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Private Claims on Nature Domains – Whether Privatisation of Hungarian Land Affects Ecological Networks

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***Abstract.** In the Central-European countries, a transformation from command-economy to market-economy is taking place. Redistribution of rights over land is one aspect of transformation, and a key process particularly in rural areas. Changing property and use rights means changing patterns of land use. In theory, ecological structures and conservation areas that existed before 1990 in cases may be converted into other types of land use. Cadastral maps and aerial photographs are analysed for two case-study areas in Hungary, providing a long-term assessment on land use changes and their implications for ecological values. For these cases, the loss of natural landscape elements has been small, whereas a considerable length of dirt roads and parcel boundaries was added. Moreover, the negative ecological impact of socialist agriculture was far greater than the recent privatisation. The typical nature of the Hungarian privatisation system and the national nature conservation policy have played an important role in preventing large-scale conversion of nature into farmland.*

***Keywords:** land reform, Hungary, landscape change.*

1 Introduction

1.1 Purpose of the research

In the cultivated landscapes of Europe, agriculture and nature live side by side in a precarious balance. Agricultural land use facilitates biodiversity to some extent, but poses a serious restriction to the remainder. As a consequence, some space is reserved where nature can develop unhampered. This space can consist of nature reserves or more coincidental elements like hedgerows, ditches, marginal land and

ponds. Together, they build the ecological network that intertwines agricultural land use.

The balance between space for agriculture and for nature is vigorously shaken in most Central European countries. The fall of socialism raised a popular demand of returning state-farm land and collectively used land to private landowners. Depending on the rules that were chosen for the privatisation process, the location of land to be returned ('private claims') may coincide with the ecological network ('nature domains').

The privatisation and redistribution of agricultural land is thus likely to have a significant impact on ecological networks. A new equilibrium in claims on land has to evolve, together with clear environmental policy for farming. Under weak institutional and legal arrangements, a lack of clear political priorities or shifting political majorities may lead to overexploitation of natural resources (Hagedorn-Luttecken, 1998). Although the transition to market economy has environmental side effects throughout (Gatzweiler *et al.*, 2002; Zamparutti and Gillespie, 2000), no inventories have been done, however, to estimate the exact impact of privatisation on ecology.

This article makes an attempt to estimate the effects of privatisation on ecological networks and nature conservation areas by analysing the actual changes in land use in two Hungarian case study areas. In order to compare the changes due to privatisation to those during collectivisation, the time-span ranges from the 1950 until today. Part of the data with respect to the recent situation was available in a GIS format, but to an important extent the only sources were aerial photographs.

1.2 Conceptual framework

In the research underlying this article two concepts are pivotal, namely ecological networks and privatisation. Let us first see what they mean individually and in relation to each other.

In a cultivated landscape, agricultural units lie adjacent to pieces of unused land. Even though agricultural parcels do not entirely lack natural qualities (on the contrary, many species are strongly attached to agricultural land use), we assume that unused land is more valuable, since it is home to wild plants and animals. For ecology, agriculture and unused land are counter moulds.

Unused land consists of lines and patches. The lines are the parcel boundaries; strips of unused land such as ditches, canals and hedgerows. The patches are the forests, swamps and riverbanks that represent bigger and less narrowly shaped pieces of nature, some of which may be owned and managed by nature conservation organisations. The patches and lines together form an ecological network, in which the patches are connected by lines and the chances of survival for wildlife are improved by its connectivity.

Privatisation means redefining the location of private ownership of land. Complex systems have been applied throughout Central Europe in order to make

a new ownership distribution that serves historical justice. The land that had been accumulated in the large production units that characterised socialism was given back to individual citizens. So, a completely new land ownership structure was implemented. Do note that not all redefined ownership resulted in redefined land *use*. Owners may have decided to lease out their newly acquired property for reasons of age, distance, occupation, prospects of marketing produce, etcetera.

An owner can roughly do three things with his newly acquired property:

- (1) He leases to the person that has used his land so far. The physical situation remains unchanged.
- (2) He decides to leave their parcels unused, thus adding space for nature, however without long-term stability.
- (3) He actually uses it for production. The structure of the ecological network is changed.

