestions were collected at the national workshop held in 2015, where several key stakeholders discussed several initiatives across the national territory. These suggestions were assessed by criteria mentioned above. At first, four case studies were considered, but later three of them were selected for the deep analysis according to their innovative and learning potential.

The project team proposed following case studies mentioned above: CZ-1 Biodiversity rich meadows in White Carpathians, East Moravia, CZ-2 Birds and amphibians support on wet meadows, East Bohemia, CZ-3 Restoration of forest: guided succession, North Bohemia.

1.3 Sample studied

The number of interviewed actors was determined by the size of total population or potential number of actors involved in the collective action.

There were carried out four case study level workshops with local stakeholders and three national level workshops with selected stakeholders.

Table 1 Overview of interviewees

Actors	CZ - 1	CZ - 2	CZ - 3
Farmers	7	2	NA
Protected Landscape Area administration	2	1	NA
non-governmental organizations	1	4	2
Hunters	NA	2	1
Forest administration – division on forest management	NA	NA	1
Forest expert	NA	NA	1
Municipality	NA	2	1
Donors and volunteers	0	2	2

Sources: Pražan, Konečná 2016; Čámská, Šejnohová, Pražan 2016; Čámská, Pražan 2016

Table 2 Attendees of the case study workshops and the final national workshop

Actors	Workshop CZ-1	Workshop CZ-2	Workshop CZ-3	Final national workshop
Farmers	3	1	NA	2
Protected Landscape Area and National Park administration	2	0	NA	2
non-governmental organizations	1	4	3	2
Forest expert	NA	NA	1	0
Municipality		1		
Ministry of Agriculture			1	1
Ministry of Environment		1		1
Advisor				1
Researchers				11

Sources: Pražan, Konečná 2016; Čámská, Šejnohová, Pražan 2016; Čámská, Pražan 2016; Pražan, Šejnohová 2017.

3. RESULTS

3.1 Driving forces for public goods/ecosystem services provision

In all the Czech case studies the main driving force is not a market and in any case the actors are not motivated to join the initiative in order to improve marketing conditions, add value, or to enter a new market. Grassland management is not profitable because of the high loss of producing beef/sheep, and the motivation to improve grasslands and to produce more fodder is low.

In CZ-1 and CZ-2 the motivation of the farmers was to have a possibility to produce as cheap as possible fodder to their beef, and at the same time to comply with agri-environmental and other agricultural policy tools (especially Direct Payments and in CZ-1 also Payments for Less Favourable Areas). The consequence is, the supporting policies are major driving force for further management of these sites (grasslands) for farmers. For other stakeholders (non-governmental organizations, administration of the protected areas, volunteers and donors) in all case studies the main driving force is a decline of biodiversity and enthusiasm of these actors in initiating collective action to prevent this trend. This is a base for different interests influencing the initiation and sustainability of the collective actions. General public shows signs of growing demand for public goods and ecosystem services, which is the important driver for initiatives where support from inhabitants is needed (source: workshops carried out in the framework of the PEGASUS project).

Table 3: Policies and organizations implementing them in the case study areas, and level of their operation

Case Study	Policy tools	Organization in charge
CZ-1 Biodiversity rich meadows in White Carpathians	Program for Landscape Management	Ministry of Environment – national level, Agency for Nature Conservation– meso-level
	Rural Development Program - Agri-environmental Measure	Ministry of Agriculture - national level, Paying Agency – meso-level
	Rural Development Program – Less Favourite Areas Measure	Ministry of Agriculture – national level, Paying Agency – meso-level
	Direct Payments (Cross-Compliance and Greening)	Ministry of Agriculture – national level, Paying Agency - meso-level
	Support for environmental non-governmental organizations activity	Ministry of Environment – national level
	Rural Development Program - Natura 2000 in Agricultural Land Measure	Ministry of Agriculture – national level, Paying Agency - meso-level
	Program LIFE+	European Commission, DG Envi – EU level, Ministry of Environment – national level, Nature Conservation Agency – meso-level, Non-governmental organization and Protected Landscape Area administration – local level
	Law on Nature Protection No. 114/1992 Coll.	Ministry of Environment – national level, Nature Conservation Agency – meso-level
	Birds (Parliament and Council Directive 2009/147/EC) and Habitat Directives (CD 92/43 EEC)	European Commission, DG Envi – European level, Ministry of Environment – national level, Nature Conservation Agency – meso-level
	CZ-2 Birds and amphibians support on wet meadows	RDP - Agri-environmental- Measure
Direct payments (+ Cross-Compliance and Greening)		Ministry of Agriculture, Paying Agency – meso-level
Support of environmental non-governmental organizations activity		Ministry of Environment national level
Law on Nature Protection No. 114/1992 Coll.		Ministry of Environment national level, Nature Conservation Agency – meso-level

