

AN INSTITUTIONAL ANALYSIS OF LAND USE IN THE MAROSLELE AREA IN HUNGARY

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Introduction - the framework of institutional analysis

Land use patterns influence the effectiveness of conservation to a high extent. Therefore, exploration and understanding of socioeconomic factors affecting land use is vital when planning and carrying out conservation activities. The aim of our study is to explore and understand those institutional factors which affect land use in the surroundings of Maroslele, Hungary.

In order to accomplish our task, we use institutional analysis as a conceptual and methodological framework (Ostrom 1990). Institutional analysis of natural resource use can be manifold. For instance, it can help to identify design principles for sustainable natural resource (common pool resource – CPR) use, or the threats regarding it (Ostrom 1999). It can contribute to the identification of those institutional factors which influence land use in the examined area, as perceived by local people. We define institutions as rules based on (Vatn 2006, pp. 2.): *“Institutions are the conventions, norms and legal rules of a society. They provide expectations, stability and meaning essential to human existence and coordination. Institutions regularize life, support values and protect and produce interests.”*

Our qualitative study is of exploratory nature – i.e. we do not want to generalize regarding the relationship between institutions and land use, but rather understand its complexity. We use Ostrom’s (2007, 2009, Poteete et al. 2010) „General Framework for Analyzing Sustainability of Social-Ecological Systems” framework for our analysis (Figure 1.) This framework identifies four subsystems (resource units, resource systems, governance system and users) which are in interaction with the CPR situations and its outcomes.

Each subsystem can be characterized with so called second-tier variables (Table 1) which themselves can be further detailed by the definition of third- and fourth-tier variables.

In the following sections those variables which significantly influence land use in the area of Maroslele as perceived by land users are being identified. Although the framework applied here is often used to analyze variables affecting (un)sustainable CPR use, no such analysis has been carried out in this study. The reasons for that: (1) on the one hand this focus was not included among our research goals, and thus (2) we do not have data on the sustainability of land use

in the area. Based on Ostrom (1990), we can say that a CPR system is used sustainably if a group of principals can organize and govern themselves to obtain continuous benefits from the given CPR. Based on this definition, sustainable land use can be defined as a situation where a group of principals are able to organize and govern themselves to obtain continuous benefits from the land at stake.

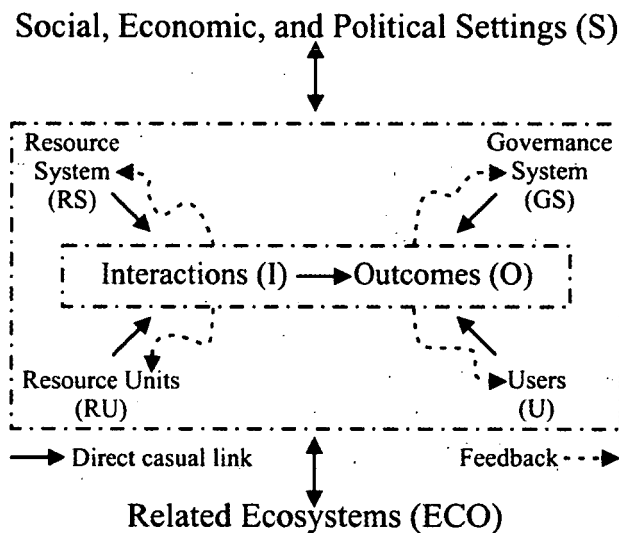


Figure 1: The core subsystems in a framework for analyzing social-ecological systems.
Source: Ostrom (2007)

Unfortunately, our research results do not allow us to make a judgement on the sustainability of the land use in the area. This is due to two reasons. First, it is generally quite difficult – if not impossible – to judge the unsustainability/sustainability of given situations/resource use tendencies, processes (Vollenbroek 2002, Costanza 1991). Second, even if we wanted to make a judgment on the sustainability of land use in the area, we have contradictory information. On the one hand, the local stakeholders interviewed did not emphasize much “negative” or “unsustainable” changes/processes regarding local land use and local environmental changes.³ On the other hand, preliminary results of a recent research⁴ show the potentially unsustainable use of the Maros river.

³ We directly asked questions about the changes in the surrounding natural environment in our interviews.

⁴ This research is the so called FUTUMAR project: <http://www.geo.u-szeged.hu/futumar>

Table 1: Second-tier variables in the „General Framework for Analyzing Sustainability of Social-Ecological Systems

Social, Economic, and Political Settings (S)	
S1 – Economic development. S2 – Demographic trends. S3 – Political stability. S4 – Government settlement policies. S5 – Market incentives. S6 – Media organization.	
Resource System (RS) RS1 – Sector (e.g., water, forests, pasture, fish) RS2 – Clarity of system boundaries RS3 – Size of resource system RS4 – Human-constructed facilities RS5 – Productivity of system RS6 – Equilibrium properties RS7 – Predictability of system dynamics RS8 – Storage characteristics RS9 – Location	Governance System (GS) GS1 – Government organizations GS2 – Non-government organizations GS3 – Network structure GS4 – Property-rights systems GS5 – Operational rules GS6 – Collective-choice rules GS7 – Constitutional rules GS8 – Monitoring & sanctioning processes
Resource Units (RU) RU1 – Resource unit mobility RU2 – Growth or replacement rate RU3 – Interaction among resource units RU4 – Economic value RU5 – Size RU6 – Distinctive markings RU7 – Spatial & temporal distribution	Users (U) U1 – Number of users U2 – Socioeconomic attributes of users U3 – History of use U4 – Location U5 – Leadership/entrepreneurship U6 – Norms/social capital U7 – Knowledge of SES/mental models U8 – Dependence on resource U9 – Technology used
Interactions (I) I1 – Harvesting levels of diverse users I2 – Information sharing among users I3 – Deliberation processes I4 – Conflicts among users I5 – Investment activities I6 – Lobbying activities	Outcomes (O) O1 – Social performance measures (e.g., efficiency, equity, accountability) O2 – Ecological performance measures (e.g., overharvested, resilience, diversity) O3 – Externalities to other SESs
Related Ecosystems (ECO)	
ECO1 – Climate patterns. ECO2 – Pollution patterns. ECO3 – Flows into and out of focal SES.	

Source: Ostrom (2007)

Based on the aforementioned research focus, our paper is structured as follows. In the second part we explore those factors which influence land use in the examined area. We do this by following the logic of Ostrom's (model). After this exploration we discuss these results and draw some conclusions which also concern nature conservation.

We do not introduce our research methodology and the examined are (the surroundings of Maroslele) in this study since this information is included in the previous chapter (Mihók *et al.* in this book).

Institutions and land use in the Maroslele area

There are many institutional factors affecting land use in the Maroslele area. Here we present our analysis on the effects of these institutional factors on local land use as perceived by local people. We use the framework for analyzing social-ecological systems (Ostrom 2007) for our analysis.

Economic development (S1) and market incentives (S5)

We investigate the effects of economic development and market incentives together – although these two are two separate factors in Ostrom’s original model (Ostrom 2007). The reason for such a choice is twofold. First, since none of the two expressions are defined in the original model, the exact difference between them is unclear. Second, according to our interviews, present market incentives are strongly connected to the more general economic trends people experienced in the area in the last several years, or even decades.

S1 and S5 affect land use in different ways. Their most trivial effect is their direct impact on agricultural land use, by influencing the importance of animal husbandry and crop production. Lately, market forces do not allow locals to be able to do animal husbandry profitably, thus this form of agricultural production is basically disappearing from the area (E6, E11, E23, E30, E15, E27).

“In the 70’s there used to be herds of cattle in Lele, grazing on the grasslands. There also used to be horses, 30-40 horse-drawn carriages, sheep and pigs. After the transition, the number of the animals gradually decreased, there are very few of them in these days. I could count the number of the cows in the village on one hand. The horses are only kept for leisure, but even so only a few animals remain.” (E30)

Besides the general trends in S1 and S5, according to some this process is also affected by other factors, e.g. by the change of regime in Hungary in 1989, since at that moment Hungary lost its former Eastern markets (E30). According to others (E8) this change is also the result of (and reason for) the changing way of local life (changing norms – U6) and (the lack of) economic opportunities (agriculture provides) for young people (potential newcomers in agriculture) in the area. These latter factors influence local involvement in agriculture in general.⁵

“The settlement is getting even more-and-more “city-like” nowadays. Few people keep animals. While formerly some pigs and poultry were kept by every house, these days only a few poultry can be seen and only at some houses.” (E13)

⁵ There is disagreement on the economic opportunities of newcomers, since according to other local people: „young people should not be afraid of agriculture, it can provide good money, an earn of living.” (E13)

Besides influencing the weight of animal husbandry and crop production, S1 and S5 have an effect on crop production itself. This effect seems to be at least twofold. First, raising input prices make many people quit crop production because of reduced profitability (E2, E25, E26, E30).⁶ S1 and S5 seem to unfold their effects together with other institutional factors. One of these is changes in technology used (U9). According to several interviewees, it is not anymore rentable to carry on with farming if someone is not able to invest in mechanization, which also influences (not only) the average land property size upwards (E8), resulting in land property concentration, and the loss of certain local employment opportunities. This also reduces the employment potential of the floodplain (E24).