When (3) applies, while coinciding with a current piece of unused land (line or patch), privatisation would result in conversion of that piece of natural habitat into agricultural exploitation. When the entire parcel would consist of forest, the long-term asset in the trees may outweigh the short-term profit from selling the wood. But a line of unused land is probably removed for production's sake.

On the other hand, in case of decision (3), additional boundaries may be newly created in formerly contiguous agricultural parcels due to the redefined property boundaries, and so do new patches (fragmentation of land use means adding a lot of border length and that would be positive from an ecological point of view). The effect of privatisation on ecological networks therefore may be removal of existing pieces of ecological network and adding new pieces.

What we therefore look for in this analysis is – in purely physical terms – to what extent the land *use* has changed, thus resulting in pieces of the existing network being removed (short term damage) and new pieces being added to the network (long term benefit). In other words: how much nature domain was sacrificed to private claims and how much was compensated. We do not consider the ecological quality of the resulting network, for landscape ecological modelling still does not allow general qualifications irrespective of specific target species.

1.3 The rise and fall of collectivised agriculture

Hungarian agriculture has known many shifts of ideology, all with subsequent impacts on the physical appearance of the cultivated landscape. Although collectivisation (1950s) and privatisation (1990s) seem clear milestones in history, they both present extensive periods of continuous reform.

After a long period of polarisation within Hungarian agriculture, the socialists made their first attempt at collectivisation between 1949 and 1953. However, without state subsidy the co-operatives were not viable. In 1953, when the previous hard dictatorship was mitigated, they mostly dissolved. The private ownership of land was suppressed with the second collectivisation (1959-1961),

although it never completely disappeared. Altogether, 1-2% of land remained in private use, mostly concerning village gardens, fields unsuitable for large-scale farming in mountain and hilly areas and dissected slopes. The high market share of the private sector persisted for some products, e.g. vegetable plants, fruits, grapes, or even more considerably for animal husbandry. The second wave of collectivisation differed from the first one primarily in that the co-operatives were stabilised with large state subsidies (machines, sowing seeds, cheap artificial fertilisers, etc.). Later the economic independence of co-operatives increased, they had opportunities to launch various services or smaller industrial ventures. This tendency grew much stronger in the 1980s when 44 percent of all co-operative income came from non-agricultural activity (Szakál, 1991).

Between 1962 and 1990 the land use structure of Hungary did not change considerably. Co-operatives owned 67% of the arable land; 22% was used by the state farms. In the case of forests the rate was just the reverse, two thirds were in the possession of the state forestry management, one third was owned by the co-operatives. There was practically no forest in private hands. During this time, many rows of trees, dividing balks, dirt roads and smaller erosion rills disappeared. In this way the ecological landscape structure became simpler, the ecological network of the landscape was weakened. As a negative result of the development of large plots, the erosional-deflational soil degradation increased. The landscape ecological conditions were greatly influenced by the development of intensive agro- ecosystems, involving intensive tillage, use of artificial fertilisers and pesticides. In many places irrigation resulted in secondary alkalinity. In the 1980s the use of artificial fertilisers on ploughlands was equal to the average of the EC countries, 250-300 kg (active ingredients)/hectare, at the same time, the nitrate contamination of subsoil water became more and more serious (Biswas, 1994).

After 1990, politics sought to return agricultural land to civilians. Privatisation was to compensate those who were deprived of the possession of their lands at the time of collectivisation. This principle was applied in most Central European countries, but with regional variations (see Swinnen *et al*, 1997). The Hungarian redistribution was based on the value of the former land property, and relied on a soil fertility index defined in Hungary more than a century ago. This index expressed the income-producing capacity of one hectare of the given plot of land. The original owner or his heir was given compensation bonds of corresponding value. These bonds served for bidding at public land auctions. In each settlement an area of land was assigned for sale from the co-operative or state property, in proportion with the assumed demand. Since the price of better quality or in other way advantageous plots increased, in such places the size of privatised plots was smaller on average. Thus, between 1992 and 1994, 350,000 persons obtained 1.5 million hectares of land in 492,300 plots of land. This means an average estate size of 4.4 hectares. The maximum area of land purchasable by one person in the course of privatisation was 300 hectares.