	Agriculture law No. 252/1997 Coll.	Ministry of Agriculture – national level
	Birds (Parliament and Council Directive 2009/147/EC) and Habitat Directives (CD 92/43 EEC)	European Commission, DG Envi – European level, Ministry of Environment – national level, Nature Conservation Agency – meso-level
CZ-3 Restoration of forest: guided succession	Operational Programme - Environment	Ministry of Environment, State fund for Environment
	Program for Landscape Management	Ministry of Environment – national level, Nature Conservation Agency – meso-level
	Law on Nature Protection No. 114/1992 Coll.	Ministry of Environment, Nature Conservation Agency – meso-level
	Forest law No. 389/1995 Coll.,	Ministry of Agriculture – national level
	Government Decree 14/2014 on financial support in forestry	Ministry of Agriculture – national level,
	Support for environmental non-governmental organizations activity	Ministry of Environment – national level

Source: Čámská, Pražan (2016)

3.2 Public goods and ecosystem services provision change

The initiatives covered by the case studies were focused on provision of PG/ESS, and therefore it was important to assess the actual outcome of the action situation and how these outputs are communicated between stakeholders. In all cases the actors reported improvement of biodiversity but no in all cases there was available evidence for that statement.

The first case study CZ-1 is situated in the region with ancient extremely biodiversity-rich meadows in the East-South border of the Czech Republic. The latest studies proved that the meadows' history can be 10 000 years long (Hájková et al. 2011) and this one of the main factors which are responsible for this high plant biodiversity, together with ecological conditions (Merunková et al. 2012) and long tradition of extensive cutting management (Jongepier 2013, Jongepierová et al. 2008). Plant species number in the locality Čertoryje in the White Carpathians (the focus area of the PEGASUS case study CZ-1) is the highest among the world ecosystems comparing areas less than 50 m² (131 species in 49 m²; Wilson et al. 2012, 44 species in 0,25 m²; Klimeš et al. 2001) and in total size 6 km² of Čertoryje was found in 2004 in total 600 species of plants (Jongepierová et al. 2008). High number of rare and endangered plant and butterfly species can be seen in the grasslands (e.g. orchids). Biodiversity monitoring is carried out regularly by botanists and entomologists from the administration of the Protected Landscape Area using standard methodology (in line with the Plan of care for the Protected Landscape Area, the standard monitoring of NATURA 2000 habitats and species and the plan for monitoring the LIFE project Butterflies CR – SR). The target rare butterfly species numbers are slowly increasing (monitored from 2011; Anonymous 2016). According to the administration representatives the ecological and social-economic benefits are provided in increasing quality (therefore the positive trend) and quantity (achievements exceed targets, so far), but no long time series were published (comparing 30 years of the co-operation between farmers and conservationists). Despite several recent scientific and popular science publications and a regional magazine published by the local organization of the nature protectionists there are still gaps in provision of these positive results to farmers, to increase their sense of ownership over the achievements of their effort.

Except biodiversity other public goods and ecosystem services are provided here, special beautiful landscape, cultural heritage (e.g. common grass cutting in traditional costumes) and several regional traditional production (however joint with ecological fruit orchards in the region, not with the grasslands). One of the farmers has started to sell the “White Carpathians hay” in the lowland, but it is an exception.

The second case study CZ-2 is focused to the bird and amphibian biodiversity improvement in the locality of Josefovské grasslands in the Eastern Bohemia. The project focuses on two main ecological and social-economic benefits: 1. Restoration and increasing of biodiversity, joint with alluvial meadows and wetlands, especially wader birds and amphibians, and 2. Educational benefits for public. As secondary effect there is 3. Benefit of cultural experience with restoration and using of former irrigation system, unique in the region, maybe in the country. The benefits from support of biodiversity and irrigation restoration are closely synergistic in this case. There is a continual effort of the Czech Birdlife Society to monitor development of the bird abundance and species structure, which is recorded annually in the last 10 years; the results are shown in the figure 1. Data of frog abundance are summarised in the table 1.