“Farming is not profitable, more and more people rent their fields out, including many old people who cannot work on the land anymore.” (E2)

“Fuel weighs on the farmers as a rather heavy burden.” (E30)

“Agriculture is declining; it is not worth dealing with it.” (E2)

“Everyone got a restitution ticket and could bid for the fields. The yards with their associated parcels were privatized and sold for good money. Private production started again, but they are not able to produce goods cheap enough to be able to sell them. There are one or two farmers, who ventured into mechanization and purchased large fields. Previously many people were employed in the area. Diggers and loggers were needed, but now everything is mechanized.” (E24)

Second, the composition of grown agricultural plants is also changing since certain plants – such as endogenous local fruit species (E24) – are not worth producing anymore (E14, E26). S1 and S5, together with constitutional rules (GS7) – this latter being connected to nature protection in certain parts of the Maros floodplain – also influence perceptions on forest management. According to one of the interviews.

“Selection cutting is a huge dead end of the conservation. Only clear cutting can make a profit!” (E33)

“The fields must be managed, jobs are needed, but the goal of conservation is also important.” (E33)

This former quotation shows that economic goals in the present economic system with high incentives on profit and efficiency may clash with nature protection goals. As an example in our case, S1 and S5 of high efficiency and

⁶ This effect might not be independent from the effect of changing lifestyles and changing socioeconomic attributes of users, since agriculture is not as popular among young people than it used to be several decades ago. In an ageing population this results in not being able to carry on hard agricultural work. We discuss these trends later in more details.

profit motive influence the preferred tree species and employment opportunities. These effects emerge also because of the changes in technology used (U9) and changed norms (U6) of the owners – in our case a government organization (GS1) –, i.e. the fact that state forestry is pretty much interested (and forced) in making profits from its operations.

“In 1991 and 1992 the old oak wood was cut down, except for 0.2 hectares, and the clear cut areas were reforested. Only the soft wood can renew itself, but its market value is not high, so they brought in some so-called non-native species, e.g. the hybrid Poplar, and the Gray and White Poplar or the American Ash. Oak trees are not planted recently due to economic reasons.” (E9)

“In 1968 the forestry produced 450 m³ timber per year and employed 220-250 people. Now they produce several thousand m³, but employ less people. The amount of profit to be produced is decided in Budapest.” (E9)

“My father and I sawed the trees, then we had lunch and baked sausages. The trees were pulled away by horses. In the evening we went to look after the livestock, there was enough time, there was no need to rush. Nowadays they get sick if they don't cut 50-60 m³ per day!” (E31)

In a capitalist society profitability is the bottom line, the fulfillment of other societal goals only come after this.

“Thing must be done in a sustainable way for both nature and the company. The contractors are only interested in money, not what the forest really needs.” (E31)

Local economic circumstances (development) also seem to have an effect on land use besides the general patterns of market and economic tendencies. This effect seem to be at least twofold: (1) low real income motivates people to engage in small scale farming to gain supplementary income and (2) subsistence crime may discourages certain activities.

“Game and fish are a great opportunity. A fishing lake was almost set up in the pits from which the sand was excavated for the highway, but in the end it did not work out, because no one grows fish for others to steal them.” (E14)

“I myself also grow garlic to supplement my salary.” (E12)

Property-rights system (GS4) and sector (RS1)

GS4 and RS1 seem to unfold their most significant effects hand-in-hand – at least in the Maros floodplain. Before the 1970's, agricultural activity was common in the floodplain area. Significant change in land use began in the seventies, after a huge flood (E4, E9, E25, E27).

“Until 1970 there were mainly orchards and small gardens, which were almost able to supply the surrounding villages with all the fruit they needed. These orchards were real jewels, they were really kept tidy. Grapes, apples, almost every kind of fruit could be found here. Many owners were concentrated in a small area. There was a large flood in the early 70's, which destroyed the gardens in the floodplain. Their destruction marked the beginning of the afforestation, because floods cause the smallest damage in forests.” (E9)

“The water level of the Maros used to be higher, but after the great flood in 1970 the dike was heightened by 2 meters. In the old times there was agriculture in the floodplain, root crops were grown, dominated by corn; sunflower could only be found in a much lesser extent. In these days the floodplain is cultivated at people's own risk, but the risk is high and these fields cannot be insured.” (E27)

Within the Maros floodplain, the dominant economic sector currently is forestry with one larger state actor (DALERD) and smaller local private owners. This kind of change is – as the former quotations show – also connected to the relatively low predictability of system dynamics (RS7), which makes agriculture within the floodplain risky. Thus RS7 with one irregular environmental state (“huge flood”) resulted in a change in human constructed facilities (RS4 – the heightening of a dike), economic sector (RS1) being present in the area and ownership (GS4)

However, land use changes did not stop at that point but went on. Many interviewees complained about the lack of accessibility to the forest areas within the Maros floodplain (E3, E6, E17), because present owners do not care about forest roads, resting places, local monuments (basically other elements of human-constructed facilities – RS4). This is the reason why several forms of earlier local uses (e.g. bathing, recreational fishing) is basically lacking (E4, E19, E22, E24), and these changes in RS1 and GS4 also contribute to the reduction in the level of resource use (harvesting levels – I1).

“Fishing and cooking was a common all day family program of the time.” (E22)

“The old trekking places and groves disappeared completely and became weedy.” (E24)

“The so-called “Tiszaháti” or “Vetyeháti” Tree or the Big Tree of the Hungarians was located in the area. This tree was a white poplar. It was about 110 years old when it fell in 2002. It functioned as a place for excursions. According to my wife 16 people were not enough to reach around it. When it fell, the locals took a piece of it as a relic. The area did not become an important excursions destination because the local town bureaus could not decide whose authority it belongs to.” (E9)

“While the Big Tree of the Hungarians was alive, many people went out there, but nowadays there are only a few visitors from Szeged.” (E11)

This process is also influenced by the changing socioeconomic attributes (U2) and norms/way of life (U6) of users (see later). Also, according to one opinion this process is somewhat self-reinforcing.

“The gifts of the Maros are appreciated, but unfortunately the utilization decreased significantly compared to the distant past, therefore this area is slowly becoming forgotten and increasingly neglected.” (E15)

Property rights influence local land use also in other ways. It is interesting that according to some (E4) state cooperatives operating before the change of regime in Hungary were in a sense better „keepers” of the area because the state cooperative system allowed land use to be planned and carried out unanimously and had different (e.g. voluntary) economic incentives – e.g. it was able to establish barter-like use agreements with locals.

“Many pastures were on the dike, we didn’t have to pay for it, just had to keep it clean. The slope of the dike was parceled out, everybody got e.g. 100 meters, 50 for the pigs, 50 for the cows.” (E10)

“The locals mainly go to the Maros for fishing and collecting wood. But lately wood collection can only be done with the permission of the forestry. There is a great demand for wood.” (E31)

Our interviewees disagreed whether there is a difference between private forest owners and the large state owner regarding the way of forestry. According to some (E2) state forestry is more “responsible”, while others (E20) see no difference.

Besides forestry, there are three important players in the area which influence local land use. The first one is MOL, an oil company having impacts on land use outside the floodplain.

“Thermal water was found by the MOL, but they had no need for it, so it was covered back. It could have been exploited as a spa like the one in Zalakaros, or used for heating greenhouses. We could have made big money with paprika and tomato.” (E21)

“Near the oil wells, the roads are well maintained by the MOL- staff .” (E11)

The second one is the national park, which influences land use within the floodplain most of all through Hungarian legislation – see later. And the third one is the Fishing Cooperative, having an impact on the use of the Maros itself (E29).

Human constructed facilities (RS4)

We already mentioned how the lack of certain human constructed facilities in the floodplain result – together with other factors – in a reduced use of the floodplain area. Besides, there are at least three recently built human constructed

facilities which influence land use.

First and foremost, the heightening of the dike changed land use opportunities – as already analyzed earlier.

“Before the construction of the embankments around 1970, the flood reached the Rózsa street. Our current place was a port for boats then. My father-in-law protested against this place at site selection saying it was too low!” (E4)

“In the past the water level of the Maros determined the type of the cultivated plants in the area. After the dam was built, the flood became less important for the crop production, so forest management has become the primary economic activity.” (E27)

Second, a motorway was built recently close to the examined area, which influenced land use and life opportunities (E13) in different ways. First, it had a direct impact, e.g. by having a new artificial facility in the landscape and by the induced sand mining. This latter changed the landscape within the floodplain. According to some these changes are quite negative (E1), while others see an opportunity to improve the use of the floodplain by enhancing recreational angling opportunities in the sandpits which came into existence because of sand mining. The motorway also has an indirect impact which might influence land use later on by influencing the local way of life by “bringing the city closer.”