1.4 General observations on Hungarian landscape changes

The property structure established by the end of 1994 has resulted in remarkable changes in land use. The first obvious change is the large-scale appearance of 3-5 hectare small plots even in the plain lowland areas. (In the slanting foothill and hilly zones the agricultural landscape structure was more mosaic like already.) As a result, new plot boundaries, alleys, dirt roads appeared, which have begun to function as landscape ecological corridors. In the first years of privatisation the areal amount of fallow land increased, too. In contrast to the yearly amount of 10,000 hectares in 1985-90, 411,000 hectares remained uncultivated in 1993, and 253,000 in 1994. This is a considerable 5-8 percent of all arable land, thus, an important landscape ecological factor. With the strengthening of production security the proportion of fallow land will further decrease, or at least it will be transformed into "ordered fallow land" or will increase the territory under meadow-pasture management.

The fragmentation of land property mostly occurred in places where interest in land was the greatest. However, this did not necessarily coincide with the spatial distribution of the most fertile soils. At present the number of small holdings is highest in places where fertility is good, around settlements, along roads or railways, near irrigation facilities, etc. (Nagy, 1995). Out of the parcels with an unfavourable location, even those with good soil quality may remain uncultivated.

The situation is somewhat different in foothill and hilly regions. The vast foothill vineyards of the so-called special co-operatives were logistically hard to divide into small plots, not to mention the terraced ones. The choice was made to restore the ownership conditions and, after the legal settlement, retain the present land use structure. Naturally, those who did not want to participate in the co-operative model, would be allowed to exchange their plots for ones outside the contiguous large areas of the co-operative. The fragmentation of property, so characteristic of the lowlands is less obvious in the slanting foothill and hilly areas.

A large share of the ecologically valuable forests became nature conservation areas in the 1970s and 1980s already. They are protected against private claims already. They can only be involved in the privatisation process to a limited extent and with permission from the nature conservation authorities

In the course of privatisation, in which new estate boundaries were determined, the ecological endowments, for instance microrelief, did not influence the assignment of plots to an extent worth mentioning. The previously established spatial structure of land use has not been better adapted to the finer landscape ecological differences. In the spatial arrangement of land property structure-modifying effect of natural endowments is still not predominant (Csorba, 1995).

Nonetheless, land privatisation has turned significant parts of designated protected areas into privately owned farmed areas, although no statistical backup is available. To realise conservation objectives in areas of high nature value

including small private holdings is a challenging task. In protected areas, nature conservation authorities often fail to supervise the large number of landowners.

In the early 1990s due to the sharp decline in farm incomes and lower real protection or agricultural production, the financial resources available for investment in machinery or for the purchase of mineral fertilisers and pesticides have been limited. On the one hand the decrease in the application of agricultural chemicals resulted in the reduction of adverse environmental impacts. Recently there is an increasing demand from the nature conservation side to reapply mainly traditional, nature friendly agricultural methods in areas with high nature value. But on the other hand the recent agricultural crisis resulted in land abandonment, which might lead to the deterioration and eventual disappearance of species profiting from semi-natural habitats created by low input agriculture.

Changes in the government policy towards agriculture and environment, as a result of the new economic and political conditions, created opportunities to reconcile nature conservation and agricultural policies. Many policy changes favourable to the environment have taken place, even if environmental protection was not the immediate goal. Given that integration with the EU has been the most important goal of Hungarian foreign policy, this contributed to providing the opportunity to adopt environmentally sound solutions in agriculture (OECD, 1999).

2 The cases and sources of information

This article focuses on two case study areas (Figure 1). The study areas are both situated in the Transdanubian part of Hungary. The first one is István major, located in Tolna county, in the Szekszárd hills near the settlement Bonyhád (pronounce: 'bondjhad'). The István major area is situated on the western part of the Transdanubian region. At the West side it is surrounded by the plain area of the town and the Völgységi-stream, from the North by the Szekszárdi hills, and the Ladományi platform. The area is surrounded by four settlements: Bonyhád, Börzsöny, Ladóc and Grabomány. Main road no. 6 is bordering the study area in the North-West.