Figure 2 The species number and abundance of birds recorded in the Josefovské grasslands locality in the years 2005-2015 (the horizontal axis). The vertical axes indicate the number of species (the left one) and the number of units (the right one). Source: the Czech Birdlife Society http://bigfiles.birdlife.cz/JL_druhy.pdf.

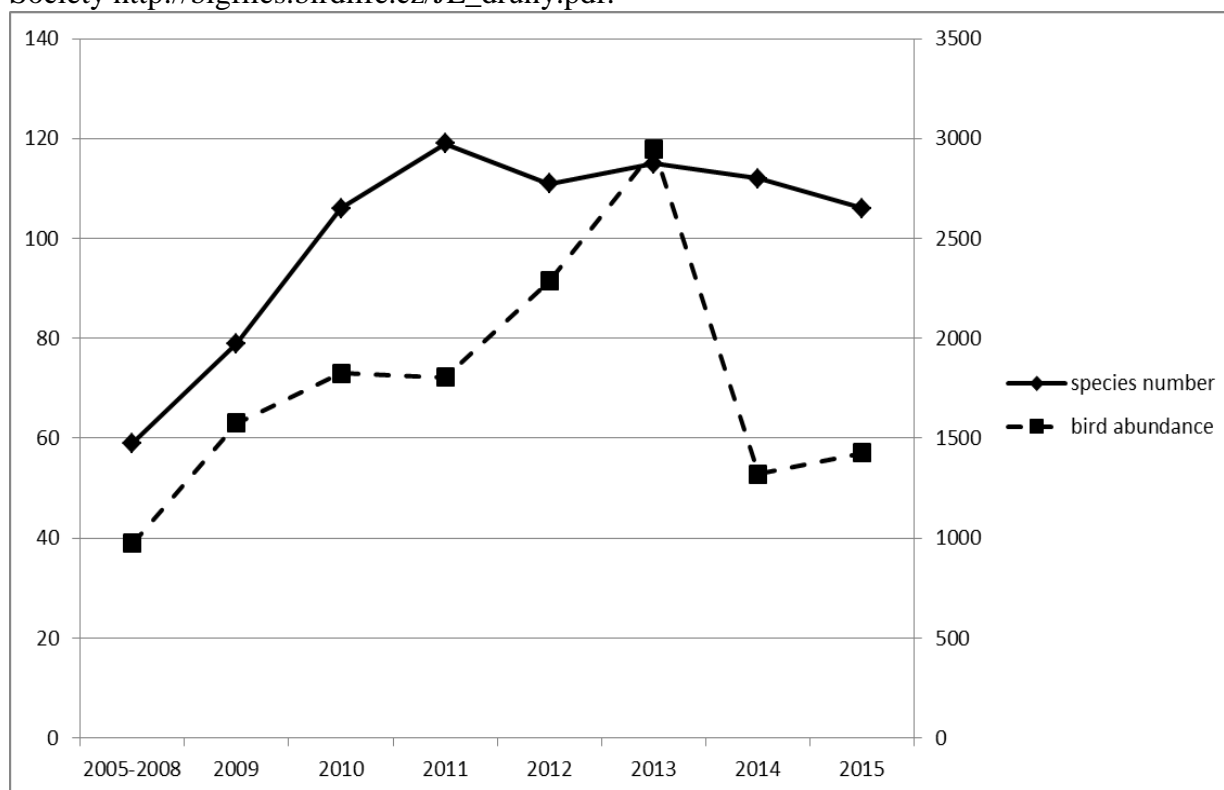


Table 4: Abundance of amphibians and species number observed on the site in the Josefovské meadows (CZ-2)

Number of amphibians	Year 2009	Year 2016
Marsh frog (estimates)	10	400
Crested Newt	5	150
Number of species	4	7

Source: Czech Birdlife Society 2017 (not published)

The educational and social benefits provided by the project are also increasing with new educational facility establishing and increasing of number of public events from 1 in 2009 to 6 in 2016.

