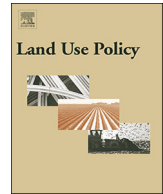




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# Fostering adaptive co-management with stakeholder participation in the surroundings of soda pans in Kiskunság, Hungary – An assessment

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## ABSTRACT

In constantly changing complex social-ecological systems conservation organisations need to take steps toward adaptive co-management if they want to be effective in their conservation activities. In the surroundings of the soda pans of the Kiskunság region in Hungary, a participatory process was initiated with the local national park directorate to understand the socio-economic context of the sodic wetland area, reveal the perceptions of local stakeholders about the current and preferable management of the area and start discussions with them about certain priority management issues related to sustainable use (grazing and ecotourism). In this article, we show how this process helped in taking the first steps toward adaptive co-management. For the assessment, criteria of effective adaptive co-management were derived from the literature. The results show that most conditions for adaptive co-management have already been fulfilled (e.g. identified set of stakeholders, sense of place shared or incentives for participation) and some social outcomes were achieved. The participatory process assisted the collaboration of stakeholders, which can contribute to positive economic and ecological outcomes in the future. Through the engagement of local stakeholders some conflicting management issues were resolved (e.g. accepting a wider range of grazing animal species and allowing flexible time for mowing) and collaboration started on ecotourism issues (e.g. information sharing with the assistance of the national park directorate). This process can be seen as the ‘formulation’ phase of adaptive co-management but more efforts are needed to move toward the ‘conjoint’ phase with more actions, monitoring and social learning. Our case also shows that ACM can be a good method for both conservation and rural development but supporting policy environment as well as financial resources assisting the participatory process and nature-friendly farming activities can be important for its long term success.

## 1. Introduction

Nature conservation is operating in complex social-ecological systems, which are characterized by constant changes with many uncertainties (Folke, 2006). Under these circumstances, conservation organisations need to be aware of the socio-economic characteristics of their operational area and undertake adaptive strategies in collaboration with local land users in order to sustain long term conservation results. It is particularly important in those areas where ecosystem management is shared with other local actors.

In contemporary conservation there has been a shift from traditional

natural resource management to adaptive forms of management, e.g. adaptive management, co-management and governance. Adaptive management has emerged as a response to uncertainties and rapid changes in complex social-ecological systems. It has been defined as a structured decision making in loops of learning by doing (Holling, 1978). Co-management is characterised by shared decision making and conflict resolution in close collaboration with local stakeholders (Berkes, 2009; Fabricius and Curry, 2015). Adaptive co-management (ACM), also referred to as collaborative adaptive management (CAM), combines the principles and practices of adaptive management and co-management focusing on joint management and learning by doing

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(Armitage et al., 2009; Plummer et al., 2012; Fabricius and Curry, 2015). It is flexible, site and situation specific. Adaptive governance places an emphasis on the socio-economic context of adaptive management, i.e. on the rules, institutions and interaction between stakeholders (Dietz et al., 2003; Folke et al., 2005; Chaffin et al., 2014). According to some scholars, adaptive co-management is a form of or approach to adaptive governance (Berkes, 2009; Fabricius and Curry, 2015).

Adaptive co-management is a type of collaborative governance which is different from top-down governance, typically characterising traditional conservation and land use policies (Berkes, 2009). While top-down governance is marked by stable institutions and a regulatory system with fixed rules and fewer interactions between stakeholders, ACM processes need a policy environment that gives room for more flexible decision making, where creative solutions can be found (Armitage et al., 2009). It can be a challenging task to transform existing policy organisations to better suit ACM processes (Folke et al., 2005). Bridging institutions can play a vital role in mediating between government bodies and local stakeholders to create this supporting environment (Berkes, 2009).

Plummer and Baird (2013) distinguish three stages of the ACM process: 1) inchoate stage, where the resource and actors exist but do not interact, 2) formulation, where stakeholders start to interact, deliberate and some learning takes place, and 3) conjoint, where deliberation and collaboration continues, some actions are implemented, monitored and social learning also takes place. Interaction and collaboration among stakeholders are key features of ACM (Miles, 2013; Monroe et al., 2013; Islam et al., 2018). Participatory processes can reveal the main stakeholders, their views and perceptions about the management of the area, identify and take steps toward resolving conflicts, as well as initiate cooperative actions (Reed, 2008). Therefore, in our view, they can be truly helpful in assisting the design and implementation of ACM in all three stages. However, if these processes are not carefully planned, and are carried out without the appropriate social skills, they can have negative effects (Reed, 2008; Díez et al., 2015) that undermine ACM.

Empirical examples of ACM are quite extensive in the literature and include approaches to fisheries and wetlands (Olsson et al., 2004; Sandström and Rova, 2010), management of protected areas and biosphere reserves (Plummer et al., 2017), forestry (Leys and Vanclay, 2011) and tackling climate change (Butler et al., 2016). It is also foreseen to be used in nature tourism development (Plummer and Fennell, 2009; Islam et al., 2018). Experiences are reported from developing countries (Butler et al., 2016) and also from many parts of the developed world including the US, Australia and Europe (Olsson et al., 2004; Leys and Vanclay, 2011; Farhad et al., 2017).

In Central and Eastern European (CEE) countries a few attempts to design or implement adaptive management have been reported (Agrawal, 2000; Grygoruk et al., 2014; Sendzimir et al., 2006), as well as some discussions with certain stakeholder groups about the design of adaptive processes (Malatinszky et al., 2013). More papers are available on participatory processes regarding management of protected areas (Anthony and Moldovan, 2008; Svajda, 2008; Stringer and Paavola, 2013; Kovács et al., 2016, 2017; Niedziakowski et al., 2012; Molnár et al., 2016). Yet, reporting on ACM processes connected to participatory processes in CEE countries is still lacking.

Assessment of ACM has been an important part of the ACM literature. Evaluation frameworks have been developed that include criteria related to conditions for ACM, as well as ecological, economic and social outcomes (Plummer and Armitage, 2007; Armitage et al., 2009). Most ACM cases are presented as case studies showing the development of the ACM through time (e.g. Olsson et al., 2004) or concentrating on certain characteristics of ACM, like social learning (e.g. Leys and Vanclay, 2011). Systematic evaluations of ACM processes have just started to emerge in recent years, including the seal and salmon conflict management in the UK (Butler et al., 2015), riparian assistance

program related to public rangelands in the Western part of the US (Smedstad and Gosnell, 2013) and rice farming in Spain (Farhad et al., 2017). Papers on the evaluation of ACM cases or processes initiating ACM in CEE countries are also lacking.

In this paper, we assess the results of a participatory process regarding ACM. The participatory process was carried out within the frame of a LIFE Nature project where stakeholder involvement in enhancing conservation management and taking the socio-economic characteristics of the region into account was a crucial element. We think this process, which was initiated by the Kiskunság National Park Directorate (KNPD), assisted in taking the first steps towards ACM in the surroundings of soda pans situated in the Northern part of Kiskunság, Hungary. Therefore, we use a set of criteria derived from the literature to assess whether the conditions of ACM had been met and what social, economic and ecological outcomes had been achieved. In the discussion, we concentrate on certain features of the ACM process and, in the conclusion, we highlight some policy aspects as well.

## 2. Materials and methods

### 2.1. Description of the study area

The study area (10,264 ha) is located in the Northern part of the Kiskunság region of Hungary, characterised by soda pans (also called sodic pans, sodic or alkaline lakes, sodic wetlands) and steppes (Fig. 1). Habitat structure of sodic pans and surrounding meadows are complex, sodic pans with catchment areas form part of the sodic wetland ecosystem. Part of the area belongs to the Kiskunság National Park and contains two Natura 2000 sites of European importance. The soda pans are designated as Ramsar sites as well due to their importance of providing habitats for migratory birds (Boros, 2007). In addition, they are protected by Hungarian national law due to their unique features (Boros, 1999). The study area includes the focus area of the LIFE Nature project (see Section 2.2) aimed at restoring the Böddi-szék soda pan.

The Carpathian basin is the Western border of Eurasia's sodic pan range (Boros et al., 2008a). The number and extent of soda pans have decreased substantially in the last century, so the remnants are of great significance (Boros and Ecsedi, 2013b).