“Large pastures have diminished as land was needed for the motorway.” (E27)

“Most of the villagers gave up on farming, they work in the bigger cities (Makó, Szeged), many of them are employed by the porcelain and the rubber factory. Travelling to the cities has become much more easier since the motorway was built.” (E26)

Local production facilities as part of RS4 might also change market incentives (S5). In our case, together with relatively cheap labor input – through the opportunities provided by a legally enabled (GS7) public employment program – they seem to partly change (redirect) agricultural production (E13, E26, E30).

“The municipalities employ public workers in agriculture, they will produce pumpkin for the pumpkin seed factory in Maroslele.” (E30)

The change in the state of formerly more intensively used human constructed facilities – not being independent from property rights (GS4) – also affects harvesting levels/use levels (I1). For example, deterioration of formerly intensively used facilities, e.g. the so called “Návay Castle” results in a less intense use and the loss of certain forms of use. Also, human constructed facilities in other geographical areas might influence the state of the local socio-ecosystem.

“The river has become cleaner in the recent years. Formerly, a sugar factory in Romania and a paper factory in Szolnok let the effluent into the river. But now the factories are closed or they implemented water treatment facilities.” (E16)

Productivity of the system (RS5)

The productivity of the resource system is influencing land use patterns heavily. The productivity of the area obviously influences local land use by influencing agricultural opportunities in and outside the floodplain. As long as it does not worth to do agriculture in the floodplain area – partly because the change in human constructed facilities (RS4), and also because the lack of predictability of the resource, i.e. River Maros (RS7) –, the surroundings of Maroslele are considered to be important for agricultural production.

“It’s not worth cultivating the land in the floodplain, huge risk... crop rotation is just not possible to make, as only maize can tolerate floods. Sometimes corn is replaced with sunflower for a year, but usually it is produced in monocultures. Wheat can be grown occasionally but it’s very risky..” (E6)

Predictability of System dynamics (RS7)

As aforementioned, RS7 influences agricultural opportunities within the floodplain (E7, E14).

“Sometimes the river Maros has an inundation each year, sometimes once in every 10 years, so farming in the floodplain is quite difficult. The soil quality in the area is very good, that’s a pity it’s not worth cultivating the land.” (E14)

Besides, the relatively low predictability of the river also discourages fishing and angling.

“Nowadays we can’t live on fishing only, because the river (water level) is “whimsical”, when the water level is high there are many fish, when low we can’t catch anything. If the infrastructure was better developed, I think, one possibility for using the area would be encouraging tourism. A tourist centre for fishermen could be built, though who will pay for this...I don’t know. In a place like the Lake Tisza with a steady water-level it’s much easier to develop such things for the delight of the whole family. Here at the Maros, with continuously changing water levels, it’s much more difficult. ” (E29)

Location (RS9)

The geographical distance (thus: location RS9 and the location of users U4) together with other factors, e.g. with the local way of life (see later) influence the intensity of the use of the floodplain. According to several interviewees (e.g. E10, E17) the relatively distant location of the floodplain from the settlement (Maroslele) influence its level of use negatively. The same is true for the

floodplains' distance of the nearby city, Szeged. This latter – although it was not mentioned in the interviews – might also be connected to the available transport infrastructure, i.e. physical distance is further enhanced by the lack of physical infrastructure providing quick access to the area for the inhabitants of the larger city.

“Although it's only 6 km, it's much too far away for visitors from Szeged.” (E11)

“I don't use the floodplain really,, it's too far (4 km), but sometimes it would be good to catch fish or to collect mushrooms.” (E20)

Operational rules (GS5)

The operational rules, being put in practice by the water authority, influence the land use by the dike.

“The management encourages the dike-reeves to keep sheep on the dam, because: the sheep are grazing the side of the dike; compress the ground; and manure the land. But you have to take care of them, they can easily “disappear” as happened at Gabor K. (a dike-reeve).” (E26)

The lack of sanctions for certain polluting activities also influences the state of the socio-economic system and land use (E29)

Constitutional rules (GS7)

There are several forms of constitutional rules affecting local land use. Within the floodplain, one of the most important is the Hungarian forestry law (37/2009), which sets up the frame for forest management, providing a stricter regulation than before according to certain opinions (E33) –. According to one opinion (E31), after the change of regime in Hungary many forests were cut down because of the fuzzy regulation of the “transition” period.

Hungarian and EU-level natural protection, e.g. the designation of Natura 2000 sites also affects opportunities for land use (E2, E11, E27, E31, E33).

“I have forests in the floodplain, but I need to ask for permission to cut some trees. The rule is: if you cut down a number of trees, you must plant the same amount.” (E2)

“I'd like to collect the punk wood for heating, but I can't do this, because protected insects live in the punk wood. The forest reserve is beautiful for those who want to see the dead wood...Leave the wood for the insects instead of people in need, well, this is weird...” (E11)

The EU influences land use also by regulations other than Natura 2000. E.g. the EU financially supports forest settling within the examined area (E33). This means that there it creates market incentives (S5) to change land use from arable farming and orchards to forestry.

“As the EU supports the forestation in the area, forests of 10, 20... acres are planted in the floodplain and outside of it... Many farmers prefer to plant forests now inside and outside the dam” (E27)

The budget allocating activities of the national government is another factor influencing land use according to some by cutting back on local development opportunities.

“The city of Makó takes all of the financial resources.” (E1)

Local regulations might also influence land use. According to one local rule:

“ Local retired older farmers can give their lands to the Local Municipality as a result of a new regulation of the last few years, in return they receive a life annuity.” (E21)

The creation of this rule might not be independent of the change in the socioeconomic attributes of users (U2) – see later.

Monitoring and sanctioning processes (GS8)

We already mentioned rule enforcement in connection with operational rules. Besides, according to one opinion, rule enforcement also influences forestry by setting different levels of controlling activities for private and state managers (E33).

Economic value (RU4) and dependence on resource (U8)

The economic value (RU4) of the Maros floodplain seems to be significantly lower nowadays than it used to be, due to the decrease of local resource-needs.

“In the 80s’ young locals used to go to the floodplain forests to collect fuel wood: to cut the branches off from the trees pulled down by the foresters.” (E18)

This aforementioned change in the local resource use is probably not independent from several other changes: (1) change in (heating) technology (technology used – U9); change in property-rights regimes (GS4) and economic development (S1) and market incentives (S5) which are different (more private-property and profit oriented) nowadays compared to socialist times; (3) change in norms (U6), being nowadays a lot more private-property centered, and (4) constitutional rules (GS7) regarding nature protection affecting intervention opportunities within protected forests (E8)

“In the past, local people from Maroslele were allowed to collect the dead wood, twigs for fuel wood. Now they are banned from doing this, because the dike-reeves collect the wood. These current rules restrict the freedom of the local people.” (E8)

The economic value of resource units within agriculture directly influences local farmers’ choices regarding agricultural production– together with local traditions (history of use – U3) and local agricultural conditions. In the Maroslele area the most popular agricultural product is garlic, thanks to the aforementioned factors (E17, E21)

The river itself also has an economic value for the local agricultural production, since it secures easy and cheap irrigation (E6, E17, E13) and contributes to the good quality of the local soils, arable land. However, we didn’t reveal the particular use of the river by the farmers.

Socioeconomic attributes of users (U2)

The change in the socioeconomic attributes of users also influences land use. This phenomenon is basically connected to the ageing of the population in the settlement (E2, E18).

“Most of the people who live here are members of the older generations, young people have been moving into cities.” (E18)

According to many locals ((E18, E22, E1, E24) this tendency is connected to both market circumstances/economic development (S1).

“after the splitting up of the former socialist cooperatives, living at the settlement became more difficult for people in economic sense. It is difficult to find a work here and earn a living.” (E18).

The change in socioeconomic attributes may also be connected to a change in the social norms of users (U6) according to which urban lifestyles might be more attractive to young people than traditional lifestyles (E24). This, according to some, affects both agricultural land use (see earlier) and also land use within the floodplain.

“The floodplain used to be really beautiful, but it is totally abandoned now. Young people don’t care about it anymore, those who managed the land have disappeared by now.” (E7)

History of use (U3)

The history of local use (U3) influences the memories locals having about the landscape and thus local attitudes, norms and perceived importance of the natural resource. Many interviewees mentioned nice memories connected to the floodplain area (E3, E18), and a deep attachment to the area as their homeland (E3).

History of local agriculture might also influence agricultural production in two ways. First, by having certain agricultural traditions connected to certain agricultural cultures (garlic, in our case) and by enhancing knowledge transmission between generations.

"The situation of local onion producers is similar to that of the apple producers' in Szabolcs." (E17)

"what I know I learned from my parents and not in school" (E6)

Location (U4)

Several interviewees mentioned that large amount of litter is piling up by the banks of the Maros. On the one hand perception of this phenomenon is the consequence of certain users' norms (U6) since some of them complain that local and non-local sport fishermen are the ones who leave their litter there (E15, E11). On the other hand the location of the analyzed resource (U4) might also influence this situation, since according to other users litter is being brought by the river itself from Romania (E11).