The István major case study area has no significant importance other than an agricultural one. Both case study areas are not typical for Hungary, since they are both located in the Transdanubia. However, they are suitable to show the changes in land ownership that occurred during privatisation.

The second case study area is Tihany (pronounce: 'teehandj'), located at lake Balaton, thus being an important tourist region. The area belongs to the Balaton Upland National Park. It is a famous wine-making area with a long tradition. The whole Balaton region has a big importance in the country, so it experiences other regulations than the other areas in the country.

The Tihany-area is generally described as rich in natural and, culture-historical values as well as in agricultural traditions (Marosi *et al.*, 1975; Ádám *et al.*, 1987; Marosi-Somogyi, 1990). Protection focuses on the conservation of

nature in the first place but also landscape and cultural background is considered (Cholnoki, 1944). This led to the establishment of the first Protected Landscape Area of Hungary here. The assessment of the geological and culture-historical monuments is followed by the appraisal of botanical and zoological values. The richness of natural and cultural values make Tihany to one of the most important tourist area.

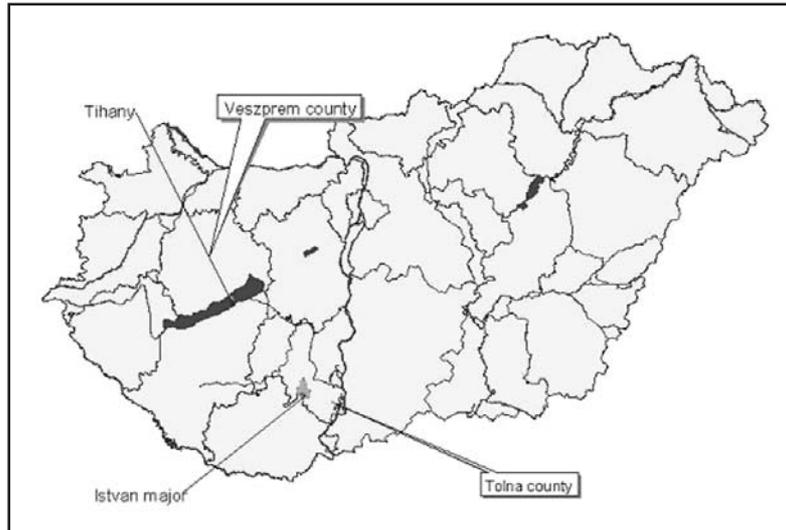


Figure 1. *Geographical location of the two case study areas*

Methods for tracing changes in the landscape are applied and described by Bonfanti *et al* (1997) and Gobin *et al* (2001). These methods are useful but cannot be used due to the type of sources available for this analysis of the Hungarian context. Also, this study has to take into account both land ownership and land use, an aspect that is not included in the methods mentioned. And the assessment criteria used by these authors are considered location specific.

Several sources were used to trace changes in land use. Maps of various points in time were studied, enabling a comparison of land use in the 1950s, the 1980s, and the most recent situation. These dates represent the stages before, during and after the collective land use. For data on land use, military maps (István major: 1950 and 1989; Tihany: 1980) and aerial photographs (István major: 1950, 1953, 1989, 2000; Tihany: 1950, 1955, 1984, 2001) were studied. For the land ownership data, cadastral maps were used. Also, literature review was made on the history of the areas, and about agricultural land use and ownership structure. The combination of these sources enables a description of the trends, which are going on in the area.

Although some cadastral maps were available in a digital format, most of the sources were on paper only. Therefore, the research does not rely on GIS-oriented

analyses completely, but the analysis to an important extent was done tentatively. The availability of sources also impeded making an exact same analysis for both cases.

Indicators for disruption of ecological networks are all cases of conversion of nature domains into agricultural land. These include nature reserves that shrink or are fragmented as well as hedgerows or parcel borders that disappear due to changing ownership patterns.

3 Results

The analysis of the various maps that were collected from the two case study areas yielded insight in what had been the impact of the land reforms. We here present the findings, first on the level of what the land reforms actually changes to the land use (what type of use and users at what location) and secondly on the level of changes in ecological quality of the landscape.