Sodic pans with open water surfaces differ significantly from other lakes because they are alkaline, characterised by high salinity, have special hydrological features (e.g. fluctuating water level) and nutrient cycles (Boros, 1999; Schmidt, 2003; Boros et al., 2008a, b; Váradi and Fehér, 2010; Boros et al., 2014). This phenomenon is of utmost importance for the conservation of the valuable flora and fauna with primary characteristic species, such as the aquatic Microcrustacean plankton *Arctodiaptomus spinosus* and Chenopodiaceae plant species, e.g. *Suaeda pannonica* (Boros, 2013; Mile and Mesterházy, 2013). Soda pans and their surroundings are very important cross-continental migrating and breeding sites for aquatic birds in Hungary (e.g. *Tringa tetanus*, *Vanellus vanellus*, *Himantopus himantopus*) (Ecsedi and Boros, 2013a). Bird species (Charadriiformes, e.g. *Recurvirostra avosetta*) which feed exclusively inside soda pans play an important role in the regulation of the trophic relationship by successfully feeding off their prey, mainly Microcrustacean plankton and Nektonic species (Boros et al., 2006a, b; Horváth et al., 2013) in a short period (Székely and Bamberger, 1992).

In the 18<sup>th</sup> century the area was dominated by marshlands and wetlands, including soda pans. In the surroundings of the wetlands, semi-nomad grazing took place and arable farming was also practiced (Boros, 2007). From the first half of the 19<sup>th</sup> century small homesteads started to emerge in the area and grazing and mowing became the dominant land use in the surroundings of the soda pans (Újházy and Biró, 2013). In the middle of the 19<sup>th</sup> century, land use changes started to have a significant impact on the state of sodic wetlands. River regulation in the 1840s followed by the construction of channels and desiccation of certain wetlands from the early 20th century dramatically

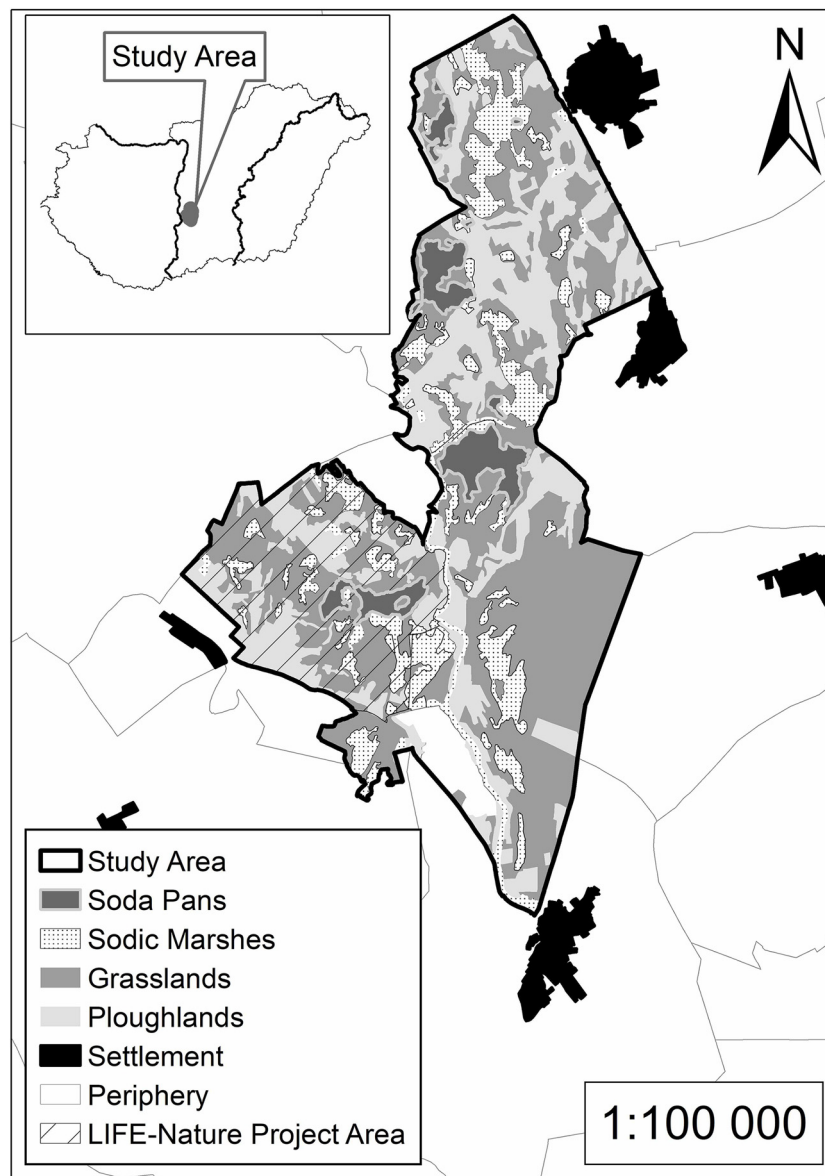


Fig. 1. Location and land cover of the study area (based on Corine Landscape Cover 1:50 000 (CLC50)).

changed the hydrological system and water balance in the area (Boros and Biró, 1999; Boros, 2007; Boros and Ecsedi, 2013b; Újházy and Biró, 2018). Fortunately, at that time still many small homestead farms operated in the surroundings of the soda pans having a positive impact on the wetlands with their extensive forms of farming and grazing (Újházy and Biró, 2013). Livestock grazing continued to take place during the socialist era. In the early 1960s, many animal species still grazed in the surroundings of the soda pans including sheep, cattle, horses, pigs and poultry (Havel et al., 2016). But agricultural intensification with mechanisation, the use of chemicals and fertilisers and the abandonment of homestead farms, negatively affected the biodiversity in the area. Grazing started to decrease and so the type and the number of grazing animals (mostly sheep and cattle remained). As a consequence, the reed and marsh vegetation started to increase (Újházy and Biró, 2013; Havel et al., 2016). Some negative impacts were mitigated by the emergence of conservation management around the sodic wetlands after the establishment of the Kiskunság National Park and its directorate in 1975 (Tóth, 1984; Boros, 2007). After the political changes in the 1990s, conservation activities continued and accession to the European Union (EU) accompanied by the designation of the Natura 2000 sites helped to strengthen the conservation status of the unique habitats of the

Pannonian Biogeographical Region (Mihók et al., 2017), including the soda pans (Boros, 2007). However, some problems dating back to the late 19th century and the socialist era remained (Biró et al., 2015). During the time of the research, conservationists faced with the problems of the unfavourable water dynamics, decreasing number of grazing livestock, the spread of reed and marsh vegetation and the emergence of some invasive species (e.g. *Elaeagnus angustifolia*, *Asclepias syriaca*) in the study area (Boros and Ecsedi, 2013b; Ecsedi and Boros, 2013).

Six settlements are directly connected to the study area, with less than 18,000 inhabitants. The demographic characteristics indicate that the local population has been decreasing since 1970. The education level is quite low (only 29% of adult inhabitants graduated in secondary school), as well as the employment rate (35%) (http1). Agriculture is the dominant land use, including animal grazing, arable farming and vegetable growing. In the study area, 8.161 ha is suitable for grazing, 70% of which is under the management of the Kiskunság National Park Directorate (KNPD). The directorate leases half of its land to 30 farmers (Fig. 2) (KNPD database, 2016).