Leadership/entrepreneurship (U5)

We found several examples of local leadership potentially affecting resource use. Several interviewees mentioned the local mayor as an example of positive local leadership. However, its influence on land use was not detailed at all.

"Recently, a considerable development has been initiated, mainly by the mayor." (E22)

"The life of the village is getting better since we have a new mayor." (E2)

We also found that "environmental leadership" might play a role in the launch of environmental protection legislation and forestry management (E16, E20, E31).

"I am a committed ornithologist and conservationist since I was a child. I initiated the preservation of several sites here around, and I myself played an important role in the naming of the Körös-Maros National Park." (E16)

"The plantation of the forests began in the 50's. A clever forester was the leader of the work, so a lot of oak forest was planted. (E20)

On the other hand, changes in the life circumstances of local actors being enthusiastic in certain issues (e.g. nature protection) may also influence land use according to some. This may also be connected to the fact that these interests are (perceived as) partial interest within the community having represented by only a small minority of local community members. Thus, the drop out of only a few interested people might “ruin the case”.

“Most of the formerly very active people founded families, so the issue (of ornithology) is declining”.

Norms/social capital (U6)

Changing lifestyles (norms) (U6) of local people, especially younger generations, influenced by the wider technological environment and wider societal culture also influences attitudes towards local natural resources and land use (E2, E6, E8, E14) –resulting in a reduced land use in the floodplain and a reduced local involvement in agriculture.

“I love nature. Nature means nothing for the youth nowadays. Even if it means something for them, it cannot be compared to what it means for the elders.” (E8)

“The landscape is changing because people are changing too. Nowadays people are running, formerly they used to have time for everything.” (E14)

The effect of social capital on land use is also interesting. First, local judgment on its level is contradictory. Some interviewees were talking about experiencing high levels of social capital (E3), while according to others, the level of social capital is quite low (E1, E6, E8, E21).

The perceived lack of social capital, together with the missing local leadership (U5) is perceived as one reason for local farmers not being able to effectively stand for their interests against larger market actors (E6, E13). Paradoxically, the presence of different kind of larger economic actors might influence local agricultural opportunities positively.

A significant change, partly connected to changes in local norms is the reduction of the amount of people living in farm-steads (Tanya) and farm-steads themselves (E10, E11, E31). This change might also be affected by economic factors like the former anti farm-stead policy of the socialist regime, the lack of formerly existing education opportunities and certain other uses/owners of the area.

Changes in social norms affects land use also in quite specific forms. It influences quite specific land use types, e.g. birding habits, the cleanness and tidiness of the settlement environment.

“Modern ornithologists do not appreciate old values. The leaders of the ornithological camps spend most of their time in the pubs.” (E1)

„The village is tiny and clean, the villagers contribute to it because they appreciate the surroundings and take care of it.” (E22)

However, generally we found a diversity in local norms regarding the importance of environmental protection. While some of the local users state to be quite environmentally conscious when using the local environment – *„They are trying to minimize the use of chemicals. They try to use the minimum of what is necessary for profitable agriculture. (E13)* – others seem to be more motivated by economic factors. According to environmentalists (E16, E20), foresters are pretty much economically motivated – even to an extent where they neglect/skip environmental regulations. However, certain foresters (E31) see themselves the opposite way – giving the best possible environmental performance among present market circumstances. Some people neglect norms when fishing illegally (E29) – this latter might also be the result of poor local economic opportunities.

“They seed the oak in rows, but the wild-boar is a smart animal, it goes along the row and pick up the seeds... They know how to cut too much tree, so the rest of the oak trees get more light, and they become bushy, or the grape-stalk run up the tree, so the foresters can cut down the forest because of bad health. They know how to do it, if they really want (to cut more trees).” (E20)

“I never cut down more than the annual growth! I wish to leave the forest to my descendants... I work according to the management plan. The oak tree is ready for cutting down when it is 60 years old, although in the forestry law there is 110 years. The whole circle is necessary: plantation, rejuvenation, attenuation, cutting. The mass of the wood (in cubic meters) is rather growing on my territory. (E31)

Although according to some (e.g. E22) preserving traditions is quite an important “norm” for the villagers, it does not seem to be connected to the floodplain area.

The local way of life also influences the use of the floodplain. Since *“all who live here spend their whole day in the open” (E17)*, local people might not have that much need for recreation in nature as people living in larger cities. According to some, the reduced use of the Maros is – besides other factors – also caused by a change in norms, since people became more risk averse than they used to be..

“Nowadays not too many people go down to bath in the river, because they fear from the river, from the strong drifting, and from the whirlpools.” (E4)

“I did not let my youngest son to go to the bank of the Maros, because the landscape has been changed, and especially because of the fast flow of the river.” (E26)

“Perhaps because of the fear from the ticks people are not going so often to the forest.” (E30)

According to Ostrom (1990), one of the prerequisites of sustainable resource use is discounting. Some interviewees state to have low discount rates.

"I do not need better business than a good one." (E27)

Local education was also mentioned as a factor influencing local norms and land use.

"I had to take practical classes in school already as a child. We learned about hoeing and prepared bird-feeding boxes in the forest." (E8)

"Young people are not able to mow by hand-scythe." (E15)

Knowledge of SES/mental models (U7)/Deliberation among users (I3)

The mental models of local users and their communication also influence land use. According to one interviewee (E33) there is regular communication between the state forestry and the national park in the area, and communication is "easy" because of the similar background.

"We consult annually with the staff of the National Park. They are foresters too, we can come to an agreement." (E33)

However, on other levels, the lack of deliberation means serious problems for certain local actors.

"The problem with the National Park is that they do not give enough information, so people do not know what is allowed and what is not in the protected area." (E1)

Lack of communication may also result in conflict with local users, especially that conservationists have different mental models and knowledge of SES compared to other users. As long as conservationists prefer untouched natural environment, locals have different preferences, e.g. they prefer certain elements of the former landscape and emphasize the economic aspects of land use.

"The everyday people only realize that nature conservation limits certain activities." (E1)

"The National Park plants native species now, for example 'grungy poplar', which is good for nothing. Earlier, foresters planted nice tall poplar forests, but nowadays they breed such trees which are good for nothing." (E11)

"Native species are suitable to use mixed with other species. The forest is good when it is mixed. If the native poplar becomes firm, the alien species can not overgrow it." (E31)

“If I invest into something, I would expect that I get something out of it. If I populate young fish, I expect some results, and not the cormorants to eat all fish.” (E29)

„Everybody sees it in a different way. Nowadays nature conservationists are the ones who dominate. They are not governed by money. But the furniture industry needs wood, it is necessary to fulfill its needs also. Nature conservation is important, the birds, and the capricorn beetles are important as well, but the production is necessary too.” (E31)

Creating categories based on occupations (e.g. conservationists, foresters, farmers etc.) does not mean that these groups are uniform regarding their mental models and knowledge. There seem to be significant differences in opinions between conservationists either.

“With so many rules it is not nature which is the master... We should not force nature to adapt to our rules, but we should adapt to rules of nature... We did better to leave the forest to grow up, and encroach only rarely. Nor the foresters neither the NP can imagine this, because former experience is diminished”. (E20)

It is also interesting to observe how local people gain knowledge about the local land and land use. Knowledge transmission from parents, “masters” and family seem to be of significant importance in this respect (E26, E31).

“Gyula Kiss drove the afforestation of the Maros floodplain in the 1950’. He was my master, but only for one year. I got a considerable part of my knowledge from my practical experience.” (E31)

Lack of trust in industrial agriculture also significantly affects land use.

“The animal husbandry is not profitable, but at least I know what I eat.”

Dependence on Resource (U8)

Different stakeholders use the floodplain and the surroundings of the settlement in different ways and to a different extent, thus they have a different kind and extent of dependence on local natural resources.

Significant forms of use and dependence are:

(1)The river and the floodplain: irrigation, wood harvesting (forestry), biodiversity protection (national park), hunting, fishing and sport-fishing. These activities are connected to different stakeholders: as long as wood harvesting, biodiversity protection and fishing are not connected to local users, irrigation, hunting and fishing are to a lesser or higher extent connected to local community members.

(2)Settlement surroundings: agriculture is the most important form of use, with garlic as the most important local agricultural product.

Formerly significant, but decreasing forms of use are (1) recreation – in the case of the floodplain; (2) gathering wood for heating – in the floodplain; and (3) animal breeding.

Although the land around the settlement seems to be very important in terms of the economic well-being of the local community, there is some divergence of its importance – probably because the aforementioned reduction of certain types of land use, but probably also because of more developed agricultural opportunities.

“The economy has changed, people are not that much dependent on nature as they used to be.” (E15)

Besides “hard” economic dependence, “softer” dependence was also mentioned connected to the ecosystem service “sense of place” (E15, E22).

“We like to live here, because of our attitude towards nature. We love silence and stillness. Only those like to live near to the Maros, who could perceive the beauty of rural life.” (E15)

Technology used (U9)

According to several interviewees, modern agricultural technology is essential for profitable agricultural production – indicating a difference a to earlier times.