The third Czech case study CZ-3 was located in the young degraded spruce forest and it is focused on biodiversity increase and education. The leading nongovernmental organization made no regular monitoring of the seedling survival or measurement of ground cover by different levels of vegetation and the number of species, but they are preparing monitoring of abundance and species diversity of bats. They feel that some monitoring is missing but there are no available capacities for it at present. The project forester visits the area often (weekly during the season) and checks the state of vegetation, bark beetle damages and fencing visually, the external forest expert does the same activities in less frequent intervals.

Indirect way for consideration of the tree species biodiversity is amount of planted seedlings (more than 70 000 from 2004), number of nesting boxes for owls (10) and bats (40). Simple comparison of the biodiversity provision could be done by cheking the old and new photos of the project area (increasing number of young deciduous trees) or by look into the fenced project forest and the surrounding forest without any undergrowth). The key determinant of improvements in ESBO provision in the project but also generally in the Czech mountain forests is amount of deer in our mountain forest.

The educational benefit from the project is stable for last years, considering stable number of the project public events (1-2 annually, appr. 40-50 visitors each event).

Table 5: Monitoring of outputs from action situation and sharing of its results

Cased study area	CZ – 1	CZ - 2	CZ - 3
Measuring the change in provision	Monitoring is provided	Monitoring is provided	Monitoring is not provided
Communication of outcomes	Results of monitoring is rarely provided to farmers, who use the resource	Results of monitoring is quite well provided to donors, could be improved in case of farmers who use the resource	Information on PG/ESS provision is provided to donors insufficiently.

Source: results of interviews in all case studies

3.3 Characteristics of the subsystems of SES

These characteristics are presented per case study area. Property rights is presented at the end of this section in table, which enables comparisons between case studies.

CZ-1 Biodiversity rich meadows in White Carpathians, East Moravia

Actors tried to initiate collective action in different ways already for a long time, but the action situation represents so far rather weak cooperation.

Resource system

The biodiversity rich dry grasslands with scattered trees in the southern part of the White Carpathian Mountains. The most valuable sites cover appr. 900 ha from 3,972 hectares of total grassland area.

Resource unit

Hay (tonnes), biodiversity rich meadows, typical landscape.

Actors

The main stakeholders on the national level are the Ministry of Agriculture, Paying Agency, Ministry of Environment and Nature Conservation Agency of the Czech Republic. On meso-level, the main stakeholders are: the Landscape Protection Area Administration (a part of Nature Conservation Agency), farmers, 2 non-governmental organizations (mainly a local branch of Association of the Czech Union for Nature Conservation), and the regional office of the Paying Agency. Indirect local actors would include the local population, other associations in tourism and food processing of local products, and tourist information centres. Only 7 farmers and one non-governmental organization manage the core case study area in the South part of the Land Protected Area White Carpathians.

Action situation

The extensive grassland management tailored to the habitats and target species needs. Stakeholders coordinate their activities in an attempt for “collective action”: biodiversity rich meadows are managed (and partly restored) through partnerships of the two ministries, the non-governmental organizations and the local farmers. The non-governmental organizations play an important role in filling the gaps in management provided under state policies.

Governance system

Regulatory and scheme contract design decided on the national level and local delivery and partnership. An agreement between the administration of the Land Protected Area and the farmers is necessary to tailor the schemes.

External factors/environment

Extreme weather events are more often (especially drought in the region); unprofitable livestock production, an increasing interest of public on the environment.

CZ-2 Birds and amphibians support on wet meadows, East Bohemia

The resource system

The project locality is about 70 ha of wet alluvial grassland and water in stream. The project “Bird Park Josefovské grasslands” is located in the North-East part of the Czech Republic and was founded in 2008. Restored original hundred year old unique irrigation system of surface channels is located between Old and New Metuje River.

The resource unit

Usual management of the grasslands is twice a year hay making. Only part of the hay is used for farmers’ cattle or horses, part is sold (e.g. zoological garden) or donated to village people for hobby animals, the demand is low (source: the farmers).

Actors

Actors in the project are The Czech Birdlife Society, a local branch of Association of the Czech Union for Nature Conservation, 6 farmers, local officers, donors and volunteers, and land owners, local population, hunters and fishers.