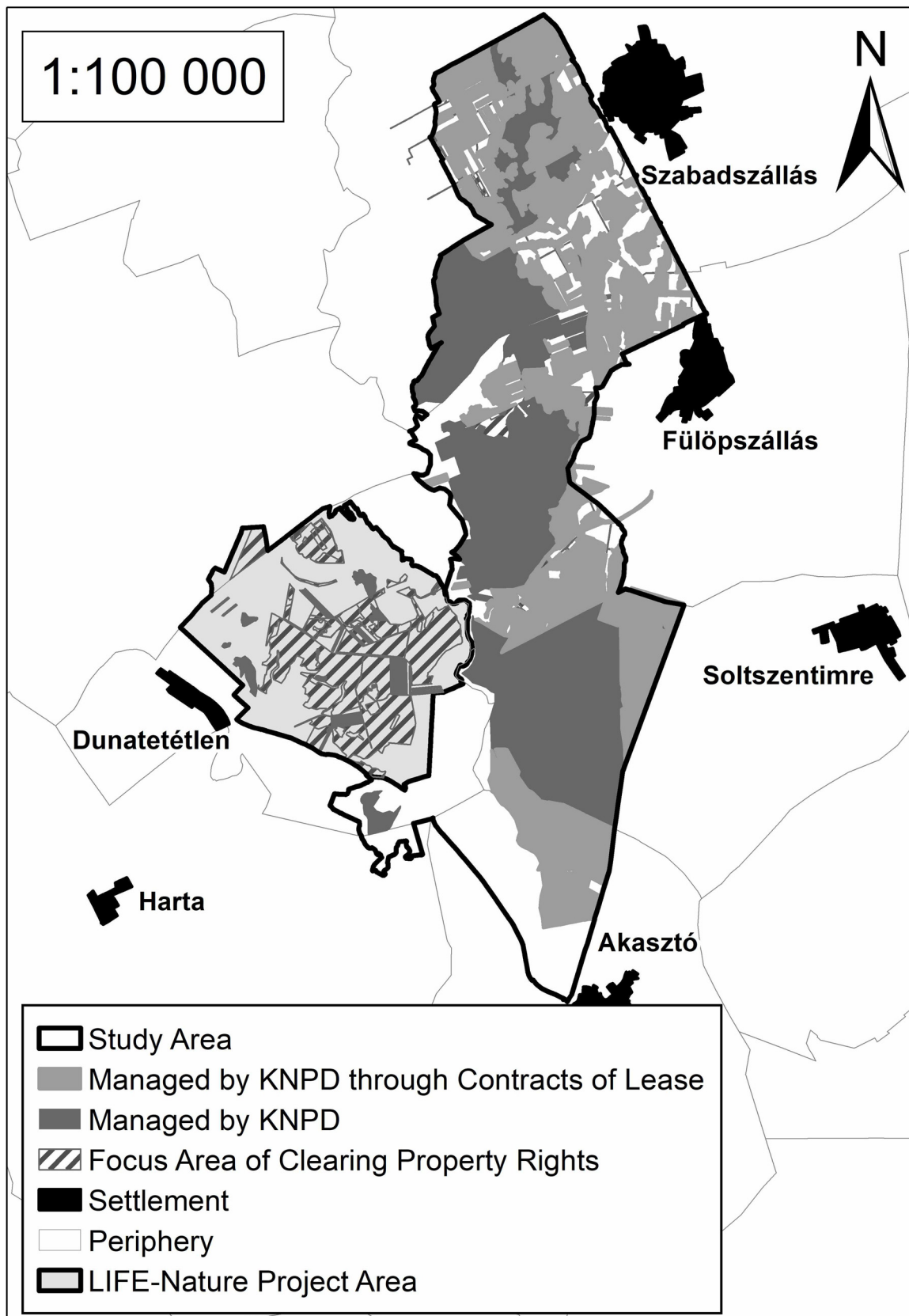


Fig. 2. Spatial distribution of areas managed by the Kiskunság National Park Directorate (KNPD) in the study area. (Source: KNPD GIS database).

## 2.2. Description of the LIFE Nature project

The research project was carried out within a LIFE Nature project (LIFE12NAT/HU/001188), titled “Restoration of pannonic sodic wetlands in the Kiskunság” co-financed by the European Union. The coordinating beneficiary is the Kiskunság National Park Directorate (KNPD) and two nature conservation non-governmental organisations are collaborating as project partners. The project is being carried out from 2013 till 2021. The main aim of the LIFE project is to restore the original water dynamics and natural habitats of the Böddi-szék sodic lake and its catchment area. The main activities include the translocation of a canal crossing the lakebed, reduction of marsh vegetation, elimination of invasive plant species, restoration of grasslands, establishment of infrastructure for grazing and ensuring appropriate grazing livestock population in the surroundings of the Böddi-szék soda pan. A sustainable land use plan is also being developed (<http2>).

## 2.3. Description of the participatory process

In 2015–2016 a participatory process was carried out in the study area within the frame of the LIFE Nature project described in the previous section. It was initiated by the KNPD. The main aim was to involve local stakeholders in further developing the conservation management of the soda pan area. It was conducted in two phases. In the first phase, desktop research, a focus group, interviews and a questionnaire survey were carried out to gather basic information about the past and present land use, the socio-economic characteristics of the area and the perception of the main stakeholder groups about the land management and possible changes. Besides data collection, the first phase was also important to get in contact with all stakeholder groups, start to build trust and foster their commitment to the process. Based on the results of the first phase, in the second phase roundtable discussions were organised to initiate a dialogue between KNPD and the stakeholders on the most pressing issues, move toward conflict-resolution and start collaboration which assists conservation management. The main characteristics of the participatory process are summarised in [Table 1](#). The authors of this paper were all involved in the participatory process, either as participatory researchers (participatory team) or staff members of the KNPD responsible for the management of the LIFE Nature project (project team). The participatory team focused on the methodological development, desktop research, facilitation of the process and data analysis. The project team initiated the process, provided conservation management expertise, assisted data gathering, organised and participated in the focus group and roundtable discussions. The two teams closely collaborated during the process.

At the beginning of the participatory process, a *desktop study* was carried out by the participatory team to assess the land use history of the area and to gather some statistical data on the demographic and economic characteristics of the region.

A *focus group* (Patton, 2002; Newing, 2011) was organised in the autumn of 2015 with staff members of the KNPD involved in the management of the study area (including the project team). It took

place in the visitor centre of KNPD in Kecskemét. The main aim of the focus group discussion was to understand the views of the conservation experts on the current land use and reveal their perceptions about potential and desired changes (see the agenda in Appendix A). The focus group was moderated by a member of the participatory team. It was audio recorded and notes were taken. An extensive summary was prepared, based on notes and recordings, and analysed with qualitative content analysis (Schreier, 2014). Emergent codes were used to reveal the main relevant issues for the conservation experts regarding the management of the study area.

This was followed by *semi-structured interviews* (Patton, 2002) among local stakeholder groups in 2015 and 2016 to reveal their perception about the current land use, the nature conservation activities and their relation to the national park directorate. (see the main themes of the interviews in Appendix B). Interviews were also used to supplement the official socio-economic data about the area and were the first steps to engage the stakeholder groups in the process. They were conducted by two young conservation professionals of the project team, who were trained by the participatory team. Purposeful sampling and the snow ball method were used to identify the interviewees. Altogether 36 interviews were carried out, the duration of which varied between 30–100 min with an average of one hour. They were conducted in pairs, with one interviewer asking questions and the other taking notes. In most cases audio recording was also taken. Notes and literally transcribed text were analysed applying qualitative content analysis with the assistance of the QCAmap software (Mayring, 2014; <http3>). Emergent codes were used to reveal the main issues important for local stakeholders regarding land use in the area.

A *questionnaire survey* (Newing, 2011; Babbie, 2013) was also conducted among the visitors of the study site who participated in conservation events and programs organised by KNPD in the autumn of 2015 and spring of 2016. The questionnaire contained 26 questions and covered topics such as circumstances of their visit, knowledge about the soda pans and the species of their surroundings, the need for further development of tourism programs and infrastructure, as well as demographic and social characteristics of the respondents. In this study only 10 questions were used in the analysis (see the questions in Appendix C). 146 persons completed the questionnaire. Since no official data were available about the number and characteristics of visitors of the area, representativeness was not applicable. Data were analysed using descriptive statistics.

Based on the results of the content analysis of the focus group and the interviews, a few topics emerged as interesting for further discussions including grazing, ecotourism, water management, visibility and roles of the KNPD in the region. Two interactive events seemed feasible within the given time frame of the participatory process and were thus organised. Grazing was chosen as the first priority topic because, based on the interviews, it was a conflicting issue between farmers and KNPD and its resolution was important for the long-term successful management of the area. Ecotourism was the other chosen topic because the interviews revealed opportunities for possible cooperation between some local stakeholders and KNPD on this issue. Finally, two *roundtable*

**Table 1**  
Main characteristics of the methods used in the participatory process.

Method	Period	Main stakeholder groups involved (number of persons)
Interviews	Autumn 2015, Autumn 2016	36 persons: farmers (20), game managers of local hunting organisations (4), local mayors (2), agricultural advisors (4), representatives of local tourism related organisations (6)
Questionnaire survey	Autumn 2015, Spring 2016	146 persons: visitors of the area
Focus group	Autumn 2015	15 persons: staff of the KNPD (9), contracted communication experts (2), researchers (4)
Roundtable discussion on grazing	Spring 2016	22 persons: farmers (7), local mayor (1), staff of the KNPD (10), researchers (4)
Roundtable discussion on ecotourism	Summer 2016	18 persons: representatives of local tourism related organisations (2), representatives of local conservation civil organisations (3), ranger employed by the local government (1), local game manager (1), farmer (1), staff of KNPD (8), researchers (2)

discussions (Patton, 2002; Newing, 2011) were organized in 2016 with the participation of local stakeholders and the representatives of the KNPD (see agendas in Appendix D).