“Who has a land, but does not have any machines, can not make profits. It is pure suicide. (E14)

This shift in certain land use types might also be connected to transmission failures (E27, E28), and also to the alteration of local norms – the increased “demand” for an “easy” way of life.

Discussion

The effects of institutional factors in land use

Institutional factors have diverse and complex effects on land use in the examined area. These can be divided into two main categories: direct and indirect effects.

By indirect effects we mean that certain institutional factors influence other institutional factors while these latter influence land use directly. This means that certain institutional factors unfold their effects indirectly through their effects on other institutional factors. An example for such effects is the heightening of the dike in the 1970s. This change in institutional factor “human constructed facilities

(RS4)” resulted changes in other institutional factors – e.g. in resource predictability (RS7) and the productivity of the system (RS5) outside the floodplain (the area surrounded by the river and the dike). These processes induced changes in sector (RS1) and influenced property rights (GS4), which factors in turn – probably together with other factors, e.g. market norms/incentives – induced alterations in land use in many different forms. The simplified example for the aforementioned complex indirect influences (interdependency) chain is shown in Figure 2.

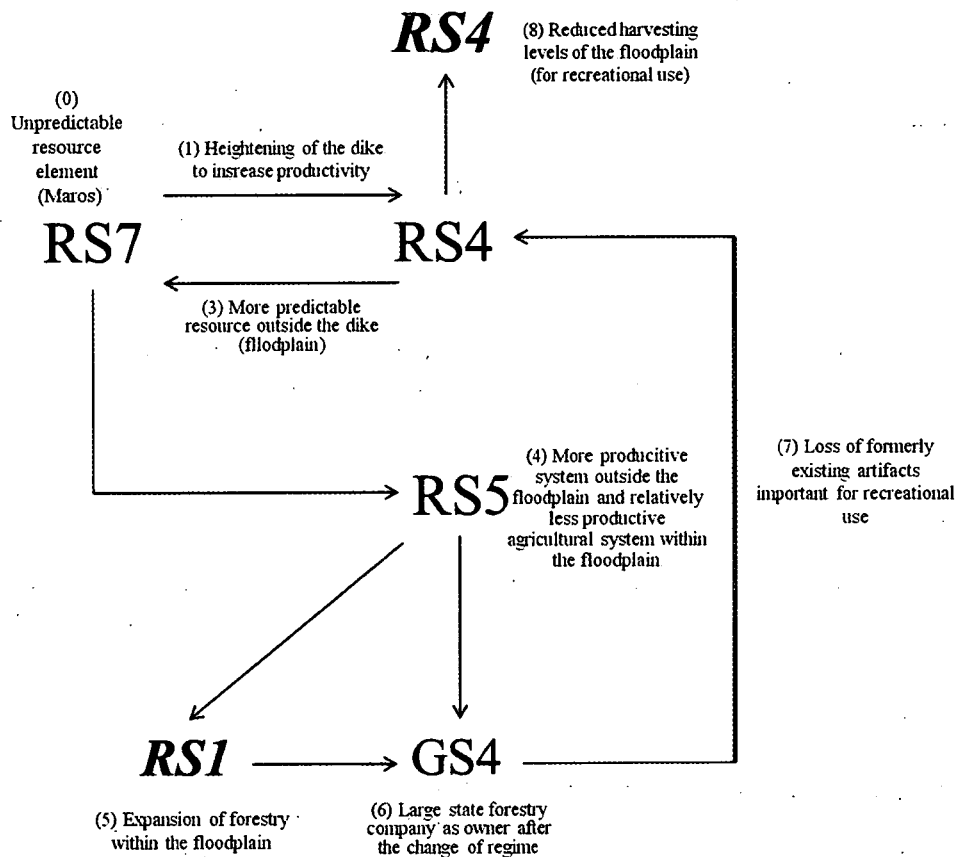


Figure 2. A simplified example of indirect influence of institutional factors on land use. Factors marked with bold italic mean direct land use change. *Source*: own illustration

Institutional factors can affect land use directly. For example, altered market circumstances influence agricultural land use patterns directly by changing the profitability of certain activities. These direct relationships are shown in Figure 3.

Figure 2 and Figure 3 show us that even if we examine second-tier institutional variables (which are themselves quite aggregated categories), there is a complex and diverse relationship between institutions and land use.

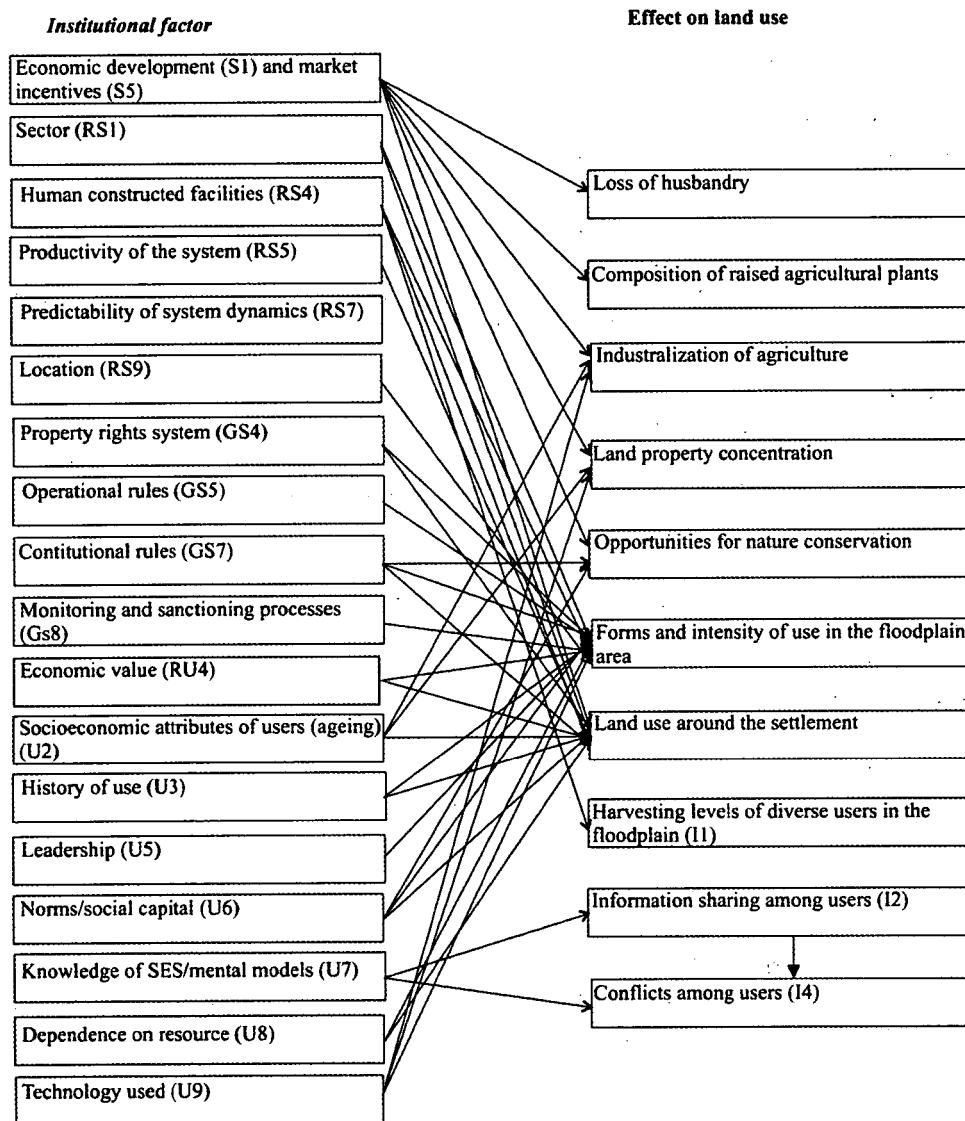


Figure 3. Direct effects of institutional factors on land use. *Source:* own illustration

Furthermore, second-tier variables cover many potential third- and fourth-tier variables with different effects on land use. “Norms/social capital (U6)” as a second-tier variable might cover many kinds of social norms (third-tier variables)

affecting land use in many different ways. Such third-tier variables could be (1) local way of life; (2) broader societal lifestyles; (3) trust; (4) the level of environmental consciousness; (5) the nature of economic norms; (6) discounting, etc.⁷

We think that this highlights two facts. First, qualitative analysis is essential when someone wants to understand land use and CPR situations in general. This does not mean that quantitative analysis does not provide relevant information, but we are convinced that at the planning and implementation phases of land use policies qualitative analysis provides information which makes the understanding of the local context possible in such a rich way which cannot be reached by pure quantitative analysis. Second, there are very many factors directly influencing land use and thus the conservation opportunities and the effectiveness of conservation. Thus, it seems to be important to examine these factors in details before planning and implementing conservation policies.