Action situation

The extensive grassland management, irrigation system management, small ponds building, and educational activities are done with support of public (mainly the Agri-Environmental-Climatic Measures of the Rural Development Program 2014-2020), and private finance. The main institutional change consisted of acquisition of part of the grassland by non-governmental organizations, creation of a working group, and the agreement between non-governmental organizations on the common approach, agreement with farmers on the grassland management, agreement on restoration of irrigation systems, and also between users of water (a small water power plant is also involved). The cooperation of some actors in educational activities for general public is necessary. Also there is an effort in finding agreement between the non-governmental organizations and hunters/farmers over the

conflicting interests. The coordination is carried out by working group with well distributed roles, even the distribution is not formal.

Governance system

The grassland management is supported by CAP (SAPS and AECM), partly by environmental programmes of Ministry of Environment; the project is managed by a working group (two non-governmental organizations) in collaboration with local, regional and national authorities and donors.

External factors/environment

Extreme weather events are more often; unprofitable livestock production, an increasing interest of public on the environment.

CZ-3 Restoration of forest: guided succession, North Bohemia

The resource system

A former commercial young spruce forest in conversion to a near-natural forest with mixed species structure is located in the Ještěd ridge in the region of Liberec, in the Czech border with Germany/Saxony. The project area is 32 ha.

The resource unit

The increased biodiversity and ecological value and stability of the forest; no wood for market is produced.

The action situation

Actors cooperate in funds provision and work on the conversion of commercial forest to near-natural forest. A management supporting natural succession consists of cutting some old spruces, planting different species of trees, protecting them with constructed fences, letting old trees to die and organization of educational public events. Some special facilities were installed there (like nests for owl and bat, or a nature trail).

Different **stakeholders** were motivated to contribute to the process of restoration by financial means or by their work. The NGO started originally the initiative as collective action but was not successful to agree with forest owners. Therefore the main institutional change was the change of property rights – the non-governmental organization bought the forest land to first get freedom for the way of conversion of the forest (in compliance with the rules of Law on forestry) and second to build trust and reputation (also through transparency) in order to get support from general public to raise funds.

The governance system

The key actor is the non-governmental organization “Čmelák – friends of the nature”, found in 1996, and the related land-trust, a member of the Czech Land-trust Organization. It operates under national policy rules (e.g. the law on forest management, EU funds). The organization is now the owner of some 60 ha in total (forests, wetlands, a pond, some grasslands), in 20 localities in the region. The forest activities are coordinated with the external forest expert (it is obligatory by the law).

External factors/environment

Extreme weather events and bark beetle calamities are more often these days.

In case of property rights the case studies differ significantly. In CZ – 1 and 2 the farmers and NGOs have rights based on rent agreements or ownership of the grassland (resource system) and have rights to withdrawal of green matter. In CZ – 1 farmers are limited in their rights on protected meadows (limits in management, e.g. fertilisers use), while in CZ – 2 there are partly limited by irrigation of land (especially those who did not agree with the project). In CZ – 2 also NGO is an owner of the land. It started to buy the land based on experience of low trust to farmers in order to secure sustainability of their operations on the wet meadows. NGO

bought all land in order to have full control over the management of the sites in CZ – 3. Hunters feel limited in their rights to manage game animals because too large area is fenced off to protect new seedlings. Following table describes in brief distribution of different forms of property right between actors in three case studies.

Table 6: Comparison of the property rights change in the case study areas

Stakeholder	Access	Withdrawal	Management	Exclusion	Alienation
<u>CZ-1 Biodiversity rich meadows in White Carpathians</u>					
Farmers	On rented (most) and owned land	On rented and own land	Limited rights (regulations)	Rented/owned land (difficult to enforce)	Only own land
Leading non-governmental organization	On rented land	On rented land	Limited rights (regulations)	Rented land (difficult to enforce)	NO
Protected Landscape Area administration	Protected grasslands	NO	NO	YES on protected grasslands	NO
<u>CZ-2 Birds and amphibians support on wet meadows</u>					
Farmers	On rented (most) and owned land	On rented and own land	Limited rights (irrigation)	Grasslands (difficult to enforce)	Own land
Leading non-governmental organization	Own land To irrigation system	Own land Irrigation system Benefits from ESBO	On own land Irrigation system	Irrigation facility – enforcing difficult	Own land
Owners of the land – non-farmers	On owned land	No (possible after lease contract ceased)	NO (on leased land)	On their land – difficult to enforce	On owned land
Hunters	On grasslands	NO	NO	NO	NO
Fishers	To river facilities	Water body (river)	Water body (river)	Only authorised fishers	NO
Municipality	Water body Irrigation system	NO	NO	NO	NO
<u>CZ-3 Restoration of forest: guided succession</u>					
Leading non-governmental organization	YES	YES (not used yet)	YES	YES (to some extent)	YES
Hunters	YES	YES – game animals	NO	NO	NO
General public	Limited	NO	NO	NO	NO

Source: adapted from Ostrom (2010); results of the interviews in the case studies

3.4 Collective action characteristics

This section focuses on characteristics related to the collective actions (more or less successful in the case studies carried out). Several of these characteristics belong to the

assessment of action situation, but these will be presented here again and in relation to collective action.