The *roundtable discussion on grazing* was organised in the spring of 2016. It focused only on the surroundings of the Böddi-szék soda pan because it was the main focus area of the LIFE project, where many activities were undergoing and planned. Preventing and managing conflicts and fostering cooperation with farmers were crucial for the success of the LIFE project. All farmers related to this soda pan were invited and only one of them could not participate. It was organised in Dunatétlen, which is the closest settlement to the soda pan. The main aim of the roundtable was to discuss the experiences with and views on the grazing management of the area, especially regarding grazing animal species.

The *roundtable discussion on ecotourism* was organised in the early summer of 2016 in the visitor centre of KNPD, in Kecskemét. It focused on the whole study site, therefore, the main tourism related organisations and farmers were invited (18 persons). Eight of them could participate and the others expressed their interest in receiving the summary of the results. The main aim of the discussion was to exchange information about the current and planned ecotourism activities of the participants, reveal new opportunities and foster cooperation among the main actors in the area.

Both discussion forums were moderated by a member of the participatory team. The rest of the participatory team and the two younger members of the project team, who carried out the interviews, acted only as observers and did not take part in the discussions. Notes and audio recording were taken. Summaries were prepared for further content analysis. Summary briefs were sent to the participants of the roundtable discussions and also to those who were invited but could not participate.

The main ethical principles of social research were followed in every step of the participatory process, such as obtaining informed consent, securing voluntary participation, anonymity of respondents, causing no harm to participants and maintaining confidentiality of records (Patton, 2002; SRA, 2003; Babbie, 2013).

#### 2.4. Methods for assessing the results of the participatory process regarding ACM

While ACM is a complex process in a social-ecological system, assessment also needs to reflect upon its dimensions (social, economic and ecological). Plummer and Armitage (2007) developed an evaluation framework for ACM that has three main components: ecological system, livelihoods and process components. They also made a distinction between tangible and intangible parameters and outcomes related to the initiatives outside boundaries of the project and general, mostly latent, parameters that come to the surface long after the projects (e.g. the ability of the community to cope with uncertainties and constant change). Even though this is a good evaluation framework and has been applied by e.g. Butler et al. (2015), it seemed too detailed for our purposes as our ACM process was in its initial stage. This is the reason why historical assessment showing the different stages of ACM development, as used by scholars (e.g. Olsson et al., 2004; Farhad et al., 2017), was not applicable either. However, conditions to start an ACM process were important to include. Fabricius and Currie (2015) compiled a list of conditions from literature on ACM that we used as a basis for the criteria related to conditions. As we aimed for a qualitative assessment, we chose broad categories for conditions and for the three dimensions of the social-ecological system.

Taking the above mentioned considerations into account, fourteen assessment criteria were derived from the literature on ACM. It consists of conditions (8) and three different outcomes: social (4), economic (1) and ecological (1) (see Table 2). While economic and ecological outcomes can usually be achieved in a longer time frame at a conjoint phase of ACM, we chose only 1-1 criterion for these outcome categories.

**Table 2**

Summary of the criteria for adaptive co-management used for evaluating the case (own compilation based on Plummer and Armitage, 2007; Armitage et al., 2009; Fabricius and Curry, 2015).

Criteria for assessment
<b>Conditions for adaptive co-management</b>
1. well-defined small-scale resource system with clear property rights
2. identifiable group of stakeholders, who are at least partly interdependent and have shared interests
3. enabling environment of collaborative actions and flexible rules
4. capacity of the key organisation/person to lead the process
5. sense of place shared by stakeholders
6. incentives for stakeholders to take part in the process
7. funding available for collaborative actions
8. time allocated for learning and doing process
<b>Social outcomes</b>
1. information sharing and learning
2. conflict resolution
3. cooperation between stakeholders
4. power balance between stakeholders
<b>Economic outcomes</b>
1. contribution (added value) to the livelihood of locals and the economic development of the region
<b>Conservation outcomes</b>
1. good condition of habitats and species

However, we envisaged that the participatory process could have some social outcomes already in the short term. That is why more social criteria were chosen. Based on these criteria, a qualitative evaluation of the case was conducted based on the qualitative content analysis (Schreier, 2014) of the written materials of the participatory process (background material from the desktop study, summaries of the interviews, the focus group and the roundtable discussions). We also used some relevant results of the questionnaire survey. The assessment criteria for ACM served as predefined codes for the qualitative content analysis. The results of the analysis were discussed among the researchers of the participatory team and one of the members of the KNPD project team in order to have information cross-check. Some quotes from the different stages of the participatory process were used as illustrations. Codes behind the quotes indicate the type of stakeholder group and a number is given for identification purposes.

### 3. Results

The results of the qualitative assessment are summarized in Table 3 followed by a more detailed explanation for each criterion.

#### 3.1. Conditions for ACM

##### 3.1.1. Well-defined small-scale resource system with clear property rights

The study area was delineated, taking into account the ecological and socio-economic characteristics of the soda pan region. It consisted of the most important soda pans and the main grazing areas surrounding them, as well as the settlements in their close vicinity, which formed a good management unit. Approximately 8,000 ha (80% of the area including sodic wetlands) were declared as suitable for grazing. KNPD managed a large proportion (70%) of the grazing land, half of which was leased to farmers, providing a good opportunity to take steps toward ACM. The rest of the area had mixed ownership partly belonging to a nature conservation association which was a project partner, the state under the management of the National Land Fund and private owners. Among land under private ownership, parcels that belonged to many owners were more difficult to manage. Nevertheless, KNPD tried to identify all owners and encourage them to follow conservation management rules, while most of the area was protected. On the LIFE Nature project site, efforts were made to clear property rights and establish appropriate management units considering the natural conditions and conservation aims. This activity was crucial for any

**Table 3**  
Summary of the results of the process based on the criteria for adaptive co-management.

Criteria for assessment	Results achieved during the participatory process
<b>Conditions for adaptive co-management</b>	
1. well-defined small-scale resource system with clear property rights	It was mostly fulfilled, but property rights were quite complex.
2. identifiable group of stakeholders, who are at least partly interdependent and have shared interests	It was fulfilled. The main stakeholder groups were identified with shared interests.
3. enabling environment of collaborative actions and flexible rules	It was partly fulfilled. Some rules were made flexible but not all.
4. capacity of the key organisation/person to lead the process	It was fulfilled during the participatory process and predicted to be fulfilled during the LIFE project. After the LIFE project, additional funding will probably be needed to secure the capacity of the key organization and person to lead the process.
5. sense of place shared by stakeholders	It was fulfilled. Shared sense of place was revealed.
6. incentives for stakeholders to take part in the process	It was fulfilled. Incentives for stakeholders were identified.
7. funding available for collaborative actions	It was fulfilled during the participatory process and predicted to be fulfilled during the LIFE project. During the project, funding was and will be secured through LIFE, the Natura 2000 compensatory payments and the agri-environmental payments. Additional funding will probably be needed after the LIFE project for KNPD to continue the process and collaborative actions. Natura 2000 and agri-environmental payments will need to continue as well to assist farmers.
8. time allocated for learning and doing process	It was fulfilled during the participatory process and predicted to be fulfilled during the LIFE project. Additional funding will probably be needed after the LIFE project to continue the process and allocate more time for the learning and doing process.
<b>Social outcomes</b>	
1. information sharing and learning	Information sharing started and need to be continued. Learning took place, but social learning still requires more effort.
2. conflict resolution	It started but further steps need to be taken.
3. cooperation between stakeholders	It started but needs to be further developed.
4. power balance between stakeholders	It was secured during the participatory process and needs to be paid attention to after the process.
<b>Economic outcomes</b>	
1. contribution (added value) to the livelihood of locals and the economic development of the region	Some steps were taken to this direction but external factors also have an influence on the outcome. Results can be seen only in a few years.
<b>Conservation outcome</b>	
1. good condition of habitats and species	Some improvements have been made but stable results can be seen only in a few years. Improvement of habitat conditions will secure better conditions of characteristic species as well.

further site-related habitat improvement. Discussions with farmers during the roundtable on grazing contributed to this activity.