What do we know? Facts, interpretations and conservation

Our research was aimed to reveal the role of institutions in influencing land use in the Maroslele area. However, it is clear that a qualitative methodology reveals both facts (knowledge) and interpretations (opinions, feelings etc.). By making this differentiation, we accept a “modified constructivist” view on social reality (Tacconi 1998, Pataki et al. 2011) This means that „There exists a physical reality subject to differing interpretations by human beings. Thus, there exist multiple socially constructed realities.” (Tacconi 1998, pp. 99)⁸

Furthermore, sometimes it is difficult to differentiate between facts and interpretations. Even if opinions on “facts” are unanimous within a community, it is clear that it might be because of a common interpretation of certain parts of the facts within the local community. (E.g. in the case of the reduced level of local use of the floodplain area, a common interpretation exists regarding the reasons for it – which are most of all connected to the lack of human constructed facilities. However, one can never be sure whether other factors are – also – behind such processes, which are not realized by the interviews themselves, e.g. their changed attitude towards the resource.)

On the other hand, university researchers might perceive to have a fine knowledge on the ecological reality regarding the natural resource at stake. But this is a quite partial knowledge if for instance, local knowledge on land use and the knowledge on local social realities are absent from it. (A scientific

⁷ Here we only mention variables which turned up in present research. The special literature e.g. on the measurement of social capital (see e.g. Stiglitz et al. 2010) provides the reader with many more information and potential variables.

⁸ For further theoretical dilemmas on this topic and this aspect of qualitative research see e.g. Kvale (1996), Mitev-Ariel (2012), Babbie (2006), Tacconi (1998).

conservationist/researcher might have fine knowledge on the “valuable” species within one area, while she might lack other important knowledge, e.g. local conservation traditions, local social/political preferences etc. It is clear that this latter type of knowledge, partly being a “locally constructed reality” is also part of that social-physical reality which influence e.g. effective conservation opportunities.)

In our view the issues raised above have an important consequence regarding conservation. We are convinced that effective conservation should take into consideration both (1) existing social and physical realities and (2) also those multiple socially constructed realities which (local) stakeholders experienced regarding the existing social and physical realities.⁹ Since the actions of stakeholders – as our research implies – is not based on pure, objective scientific, physical realities, but rather on their own socially constructed realities. Therefore beside the examination of the physical realities effective conservation demands the exploration and understanding of socially constructed ones.

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References

- Costanza, R. (eds.) 1991: Ecological Economics: The Science and Management of Sustainability; Columbia University Press, New York.
- Kelemen E. – Bela Gy. – Pataki Gy. (2010): *Módszertani útmutató a természet adta javak és szolgáltatások nem pénzbeli értékeléséhez*. ESSRG Füzetek, 2. szám, SZIE KTI Környezetgazdaságtani Tanszék, Környezeti Társadalomkutatók Csoport, Gödöllő. - <http://www.essrg.hu/sites/default/files/documents/kelemen/ESSRG-Fuzetek2.pdf>
- Kvale, S. 1996: Interviews: An Introduction to Qualitative Research Interviewing. Sage Publications, Thousand Oaks, California.
- Mitev Ariel Zoltán 2012: Grounded theory, a kvalitatív kutatás klasszikus mérföldköve. *Vezetéstudomány*, 18(1), 17-30.
- Ostrom, E. 1990. *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge University Press, Cambridge.
- Ostrom, E. 1999: Design Principles and Threats to Sustainable Organizations that Manage Commons. Workshop in Political Theory and Policy Analysis.

⁹ A good example for a planning method enabling such type of conservation activities is available in Kelemen et al. (2010).

- Ostrom, E. 2007: A diagnostic approach for going beyond panaceas. *PNAS*, 104, 39, 15181–15187.
- Ostrom, E. 2009: A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325, 419-422.
- Pataki Gy. – Bodorkós B. – Balázs B. – Bela Gy. – Kelemen E. – Kohlheb N. (2011): A vidékfejlesztés demokratizálásának lehetőségei: akciókutatás a Mezőcsáti Kistérségben. In: Pataki Gy. – Vári A. (szerk.): *Részvétel – Akció – Kutatás. Magyarországi tapasztalatok a részvételi-, akció- és kooperatív kutatásokból.* 9-27. o.
- Poteete, A. R. – Janssen, A. – Ostrom, E. 2010: *Working together. Collective action, the Commons, and Multiple Methods in Practice.* Princeton University Press, Princeton and Oxford.
- Stiglitz, J. – Sen, A. – Fitoussi, J-P. (2010): *Report by the Commission on the Measurement of Economic Performance and Social Progress*
- Tacconi, L. (1998): Scientific methodology for ecological economics. *Ecological Economics*, 27, 91–105.
- Vatn, A. 2006: *Institutions.* Internet Encyclopedia of Ecological Economics.
- Vollenbroek, F. A. 2002: Sustainable development and the challenge of innovation. *Journal of Cleaner Production*, 10, 215–223. o.

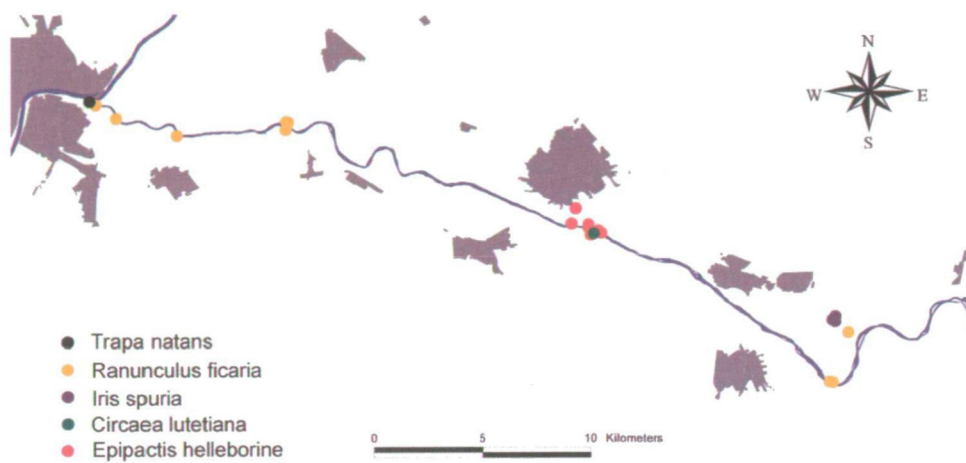


Figure 1. Occurrences of some rare or protected plants along the river Maros.

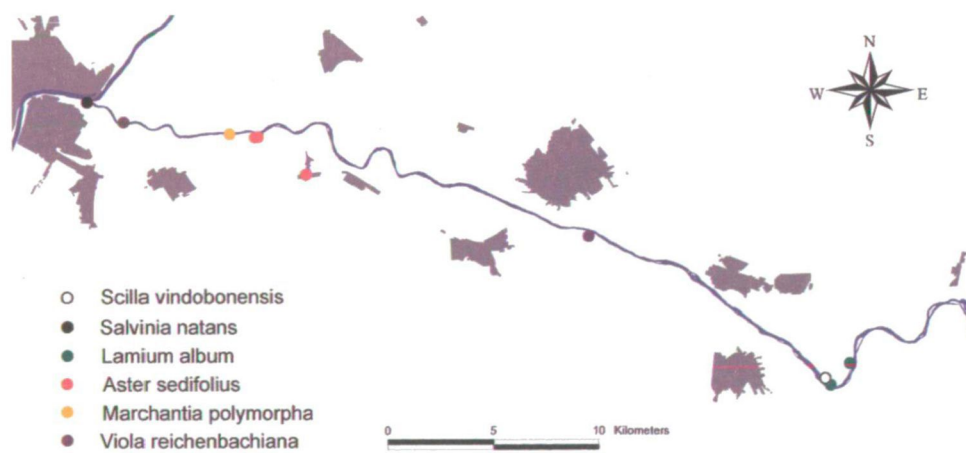


Figure 2. Occurrences of some rare or protected plants along the river Maros.