The case studies represented different level of the collective action. In CZ-1 the actors did not managed to create full collective action despite the long term effort (30 years) from both administration of the Landscape Protected Area, non-governmental organization and some farmers. But the effort led at least to some degree of cooperation complicated by some features of hierarchical behaviour used by PLA administration (Prazan 2014, Prazan, Theesfelt 2014). On the national level there was started also some relatively advanced level of cooperation, when Ministry of Environment and Ministry of Agriculture agreed to create web based tool (a special application in the Land Parcel Identification System) which facilitates agreement between the farmers and the Landscape Protected Area administration on the targeting of Agri-environmental Schemes. But it was revealed that both ways of cooperation do not represent full collective action.

In CZ-2 the collective action was initiated, but some farmers did not join the initiative. It means that some agreements of actors in the collective action influenced those, who were not involved in the decision making (especially water management regime of wet meadows). Also donors of financial support became part of the collective action.

In CZ-3 the collective action was represented mainly by the non-governmental organization carrying out the project and donors and supporters (financial or in kind), partly also by the local forest expert.

3.5 Factors of collective action

An external condition for a successful collective action with the aim of provision of public goods and ecosystem services was a need for demand for such goods/services or at least appreciation by inhabitants which was possible to turn into demand under the action situation. In all cases the interviewees indicated the **demand for** public goods and ecosystem services is growing. Inhabitants were not directly included in the collective action in CZ-1 and the public appreciation was not valued high in this case study area by some actors, but by some yes (including by conservationists, researchers). In this case there were rather visible contrasting opinions of the stakeholders. Several interviewees believed the public goods and ecosystem services are valued by inhabitants in region high, but farmers did not agreed at the workshop fully with this statement. On the national level stakeholders agreed that the demand for public goods and ecosystem services is growing quite significantly during the last years.

The definition of factors of success of collective action were adapted from literature (Ostrom 1990, Ostrom 2005; Ostrom and Cox 2010; McGinniss and Ostrom 2014).

In the case studies CZ-2 and CZ-3 the **coordination and management** were regarded as quite sufficient and supporting the collective action. Significant effort in coordination of the cooperation was recognised in CZ-1 from the Protected Landscape Area administration which represent largest group of actors between the three case studies.

Information sharing between the actors was valued quite high by the interviewed stakeholders in CZ-2 and CZ-3, and on the national level workshop. In CZ-1 this factor was seen as deficient.

The results of interviews and especially the workshops showed there is lack of **knowledge how to initiate and run collective action** between stakeholders in all the case studies. But there were some differences. In CZ-2 the leading non-governmental organization coordinating the collective action hired a local project manager who is quite trustworthy and he is able to bridge the lack of knowledge to some extent by strong enthusiasm and by his personality.

The level of **trust** was recognised quite low between farmers and the Protected Landscape Area administration in CZ-1, some farmers and the leading non-governmental organization in CZ-2, and between the leading non-governmental organization and the hunters in CZ-3. Much higher was the trust level between the actors with similar interests (between the leading non-governmental organization and the Protected Landscape Area administration, two the leading non-governmental organizations and donors in CZ-2, and the leading non-governmental organization and donors in CZ-3). National level workshop approved in general, that the level of trust prevents viable collective action for public goods and ecosystem services provision (the stakeholders mentioned it prevents the farmers in cooperation even when profit is in stake).

Difference in the interest was quite high between the farmers and the non-governmental organizations/ Protected Landscape Area administration (CZ-1 and CZ-2). Between the non-governmental organization and the hunters (CZ-3) the interest was not so different, but the way how the goals should be reached. But it was very close between the non-governmental organizations and donors and volunteers (CZ-2 and CZ-3) and between two the non-governmental organization s (CZ-2) and NGOs and protected area administration (CZ – 1).