### 3.1.2. Identifiable group of stakeholders, who are at least partly interdependent and have shared interests

The main stakeholders identified in the participatory process included the national park directorate, conservation civil organisations, farmers, local governments, hunting organisations, tourism related entrepreneurs and visitors of the area. The focus group with the KNPD staff, the interviews and the questionnaire survey detected interdependence and shared interests among these groups.

The initial focus group with the KNPD staff and the interviews revealed that the national park directorate and farmers were interdependent in the management of the soda pans and the surrounding sodic steppe areas. They shared the opinion that the area was most suitable for grazing and provided good fodder for the livestock. "From the beginning of the World there have always been (grazing) animals on it (farmer\_9)". They also had a shared interest in maintaining grazing, because on the one hand it was an important source of livelihood for farmers and on the other hand it was considered as the appropriate management method for the long-term sustenance of the fragile soda pans. The area was undergrazed according to the conservation experts, thus KNPD wanted to encourage farmers to continue grazing and collaborate with them. Farmers emphasised in the interviews that market opportunities related to animal husbandry had decreased in the region because the processing industry disappeared and possibilities for selling the products became limited. They needed the agricultural subsidies and the KNPD's support to continue their operation.

Conservation experts and farmers agreed that reeds and marshes should be eliminated, although for different reasons. According to the conservationists, reeds and marshes harmed the soda pans. According to the farmers, the spread of reeds and marshes also decreased the area suitable for grazing, so the animals needed to walk much longer distances and diseases could occur more often.

All identified stakeholders had a shared interest in ecotourism

development, as a possible development path for the region. The questionnaire survey showed that there was a demand for ecotourism. Most of the surveyed visitors (74%) came from the surrounding areas with family members (66%). The main aim of their visits was excursions, birdwatching and photography. Birdwatching tours and conservation guided tours for families were the most preferred programs by visitors to be further developed but other tours for different age groups and special tours like photography and observation of flora also ranked high. A birdwatching tower and educational path were the most favourable options for ecotourism related infrastructure development. The focus group with the staff of KNPD revealed that for conservation experts, ecotourism seemed as a means to show the unique habitats and species in the surroundings of the soda pans. KNPD combined ecotourism with awareness raising and environmental education and wanted to show the significance of soda pans to locals and to visitors. The questionnaire survey among tourists showed that there were gaps in knowledge concerning some characteristics of the key bird and plant species of this special habitat. Although, visitors, who were members of nature conservation organisations, seemed more knowledgeable. Conservation experts of the directorate emphasised during the focus group that guided tours would be preferable but the capacity of KNPD staff was limited. On the other side, interviews showed that the beauty and diversity of the landscape were considered as a touristic attraction by local stakeholders as well. "It should be shown to people." (tourism\_3). Local stakeholders stressed that tourism in the area is under-developed and they would like to broaden the touristic programs with horse riding, cycling, steppe village tourism, more guided tours, field trips and nature photography. Interviews also revealed opportunities in farming and farm products to be further developed for tourism purposes. Tourism organisations, restaurants, accommodation owners, some farmers, and hunters were keen to cooperate with the KNPD on ecotourism development.

### 3.1.3. Enabling environment of collaborative actions and flexible rules

The LIFE project provided a good frame for initiating collaborations

among stakeholders of the study site. In the focus group with the KNPD staff, it was emphasised that there was a shift in the management of grasslands to sharing the management activities with farmers through leasing them more land. In the surroundings of the soda pans, it became an important goal regarding these sodic lakes to play an important social role as well. Due to the diversity of the habitats and the sensitivity of the sodic wetlands it was a challenge for KNPD to find the most appropriate management methods to secure long term favourable status of the soda pans and their surroundings. “A complex management system needs to be developed, which harmonises the different methods in time and space.” (conservation\_1). It also meant that KNPD was open to collaborate with local farmers to set up an adaptive management system.

Prior to the participatory process, conservation rules regarding the management of and ecotourism in the soda pans and their surroundings were quite strict depending on the protective status of the different spots. Nevertheless, the roundtables showed that KNPD was open to discuss some conservation rules with farmers to find a balance regarding ecotourism related restrictions, in collaboration with tourism related stakeholders.

The roundtable discussion on ecotourism revealed that the national park product brand, introduced a few years before the project, could also provide a good framework for collaboration between farmers and the KNPD. Farmers who operated in nationally protected or Natura 2000 sites and had high quality products representing the characteristics of local landscapes, based on local ingredients produced with nature-friendly farming could apply to use the brand. These products were also displayed in the visitor centre of KNPD and in conservation related fairs where the directorate was present.

#### 3.1.4. Capacity of the key organisation/person to lead the process

The LIFE project team of KNPD had the capacity to initiate and be engaged in the participatory actions and lead the process towards ACM. The research team, comprising participatory experts, facilitated the participatory process and helped in conflict resolution and starting collaborative actions. The participatory team provided training for young professionals working in the project to carry out the interviews and the questionnaire survey. In this way, capacity building had also taken place which was useful for the continuation of ACM. During the LIFE project capacity is predicted to be secured but additional funding is needed to continue the process after the project finishes.

#### 3.1.5. Sense of place shared by stakeholders

The initial focus group with the KNPD staff, the interviews and the roundtable discussion on ecotourism showed that local stakeholders appreciated the beauty and the mosaic landscape characterised by unique habitats and species. Local people also named some species that were valuable to them, birds like the great bustard (*Otis tarda*), white stork (*Ciconia ciconia*), wild goose (*Anser anser*), great egret (*Ardea alba*), white-tailed eagle (*Haliaeetus albicilla*) and mammals like the European ground squirrel (*Spermophilus citellus*) or the Eurasian otter (*Lutra lutra*). They expressed a connectedness and belongingness to the area and an appreciation of its values. “It is unbelievable how many living creatures find their living in such a dreary sodic steppe” (farmer\_3). Even the beauty of the sunset in the steppe area was mentioned by one of the interviewees. Besides its beauty, the landscape seemed to be a source of peace and tranquillity as expressed by many interviewees. There was a shared vision of sense of place among local stakeholders, the landscape being a part of their identity. “I like living here in the sodic steppe very much, my ancestors lived here and I will grow old here as well.” (farmer\_6)

#### 3.1.6. Incentives for stakeholders to take part in the process

Interviews revealed the main incentives for stakeholders to participate in the process. Farmers were operating mostly in protected areas, the majority of them rented grasslands from KNPD. Restrictions induced by conservation regulations in the leasing contract were not that flexible before. Therefore, for farmers, the opportunity to discuss these

issues was a good incentive to take part in the process. The relocation of the canal was also an important issue for farmers operating in the Bóddi-szék area, so obtaining information about the related activities and discuss options feasible for them encouraged them to take part in the roundtable discussion. For the other stakeholders, the possibility for ecotourism development and a foreseen future gain in income was a good incentive to participate.

#### 3.1.7. Funding available for collaborative actions

The LIFE project provided funding for collaborative actions, but it is uncertain whether the yearly budget of the KNPD can cover the continuation of the process after the project ends. Additional funding will probably be needed to continue the process. Part of the project area belongs to the Natura 2000 network, where a compensation payment scheme co-financed by the EU was available for users of grasslands. The surroundings of soda pans were nominated as a High Nature Value Area where farmers could participate in voluntary agri-environmental schemes, co-financed by the EU. These payment schemes were important in supporting collaborative actions and they will be crucial for the long-term continuation of grazing in the area, as it is not very profitable without subsidies.

#### 3.1.8. Time allocated for learning and doing process

The facilitated participatory process lasted for two years. This was sufficient time to initiate some collaborative actions and take the first steps toward ACM. The time frame of the LIFE project (8 years) is long enough to implement some ideas and monitor results. The co-management process can be foreseen only until the end of the LIFE project. More time would be needed to make the ACM fully operational, but it will depend on additional funding

### 3.2. Social outcomes

#### 3.2.1. Information sharing and learning

The roundtable discussions provided a good opportunity for information sharing among the stakeholder groups and for mutual learning. During the roundtable discussion on grazing, the project details seemed quite useful for farmers. Conservation experts informed farmers about the plans to mow and shred reeds and marshes to make the area suitable for grazing. They also shared their preference for grazing with more species and breeds (e.g. cattle, sheep and donkey) and spoke about their experience with buffalo grazing at another site. Farmers explained the differences in market opportunities for certain grazing animal species which is the reason why some farmers prefer sheep. They also shared their experiences and some difficulties regarding grazing with certain animal species on different parts of the soda pan area and under diverse natural conditions, especially related to the fluctuating water level. Conservation experts explained that water retention, from a conservation point of view, is good for the area, especially for the natural water regime of the lakes. They emphasised that soda pans are fragile ecosystems, very sensitive to artificial water intake, and the water supply arriving with the channel could be considered as harmful to it due to changes caused in chemical composition. Information on the relocation of the canal was of utmost importance for farmers because they were afraid of inland inundation. The water expert of KNPD introduced the plan, its current status, the expected impacts and further steps. He also showed that relocation will not increase the risk of inland inundation. After the roundtable discussion on grazing, two other meetings were held about the relocation of the canal to take the interests of the farmers into consideration during planning. Farmers also shared information about the problem of late mowing, namely the decreased quality of the hay. They also spoke about the problem that some of their grazing areas in and around the soda pans were not eligible for agri-environmental payments because wetlands were excluded from these schemes despite the supporting statement of the KNPD. Farmers asked for additional assistance from the KNPD staff



to clarify this situation to the agency responsible for the agricultural payments.