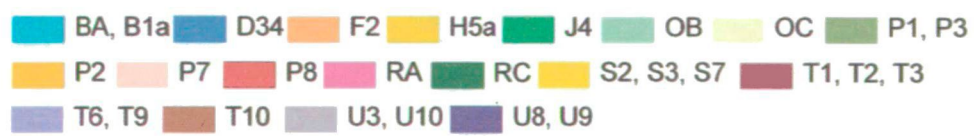
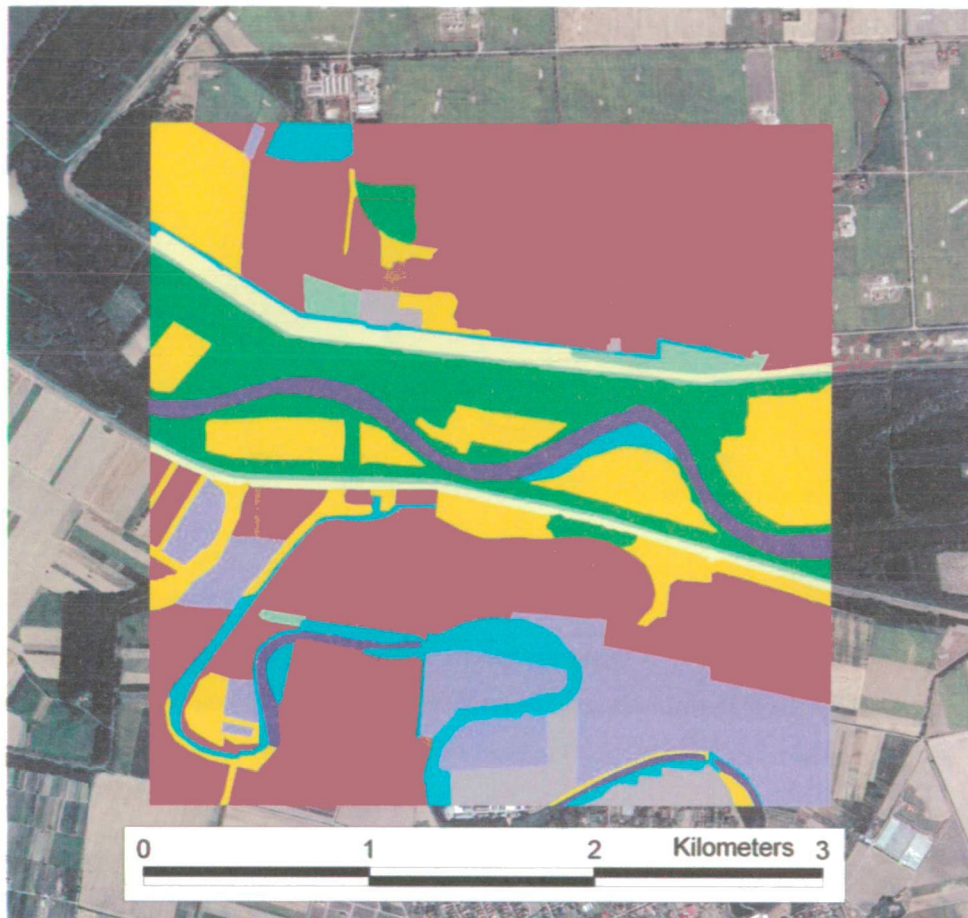