The results of the interviews and workshops showed that the principle of **reciprocity** is not systematically pursued by the actors but rather intuitively, even in rather successful collective action in CZ-2. This was also assessed by the stakeholders at the case study level workshops and the national workshops as a limiting factor of the collective actions. The principle of reciprocity was suggested on the second workshop in the CZ-2 case study area: the non-governmental organizations and a representative of the local administration offered to the farmer the support of demand for his commodities and increase of reputation as a reward of managing the site (the non-governmental organization coordinate large network of environment enthusiasts), the farmers replied to the offer: “Higher reputation and demand for my commodities cannot help me”.

Regarding an **agreement on common rules** the CZ-2 and CZ-3 were quite good examples in the case of donors. Donors see the rules implemented by the non-governmental organizations for the funds collection as transparent and this supports quite high trust to these two non-governmental organizations. Between the non-governmental organization and the farmers the agreement on rules happened well in the case of water regime under CZ-2 (required by law), but no rules agreed in the case of CZ-3 between the non-governmental organization and the hunters and the rules had to be agreed on the government level to solve the dispute. In the

case of CZ-1 the rules are given from the national level and implemented on the local level and are defined for agri-environmental contracts (both EU and national types) and based on the Law for the Nature and Landscape Protection. The space for the rules definition was not large in this case, but the rules perception by the farmers was influenced a lot by the way how the rules were implemented on local level (i.e. from the Protected Landscape Area administration) which proved to have several inconsistencies (Pražan 2014).

Rules compliance was **controlled** rather heavily in CZ-2 on the local level, which was given by their origin – based on the laws and regulations (Common Agricultural Policy or the Law on Nature and Landscape Protection). On the national level (CZ-1) the rules between two ministers were not controlled in usual term, but the agreed process of cooperation assured the rules were observed. Rules in CZ-2 were agreed between the non-governmental organization and the farmers (water regime with written document, less formally on grassland management), but their compliance is rather well controlled, even the control system or penalties were not defined clearly. Rules associated with fund rising were observed well by the non-governmental organization in CZ-2 and CZ-3, and helped to the success of collective action.

Monitoring of effects of the action situation is quite well running in CZ-1 and CZ-2. But only in CZ-2 the results are **communicated** to donors (not sufficiently to the farmers and other actors). In CZ-3 the regular monitoring did not start yet. This deficiency was recognised also on the national level (source: the final national level PEGASUS workshop) as a key for the collective action success. In the case of CZ-1, where only policy support is driving force for public goods and ecosystem services provision, this deficiency leads to uncertainty over the actual purpose of the support (Pražan 2014).

Factor “**Available information about actors’ preferences over reciprocity, trustworthiness, cooperation**” as a condition for a successful collective action, was not identified as a systematic mechanism in any of the studied cases. On the national level this factor was regarded as a factor with negative connotation (sharing such information was seen as a betray) (source: the final national PEGASUS workshop).

Leadership was regarded as very important in all the cases. In CZ-1 and CZ-3 strong leaders were present, and in CZ-2 the leader was not so strong but very enthusiastic and committed, and in addition quite trusted by local inhabitants. The participants on the final national PEGASUS workshop agreed that there is a lack of leaders because they are rather soon burnt out, because they have to regularly overcome the unstable institutional environment, low trust and other factors preventing collective action.

Table 7: Overview of the selected factors of the successful collective action

Factor	CZ-1	CZ-2	CZ-3
Demand for public goods and ecosystem services	Opinions differ	YES	YES
Coordination and management	Not clear	Good	Good
Information sharing	Not sufficient	Quite sufficient	Quite sufficient
Knowledge how to run a collective action	Low	Low	Low
Interest: farmers/foresters - the non-governmental organizations/ the Protected Landscape Area administration	Very different	Very different	Very different
Interest: the non-governmental organizations and donors and volunteers	NA	Close	Close
Interest: the non-governmental organization and hunters	NA	Partly similar	Different
Trust level in relationship: farmers- the non-governmental organization	Poor	Poor	NA
Trust: farmers – the Protected Landscape Area administration	Poor	NA	NA
Trust: the non-governmental organization – donors and volunteers	NA	High	High
Reciprocity considered by the actors	Not sufficiently	Only partly	Not sufficiently
Operational rules definition between the non-governmental organization /the Protected Landscape Area administration and farmers	By legislation –formally defined	Water regime formally agreed, grassland management formally under legislation and less formally between leading NGO and farmers	NA
Rules of fund rising	NA	Well defined	Well defined
Rules: the non-governmental organization and hunters	NA	Not defined	Not defined
Rules: control	Quite effective	Quite effective (even not agreed sanctions)	NA
Conflict resolution system	Not well implemented (defined in past)	Not defined	Not defined
Signals on actors' preferences	Not reliable	Not reliable	Not reliable
Leadership	Strong and committed	Committed	Strong and committed