During the other discussion forum on ecotourism, participants shared information about their current activities and their views on possible cooperation. KNPD and the two conservation civil organisations already had ecotourism related programs in the area. A new educational path was planned on the Böddi-szék soda pan and a photo exhibition that shows the natural values of the project area. The tourism expert of KNPD also shared information on the “national park product” brand.

### 3.2.2. Conflict resolution

The interviews with stakeholders and the focus group with the KNPD staff showed that besides some shared interests, there were a few conflicting issues between farmers and KNPD regarding the animal species used for grazing, regulations and water retention.

KNPD used grey cattle and buffaloes in those parts of the study area which was not leased to local farmers and had a good experience with these species. Within the frame of the Life project KNPD planned to purchase cattle and donkey, while a civil organisation being a project partner intended to purchase sheep for grazing in the Böddi-szék area. Interviews showed that sheep grazing was the preferable land use also for many local farmers because it had a tradition in the area, know-how and infrastructure were available and it seemed more profitable than grey cattle or buffalo grazing. Fewer farmers grazed with cattle. Farmers practising sheep grazing were afraid that they will be required to convert to cattle. During the discussion forum on grazing, representatives of KNPD emphasised that they plan to use more animal species for grazing in the Böddi-szék area. Sheep grazing was acknowledged by the directorate as an appropriate conservation management method, so sheep farmers understood that they do not need to switch to other species if it is not feasible for them. In the same roundtable discussion, conservation experts of the KNPD acknowledged the arguments from farmers for early mowing, as it was important to provide good quality fodder for grazing animals during the winter time. Therefore, they showed a willingness to modify the time depending on the weather conditions and other circumstances of the given year if conservation needs were also met (e.g. larger area was left unmowed). This was considered as a good compromise by the participants. In the same event, farmers also raised the problem of water retention while in their view it hindered the grazing activities. Conservation experts of KNPD explained that water retention was important for securing the natural water cycle of the soda pans. The two groups understood each other's views, but it was stated that further discussions were needed to find mutually acceptable solutions.

### 3.2.3. Cooperation between stakeholders

There had been some cooperation between KNPD and local stakeholders prior to this process, both on grazing and ecotourism, but the participatory process provided new opportunities. After the initial rehabilitation of the Böddi-szék soda pan (mowing of reeds and marshes, eradication of invasive species and relocation of the canal), collaboration with local farmers regarding grazing was a high priority for KNPD in order to maintain the good condition of the habitats over the long-term. KNPD intended to lend part of the purchased animals to farmers to optimize grazing. Conservation experts shared this plan during the roundtable discussion on grazing.

In the roundtable discussion on ecotourism, participants showed their willingness to collaborate on ecotourism development. The diverse landscape with salty patches, scenic bird populations, migration of wild goose and extraordinary plant species were named as the main attractions of the soda pans and surrounding grazing lands that ecotourism could build upon. KNPD offered its visitor centre and internet website as a platform for sharing information about tourism related entrepreneurs and their services. It also gave opportunities for cooperation in fundraising and assisted in the development of products

eligible for the “national park product” brand. Some ideas on ecotourism development were collected, e.g. establishing an information board near to a birdwatching tower, renovation of an old hayward house for use in ecotourism activities, development of agro-tourism programs, organising farm wagon tours and exhibiting native livestock species and breeds. The participating farmer offered his farm as an agro-tourism attraction where farming and some processing (e.g. cheese making) activities can be shown. Conservation civil organisations were willing to continue and broaden their educational and awareness raising programs. Participants also named some possible new educational programs and supported the development of an information centre.

### 3.2.4. Power balance between stakeholders

While KNPD was the main actor of nature conservation in the region and had the most financial sources to implement management options it had the greatest stakeholder power as well. Interviews showed that this power was acknowledged by the local stakeholders and there was also an expectation that the directorate should assist the development of the area. As the process was facilitated by independent participatory experts, all important stakeholder groups were given the opportunity to express their views and were invited to participate in the dialogue. In addition, power balance was taken into consideration when designing and moderating roundtable discussions. Participating experts of KNPD were good partners in this process.

## 3.3. Economic outcomes

### 3.3.1. Contribution (added value) to the livelihood of locals and the economic development of the region

The interviews and, partly, the desktop research showed that a new path for development was needed in the study area. Although agriculture was the most important sector, the processing industry was missing, the population was aging and decreasing in number and many people found work outside of the site in industrial firms or in the service sector. Grazing was still important for many farmers although, they were dependent on agricultural subsidies. Tourism was quite limited in the area, but all stakeholders appreciated the landscape and saw opportunities in ecotourism development. The participatory process showed that ACM could contribute to nature-based development of the area and could have an added value to the livelihood of locals. However, more time is needed to show real economic outcomes.

The roundtable discussion on grazing revealed that, with more flexible rules, the financial benefits of farmers could be increased (e.g. earlier mowing provides fodder of higher quality). Nevertheless, the continuation of the agri-environmental payments and development of the processing industry (e.g. for meat and milk products) are needed in order to have a greater impact on the economic development of the region.

In the roundtable discussion on ecotourism, collaboration between the conservation and the tourism related organisations started and some opportunities were identified which could be profitable for both sectors. Ecotourism infrastructure development planned in the LIFE project can provide a good base. Products of grazing animals marketed as national park products, or used in local restaurants, can have an added value to the viability of grazing and at the same time contribute to ecotourism development. In the future, tourism related entrepreneurs might also apply for the national park product brand with their tourism services having an economic impact both at firm and sector level. However, collaborations need to continue in order to achieve a stable result.

## 3.4. Ecological outcomes

### 3.4.1. Good condition of habitats and characteristic species

Activities planned in the LIFE project (e.g. rehabilitation of the

habitats, good management after the desired state is reached and conscious visitor management that takes the carrying capacity of the area into account) can secure the good condition of the soda pan habitats and their characteristic species but more time is needed to achieve stable outcomes.

Rehabilitation actions within the LIFE project concentrated on the Bőddi-szék area. Some actions (e.g. eradication of invasive species and marsh vegetation) started during the participatory process and will help to restore the natural state of the soda pan. Relocation of the canal crossing the lakebed was under planning and is expected to be completed by 2021. This is important to recover the natural water cycles and enlarge the water surface, attracting diverse waterfowl. The participatory process helped in sharing information about the ongoing and planned rehabilitation activities and provided a forum to discuss issues important to local farmers and, in the case of the relocation of the canal, tailored some decisions according to stakeholders' needs.

Appropriate grazing systems are essential in the management of the soda pan habitats. Grazing hinders the spreading of marsh and reed vegetation and largely contributes to the increase of biodiversity due to the varied microhabitats created by this traditional management type. Due to the variable habitat structure of sodic vegetation, where community types follow each other in zonal or in a mosaic-like system, a wider variety of native animal species were considered optimal by the conservation experts. Cattle in the depressions, and sheep, horses and donkeys on the higher reliefs could be best suited to the ecosystem. Local farmers have played a crucial role in grazing and it is a conservation goal to maintain in the future as well. The participatory process assisted in sharing information about the planned management, revealing conflicting points and finding those management options for the fragile habitats that can be accepted by local farmers.