Figure 3. Habitat map of the Szeged site

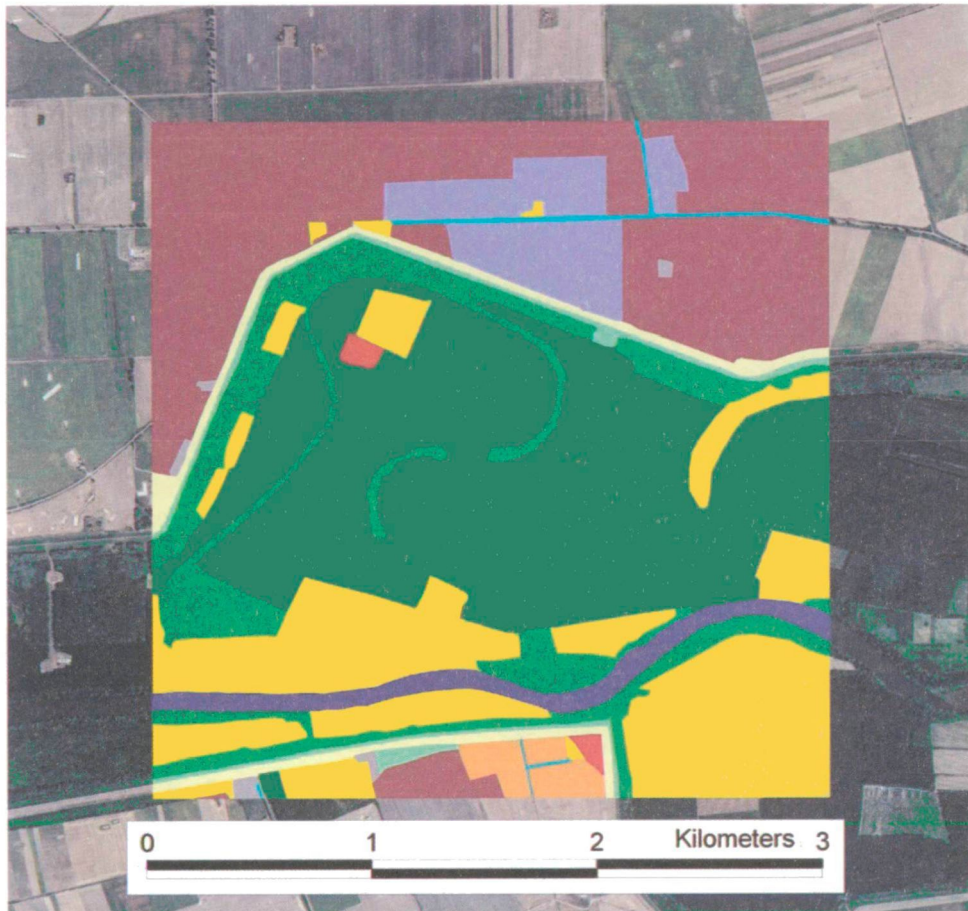


Figure 4. Habitat map of the Maroslele site

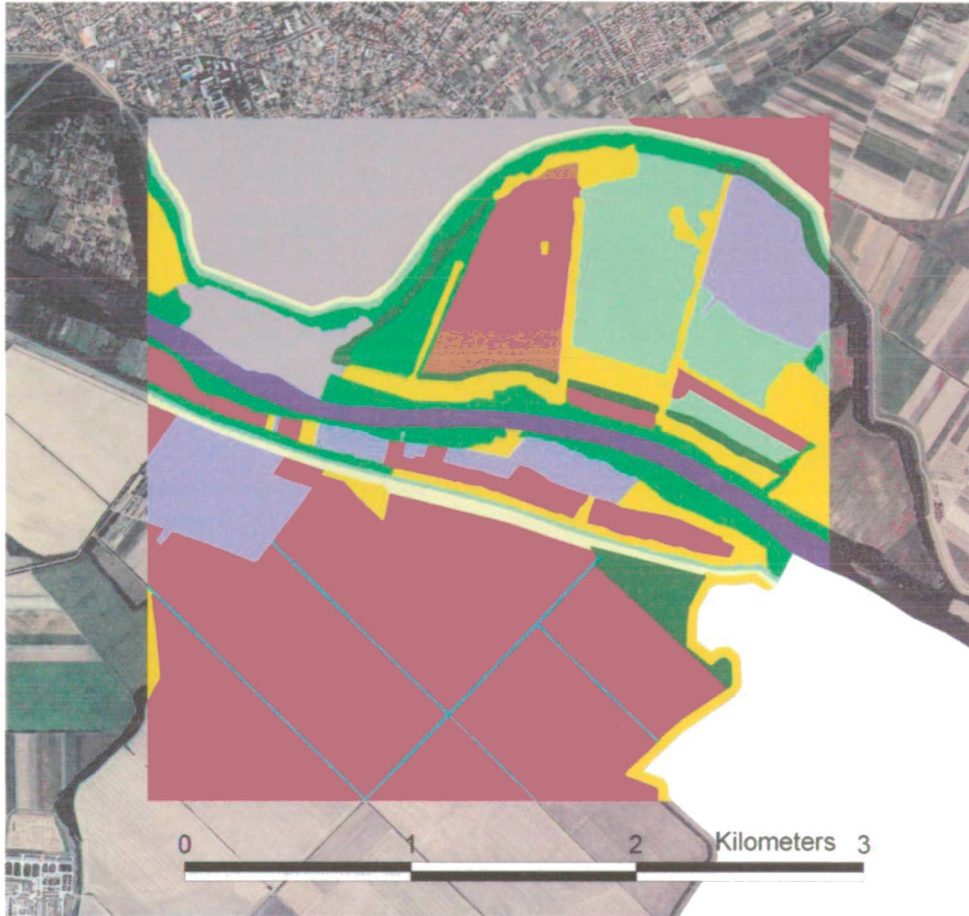





















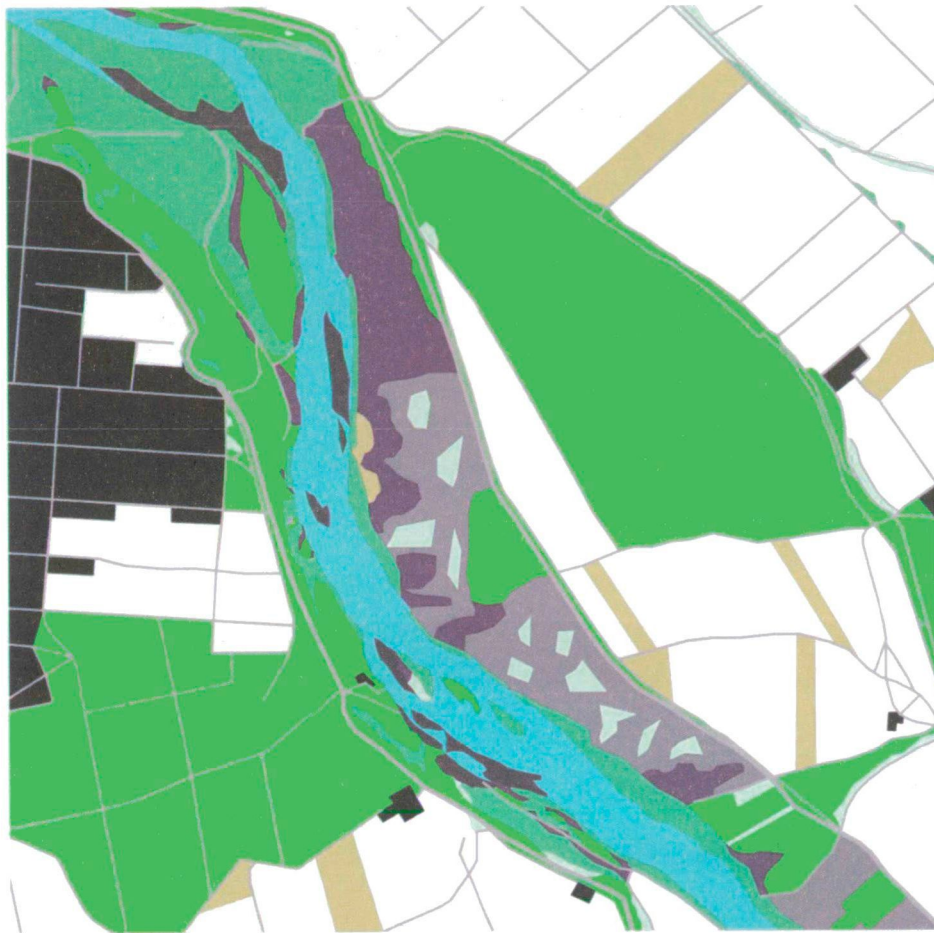
Figure 5. Habitat map of the Makó site



Figure 6. Habitat map of the Magyarcsanád site

Legend for the Figures 3-6 in Colour plates. Explanation of Á-NÉR habitat codes.

	BA, B1a	BA,B1a	Eu- and mesotrophic reed and Typha beds
	D34	D34	Mesotrophic meadows
	F2	F2	Salt meadows
	H5a	H5a	Closed steppes on loess, clay, toff
	J4	J4	Riverine willow-poplar woodlands
	OB	OB	Uncharacteristic meadow and tall herb communities
	OC	OC	Uncharacteristic dry/semi-dry grasslands and tall herb communities
	P1, P3	P1	tand of native trees
	P2	P2	Mesic shrub vegetation
	P7	P3	New afforestation
	P8	P7	Extensive orchard with ancient cultivars
	RA	P8	Clear cuts
	RC	RA	Scattered native trees or narrow tree lines
	S2, S3, S7	RC	Uncharacteristic hardwood woodlands and plantations
	T1, T2, T3	S2	American poplar plantations
	T6, T9	S3	Other non-native deciduous plantations
	T10	S7	Tree lines mostly with non-native species
	U3, U10	T1	Annual intensive arable fields
	U8, U9	T2	Perennial intensive arable fields
		T3	Vegetable and flower plantations, greenhouses
		T6	Mosaic of small agricultural parcels
		T9	Gardens
		T10	New abandonments on arable lands, vineyards and orchards
		U3	Villages
		U8	Rivers and streams
		U9	Lakes and ponds
		U10	Farms



3 km

LEGEND

- Amorpha fruticosa
 Fallow
 Arable
 Meadows
 Forests
- Scrubs
 Villages and farm buildings
 Water surfaces
 Pit ballasts
- Orchards and vineyards
 Gravel
 Reed
 Golf course

Figure 7. Land-use categories – Igrış.



3 km

LEGEND

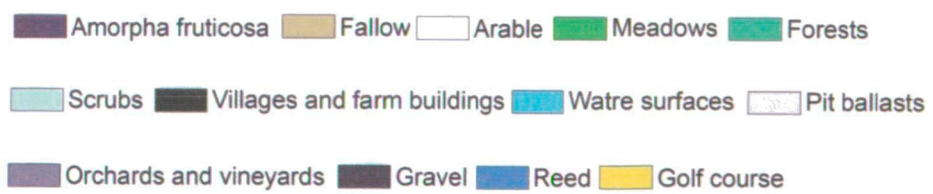


Figure 8. Land-use categories – Felnac.



3 km

LEGEND

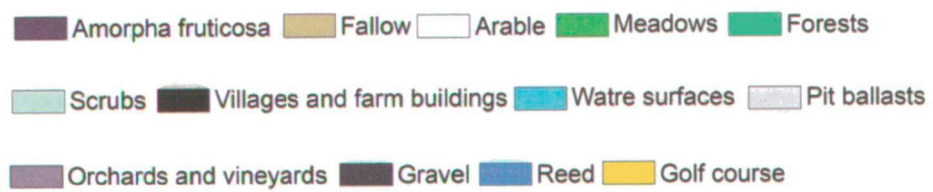
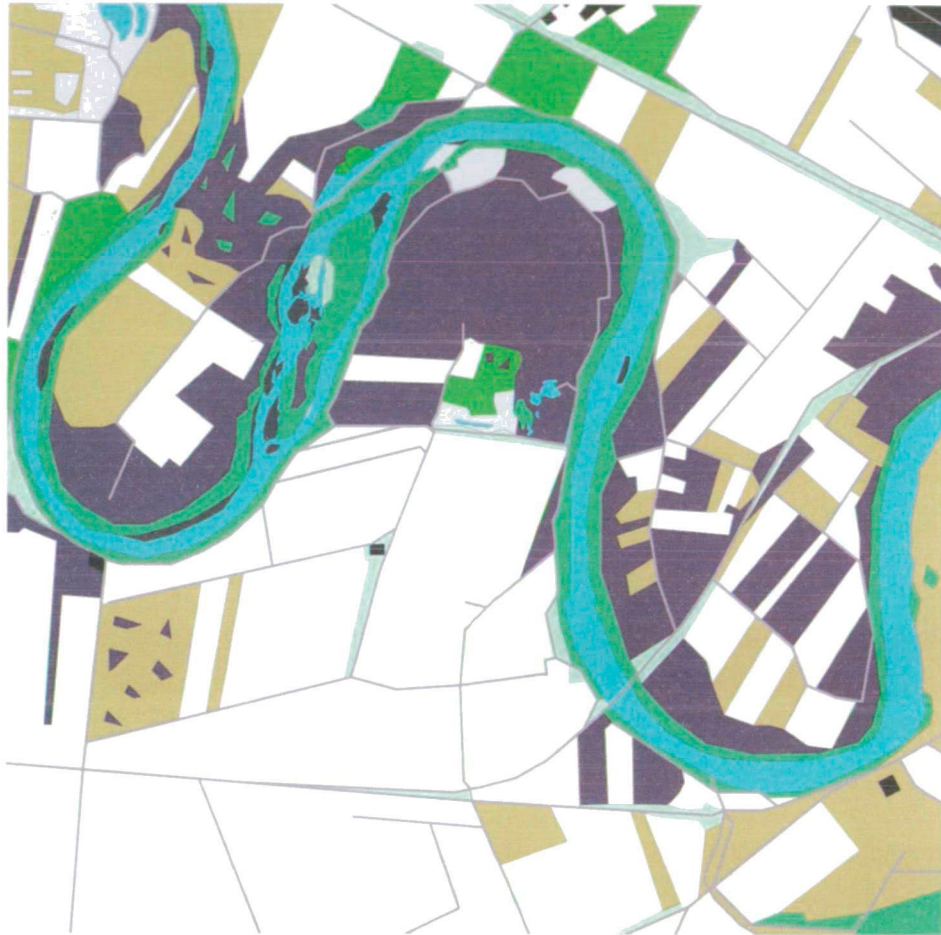


Figure 9. Land-use categories - Vladimirescu.



3 km

LEGEND



Figure 10. Land-use categories – Păuliș.



Figure 11. Pasture invaded by *Amorpha fruticosa* (at Pāuliņš).



Figure 12. Abandoned plum orchard (Pāuliņš)



Figure 13. Coppiced willows – remnants of traditional practices (at Igrış)



Figure 14. Lipova (Hoffmann, 2012).



Figure 15. Frumuseni (Hoffmann, 2012).



Figure 16. Felnac (Hoffmann, 2012).



Figure 17. Igris-island (Hoffmann, 2012).



Figure 18. *Oedaleus decorus* (Germar, 1826) ♀ (Hoffmann, 2012).



Figure 19. *Odontopodisma acuminata* Kis, 1962 ♂ (Hoffmann, 2012).



Figure 20. Road in the Ceala Forest near Arad used by *Odontopodisma acuminata* taking sunbath during fall (see Figure 13) (Hoffmann, 2012).



Figure 21. *Odontopodisma acuminata* Kis, 1962 ♀ run over by car (Hoffmann, 2012).