Source: Records from the case study interviews and workshops

NA: Means not applicable

4. DISCUSSION

In all cases the purpose of collective action or at least some level of cooperation led to increase of biodiversity and also in some cases to some social public goods (e.g. education).

The context for the collective actions in three case studies differs a lot. The cases are very different in institutional settings and also in resource system. One must consider: CZ-2 and CZ-3 are located outside the protected areas (only part of CZ-3 area belongs to the protected created for one bat protection); on the contrary CZ-1 is located in the most valuable part of the Landscape Protected Area with the highest habitat (mostly the 1st zone of the protection) and often species protection. The Landscape Protected Area administration is responsible for the suitable management of the whole area, but the funds from the Ministry of Environment are not sufficient. Therefore there is necessary to use CAP tools, especially Agri-environmentally-climatic Measure, which is not tailored enough for such purpose (Pražan, Čámská 2015). The level of cooperation of the local non-governmental organisations (there are more than one in the region) and the Landscape Protected Area administration and efforts to reach an agreement with farmers are high and still not common in the CR.

The capacity of actors to carry out a collective action also differ, but it is to a large extend influenced by different institutional settings because the deficiencies in capacity to carry out collective action were found very similar in all cases. For example in CZ – 1, the relationship between actors with different interests (i.e. farmers and protected area administration) is determined to a large extent by legal rules agreed on national level but not agreed between actors. Despite significant effort of both parties the collective action was not possible in this case.

There is a group of factors which do not support success of collective action, because of their low maturity (e.g. low trust, not applied reciprocity, low capacity to implement and enforce rules, absence of signals on preference of actors on reciprocity, trustworthiness, lack of knowledge of principles of collective action) led to substantial change in property rights as a second best strategy to pursue sustainability of achievements in environmental public goods and ecosystem provision (cases CZ – 2 and 3). But there is intuitive need for collective action, because in all cases actors tried first the collective action and the other options were chosen when this was not attainable between groups with different interests.

In two case studies (CZ – 2 and 3), it was possible to carry out the collective action by actors with similar interests (e.g. between NGOs and donors, between different NGOs). In both cases the growing demand for environmental public goods and ecosystem services was used for fund rising from inhabitants (for land purchase) and also public funds for capital works.

Leadership was recognised as key factor, which is able to some extent bridge the low capacity for collective action (factors mentioned in table 7), but because these are changing slowly (Slangen 2008), the leaders are at risk of being burn out because the activity is too demanding. In cases CZ – 2 and 3 the high pressure on the leadership was recognised as a risk factor for the long term sustainability of the initiative.

It was revealed the capacity to cooperate between actors with different interest in the case studies is very low, which was approved also by participants of the national level workshop. At that event it appeared, that the loss of capacity to cooperate is not fully recognised by actors and some of the factors of success of the collective action was seen even as sign of negative behaviour in society. The factor was: “Available information about actors’ preferences over reciprocity, trustworthiness, cooperation”. This factor was according to participants conditioned by “reporting” in society which is perceived as betray. This factor needs further investigation in order to increase the understanding of its origin, which could give sufficient knowledge to overcome that deficiency in favour of future attempts of collective actions.

5. CONCLUSIONS

In studied case studies is the capacity to run collective action for public good and ecosystem provision quite low between actors with different interests and the knowledge how to initiate and run such initiative is low. The difference in final outcome of collective actions was more influenced by difference of institutional settings and some factors in the environment to action situation, than the capacity of actors to run collective action, which was similarly low in all case studies.

There is a need for deeper understanding of origin of some factors which do not support the success of collective action in order to facilitate growth of capacities of actors to initiate and run the collective action for environmental public goods and ecosystem services provision.

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