Conscious planning of ecotourism infrastructure and programs with efficient visitor management, which were planned within the LIFE project, can secure the favourable condition of the soda pans and native species, providing an opportunity to show the beauty of these unique habitats. In the roundtable discussion on tourism, participants also emphasised the importance of controlled visitor management. The questionnaire survey showed that tourists accept regulations and restrictions if they understand the reasoning behind it. The participatory process revealed that ecotourism has a valuable potential for the area and provides an opportunity for ecotourism related stakeholders to share information and start collaborative actions.

## 4. Discussion

### 4.1. How far did we get in the ACM process?

As it was noted in the introduction, according to Plummer and Bird (2013) three stages of ACM can be distinguished: 1) the preparatory 'inchoate' stage, 2) the deliberative 'formulation' stage and 3) the elaborative 'conjoint' phase with social learning. According to our results, our participatory process reached the formulation stage and it is a challenge to continue the process and enter the conjoint phase.

Most of the conditions for ACM were at least partly fulfilled by the end of the participatory process. More flexible rules and clearer property rights can assist in the further development of ACM. Regarding the outcomes, in all categories (social, economic and ecological) some steps have already been made. In order to reach the conjoint phase, more formalised agreements and partnerships might be useful between KNPD and the local stakeholder groups. That would mean steps toward more balanced relationships with power sharing, the importance of which is underlined in the literature on ACM (Armitage et al., 2009; Berkes, 2009). Studies show that ACM processes need a longer time, sometimes decades to fully develop (Olsson et al., 2004; Farhad et al., 2017). In our case the greatest challenge is to continue the ACM process after the LIFE Nature project ends. The capacity of managing and facilitating ACM and financial resources are the two main cornerstones for

successful continuation. The importance of financial resources is emphasized in other case studies on ACM as well (e.g. Butler et al., 2015; Farhad et al., 2017).

Our process concentrated on the local scale but successful adaptive co-management also requires interactions across scales (Olsson et al., 2004; Armitage et al., 2009; Berkes, 2009). Cooperating with regional development agencies to include this ACM process in regional planning may be fruitful. Discussions with the ministry responsible for nature conservation in securing long term funding and naming this project as a pilot project for ACM can contribute to the viability and the continuation of this process. Collaboration with other management bodies operating in the surroundings of sodic wetlands in other parts of Hungary and Europe and sharing experiences would be useful in improving ACM in our study area.

### 4.2. The outstanding role of the national park directorate in the implementation of ACM

Bridging institutions can play a vital role in ACM processes (Berkes, 2009). Clark and Clarke (2011) analysed adaptive governance in sustainability projects in British national parks and found that national park authorities had a mediating or bridging role in interactions and knowledge transfer with different local stakeholders. This is also true for Hungarian national park directorates (NPDs). Hungarian NPDs have an integrating role in managing protected areas in collaboration with the local stakeholders and promote conservation-friendly regional development. They operate as knowledge hubs, covering a wide range of expertise backed by field experience, which make them the main collaborative partner of conservation authorities. NPDs have been successful in mobilising external financial resources, e.g. from EU funds, and have been able to carry out rehabilitation projects, enhance conservation management and develop ecotourism and environmental education infrastructure and programs even if the direct governmental financial support has been quite low (Kovács, 2017; Mihók et al., 2017). Through their rangers, they have close contacts with farmers who lease land from the directorate and/or are taking part in Natura 2000 or agri-environmental payment schemes. In recent years many local entrepreneurs (farmers, craftsmen, processing firms, at some places tourism organisations) that operate in Natura 2000 sites and have environmentally friendly local products or at some places services, applied for national park product brand administered by NPDs (http4). It is a new form of relationship between locals and NPDs and can have an added value for nature-friendly regional development.

In our case the KNPD was also the main integrating actor in the initiation of ACM similarly to the Clark and Clarke's (2011) study. Interviews showed that local stakeholders saw the different roles of the KNPD as the regulator, the manager of protected areas, the expert organisation in nature conservation and the provider of opportunities for locals. It meant that they recognised the potential in KNPD to play the key role in conservation friendly regional development and they accepted it as a leading organisation. The LIFE Nature project provided funding to start this process and the staff of KNPD working in this project was very open to be engaged.

As ACM processes are usually multi-scale projects (Berkes, 2009), bridging organisations can connect the different levels of governance. In the ACM case on rice farming presented in the paper of Farhad et al. (2017), the regional rice farmers federation was the bridging organisation mediating among different levels of governance and assisting conflict resolution. In the study of Smedstad and Gosnell (2013) on riparian rangeland management, the National Riparian Service Team, which provides training and assistance in implementing ACM processes for riparian areas, also served as a bridging institution strengthening horizontal and vertical relationships. In our case, KNPD can be the bridging organisation between local stakeholders and the institutions at regional and national levels as well, especially on advocating a more flexible management rule system for NPDs and stressing the importance

of continuing agri-environmental funding.

#### 4.3. Participatory process fostering ACM

While collaboration is an inherent part of ACM (Armitage et al., 2009; Berkes, 2009; Fabricius and Currie, 2015), it needs the active participation of stakeholders to be successful. Participatory processes play an important role in second and third stages of ACM, when it is crucial to reveal and engage with the most important stakeholders. However, it matters how participatory processes are planned and implemented because they can have distortive effects (Reed, 2008). In our case the participatory process was carefully planned with a close cooperation between participatory experts and the KNPD project staff, best adapted to the local needs and circumstances. Desktop research was conducted to gather preliminary information about the past and present land use and on the stakeholders, followed by stakeholder involvement in two phases. In the first phase, interviews with the local stakeholders, a questionnaire among tourists, and a focus group with the KNPD staff served as information collection on the perception of lands use, conflicts and possible cooperation. From this first phase of involvement, it became clear that there is an opportunity for ACM and related collaborative actions, as many conditions for ACM require interdependence and at least partly shared interests were met. In the second phase, facilitated roundtable discussions provided an approach to build trust, taking steps toward conflict resolution and initiated collaborative actions regarding the two topics of grazing and ecotourism. which can be considered the first steps toward ACM. However, participatory processes need to continue in the conjoint phase of ACM as well in order to be successful and assist in social learning. Other studies also show that the continuation of the participatory process is crucial for the fulfilment of ACM. For example, Butler et al. (2015), in the seal and salmon case, revealed that after the main conflict was solved, collaborative processes started to decline and efforts were needed to renew the interactions again.

#### 4.4. Collaboration between social scientists and conservation practitioners as an important element of ACM

Recent papers emphasise the important role of social sciences in nature conservation (Blicharska et al., 2016; Bennett et al., 2017a, b). In relation to ACM, experts with social science background can act as independent facilitators of ACM processes. Social science methods are very useful in revealing perceptions of local stakeholders, identifying conflicting issues or topics for possible cooperative actions, mitigating conflicts and fostering collaboration between stakeholders. Conservation experts generally have natural science backgrounds and lack skills for successful application of social science methods (Madden and McQuinn, 2014). This is why it is useful for conservation professionals to collaborate with social scientists. The independence of social science experts is useful in facilitating conflict resolution or fostering collaborating actions with local stakeholders. They do not need to be constantly present in ACM, if there is capacity in the key organisation to continue collaborations and engagement of local stakeholders. If new conflicts arise, a new stage of ACM starts or evaluation of ACM is needed, then from time to time their involvement can be useful. Social scientists learn from conservation experts in these processes, e.g. about the local conservation contexts, characteristic habitats and species of the site, the ecological processes and locally feasible management options.

In our project, collaboration between natural and social scientists worked well. We see it as one of the key factors for the success of the process. Discussions were regular between the participatory research team and KNPD project team during the project to reflect on the information available at different stages and assist the design of the next stage in a flexible way. Mutual learning had also taken place. The participatory process lasted for two years, but as ACM evolves,

involvement of social scientists can be foreseen again.

## 5. Conclusions

Adaptive co-management is a long process with many 'loops of learning by doing', cooperation between stakeholders and social learning. Participatory processes assisted by external experts can be very useful in taking the first steps towards ACM. In this paper, an assessment of the results of a participatory process regarding ACM was conducted. Our results indicate that conditions for ACM were almost all fulfilled. ACM has started and even reached the second (formulation) stage in the soda pan region of Kiskunság, already having some social impacts, while economic and ecological outcomes can be foreseen in the future. In order to have long term results in the local social-ecological system, allocation of human and financial resources need to be secured for a longer time frame.

Our case shows that ACM has a potential to become a method not only for nature conservation but for rural development as well. Nevertheless, ACM processes can be successful if conducted in a supporting policy environment. It represents a new form of governance based on collaboration between stakeholders. ACM needs a more flexible institutional setting and regulatory framework, which provides room for negotiations suited to local circumstances. This needs to be taken into account when upscaling our ACM process. Changing rules and institutional frameworks is usually a slow process, so mainstreaming ACM into nature conservation and regional development policies can be foreseen only in a longer time frame.

In addition, financial support to bridging institutions is needed for the initiation and coordination of ACM, because participatory processes, where economic and ecological interests of the different stakeholder groups need to be balanced, require time and resources. As our results indicate, agri-environmental schemes can also become an important tool for ACM especially in areas where nature friendly farming has limited profitability under the current market conditions.

Our study shows that assessment of ACM processes, even in the preliminary phase, can be useful for conservation managers. It can reveal the strengths and weaknesses of the process and assist with some changes, before fully implementing ACM. The assessment framework can be applied to evaluate the next stages as well and can even be further developed to include new criteria related to the main dimensions of ACM as more economic and ecological outcomes start to appear.

### Author statement

**Eszter Kovács:** Conceptualization; Methodology; Investigation; Formal analysis; Supervision; Writing – original draft.

**Orsolya Mile:** Conceptualization; Funding acquisition; Resources; Methodology; Visualization; Validation; Writing – review and editing.

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**Veronika Kasza:** Investigation.

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**Barbara Mihók:** Conceptualization; Project administration; Supervision; Methodology; Investigation; Formal analysis; Writing – review and editing.

## Declaration of Competing Interest

None.

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## Appendix A. Agenda of the initial focus group with the staff of the Kiskunság National Park Directorate (KNPD)

Introductory presentations (1 h)

- 1 Opening (member of the project team and member of the participatory team)
- 2 Introduction of the socio-economic assessment within the LIFE project (member of the participatory team)
- 3 Summary of a past survey among local majors related to the KNPD whole territory on the perceptions about KNPD (external experts)
- 4 Introduction to the LIFE project and its main activities (members of the project team)
- 5 Experiences with grassland management in the study area (rangers of the study area)

Coffee break (10 min)

Discussion (110 min) (moderated by the member of the participatory team)

- 6 Main themes: perceptions about the optimal land use, main obstacles, possible conflicts, opportunities for cooperation

Closing (10 min) (member of the participatory team)

## Appendix B

Summary of the main themes covered in the interviews

A separate interview line was prepared for each main stakeholder group, tailored to the characteristics of the group. The summary of the main themes covered in the interviews is as follows.

- 1 Short introduction by the interviewer about the purpose of the interview and ethical issues related to the interview
- 2 Introduction: work and professional background of the interviewee; main activities and characteristics of the organisation he/she represents; market opportunities; subsidies received
- 3 Local socio-economic situation: perception about local livelihood, employment opportunities; state of local economy; local community initiatives, current and planned development projects, changes needed for development
- 4 Relations between local stakeholders and land use conflicts: perceptions about other stakeholder groups, relations to other stakeholder groups, co-operation within the stakeholder group
- 5 Landscape, related processes and ecosystem services: perception about the landscape, its characteristics, relation to the landscape, economic activities suited to the landscape, impact of the interviewee's activities on the landscape, benefits of the landscape to locals, past of the landscape, perceived changes and their impact on

livelihood and economic activities

- 6 Soda pans: perception about the soda pans and their values, activities, traditions and benefits related to the soda pans in the past, changes in land use related to the soda pans and their impacts on local livelihoods and economic activities
- 7 Management of grasslands: perception about desirable management methods on the grassland in the surroundings of the soda pans, comparison of the optimal and the current situation
- 8 Perception about the national park directorate: perception about the activities of the national park directorate, its grassland management, its impact on the local livelihood, personal relations, its possible role in the region, opportunities for cooperation
- 9 Future scenario: perception about the future of the landscape and the land use, desirable changes, role of stakeholders in the changes
- 10 Closing the interview: acknowledging the interviewees' time; suggestions for further contacts

## Appendix C. Main themes and questions of the questionnaire used in this study

Question 1. home place of the visitor: Where did you come from? Please provide the name of the settlement where you live.....

Question 3. companion of the visitor during the visit: With whom did you come? (family members, friends, alone, groups, other, please specify.....).

Question 6. aim of the visit: What is the main aim of your visit? You can choose more than one options. (excursion (on foot or with a bicycle), horse riding, vacation birdwatching, photography, angling, hunting, research, other, please specify.....).

Question 9. knowledge about the characteristics of the soda pans: In your opinion which statements are true for the soda pans? Please mark it with x (Salt resistant plants live on their banks. Their depth is 4–10 meters. Their water can be white. The salt content of their water is high. They never drain.).

Question 10. knowledge about the characteristic protected bird species of the soda pans in the study area: In your opinion which protected birds appear in the surroundings of the soda pans of Kiskunság that you can observe as well? Please mark with an x (appear, does not appear, I do not know) (Hungarian name of *Himantopus himantopus*, *Aquila chrysaetos*, *Vanellus vanellus*, *Cinclus cinclus*, *Tichodroma muraria*, *Recurvirostra avosetta*, *Tringa totanus*).

Question 11. knowledge about the characteristic plant species of the soda pans in the study area: In your opinion which plants appear in the surroundings of the soda pans of Kiskunság that you can see as well? Please mark with an x. (appear, does not appear, I do not know) (Hungarian name of *Camphorosma annua*, *Puccinellia limosa*, *Alkanna tinctoria*, *Pulsatilla grandis*, *Suaeda pannonica*, *Colchicum arenarium*, *Lepidium catilagineum*)

Question 13. perception about the possible restrictions: Please mark, which visiting options you support (I support, I do not support, I do not know). (Some areas can be visited only along a marked fenced path. Some sensitive areas can be visited only with a guide and upon registration. The most sensitive areas cannot be visited. The habitats characteristic to the area can be seen walking on an educational path. Restrictions can be induced during nesting time of certain birds or during sensitive periods of other animals. All habitats can be visited at any time. Photos can be taken in areas freely accessible areas, along marked paths and from the photo tower. Photos can be taken everywhere.)

Question 14. preferred eco-touristic programs: What kind of touristic programs would you like to see in the area? You can mark more than one options. (conservation guided tours for adults, conservation guided tours for families and children, conservation programs for children, birdwatching tour, tour to show the flora of the area, introduction to traditional farming with an animal show, exhibition of local products and tasting of local food and gastronomy festival,

cooking competition of traditional meals, other, please specify....., none of them, I do not know).

Question 16. preferred tourism related infrastructural development: What kind of touristic infrastructure development would you like to see in the area? You can mark more than one options. (educational path, nature school, visitor center, birdwatching tower, photo tower, restaurants/catering places nearby, more accommodations nearby, horseriding opportunities, bicycle rental place, other, please specify....., There is no need for development, I do not know).

Question 26. membership of conservation organisation: Are you a member of a conservation civil organisation? (no, yes. If yes, please specify.....)

#### Appendix D. Agendas of the roundtable discussions

*Roundtable discussion about grazing in the Böddi-szék soda pan area*

Opening (5 min) (member of the participatory team)

Introductory presentations (20 min)

- 1 Presentation about the LIFE project (member of the project team)
- 2 Presentation about the natural values of the Böddi-szék area (member of the project team)

Discussion part 1 (30 min)

- 3 Experiences with grazing in the area, advantages and disadvantages of using certain animal species (moderated by a member of the participatory team)

Case study (10 min)

- 4 Presentation about the experiences of KNPD with buffalo grazing in another soda pan area (representative of KNPD)

Discussion part 2 (30 min)

- 5 Other questions related to the management of the area (moderated by a member of the participatory team)

Closing and reflections (10 min) (moderated by a member of the participatory team)

Lunch (1 h)

*Roundtable discussion on ecotourism in the soda pan area*

Opening (5 min) (member of the participatory team)

Introduction (25 min)

- 1 Short introduction by the participants (moderated by a member of the participatory team)
- 2 Presentation about the tourism related activities of KNPD and opportunities for cooperation
- 3 Presentation about the touristic attractions and programs in the Upper-Kiskunság soda pans and their surroundings (rangers of the KNPD)
- 4 Introduction to the LIFE project and the its tourism related activities (member of the project team)

Discussion (60 min) (moderated by a member of the participatory team)

- 5 Tourism related activities of the participants and opportunities for cooperation with KNPD and other organisations

Closing and reflections (10 min) (moderated by a member of the participatory team)

Lunch (1 h)

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