3.1 Land use changes in István major

Socialist collectivisation was quite successful in the István major area. After the 2nd World War small and middle size farms were dominant. In 1949 the newly organised “Dózsa népe” co-operative farm was established on the property of an existing one and started the production on 660 cadastral acres. On the aerial photo from 1950 still many small parcels of different use can be seen, but on the aerial photo from 1953 initial merging and concentration efforts can already be recognised.

The co-operative survived the revolution of 1956 in a transformed form with a new name, and in 1966 it merged with the Petőfi co-operative. The new farm of 2433 hectares was one of the biggest in the county. The latest co-operative, the Pannónia Agricultural Co-operative was established in 1972. It had 920 members, and merged all the small co-operatives in the surroundings. This co-operative remained active also after the privatisation of land. The aerial photo from 1989 still shows conditions similar to the one before privatisation: huge parcels of arable land are prevailing. Thanks to the privatisation and compensation law, a big part of the land was distributed again. The distribution was organised in an auction, everybody could apply for land. As a result of this, the distribution was a half success. The newly distributed plots do not provide favourable conditions for the owners to cultivate, so most of them just made a contract with the co-operative. Currently, next to the huge lands cultivated by the co-operative we can also see thin, long parcels, which were distributed without any logical consideration (Figure 2).

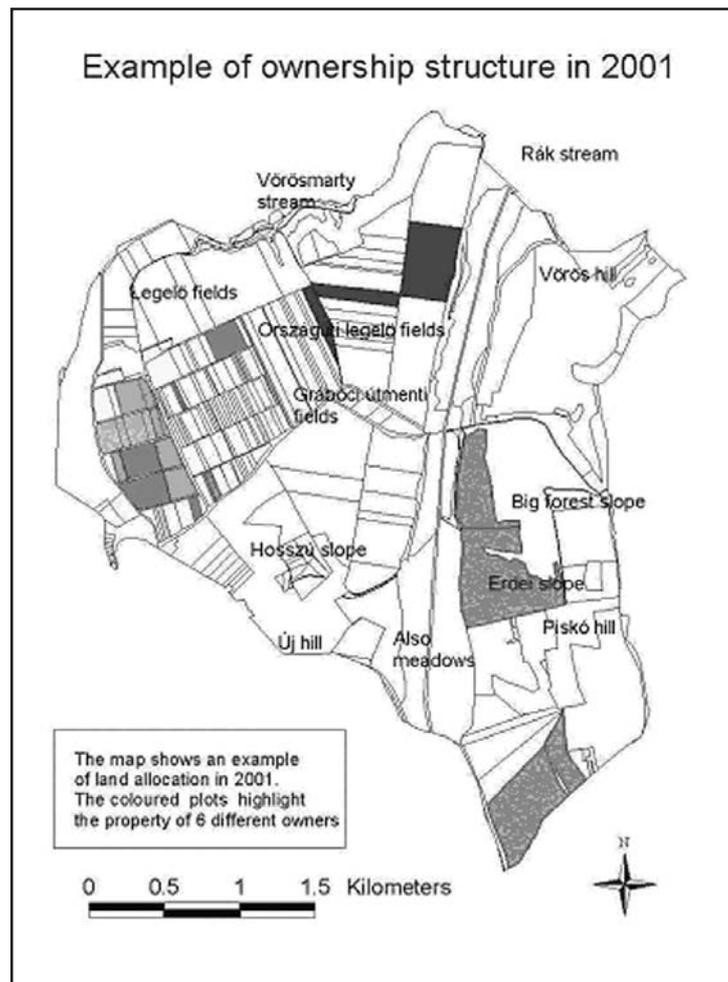


Figure 2. *Example of how land privatisation created inefficient agricultural land use; selected data from the István major case study area.*

Basically, history has repeated itself. At the beginning of the 20th century land fragmentation was typical to the area, at that time resulting from sales and heritage. In the 1950s as the establishment of the co-operatives began the small parcels were merged into huge parcels, and the cultivation of the area became more economical. After the 1990s, with the compensation and privatisation the big plots of the co-operatives were divided into pieces again, but these pieces are too small to be efficiently cultivated; the size and shape makes cultivation uneconomical, sometimes even impossible. Therefore the small parcels are cultivated in big units again, by leasing them to the co-operatives.

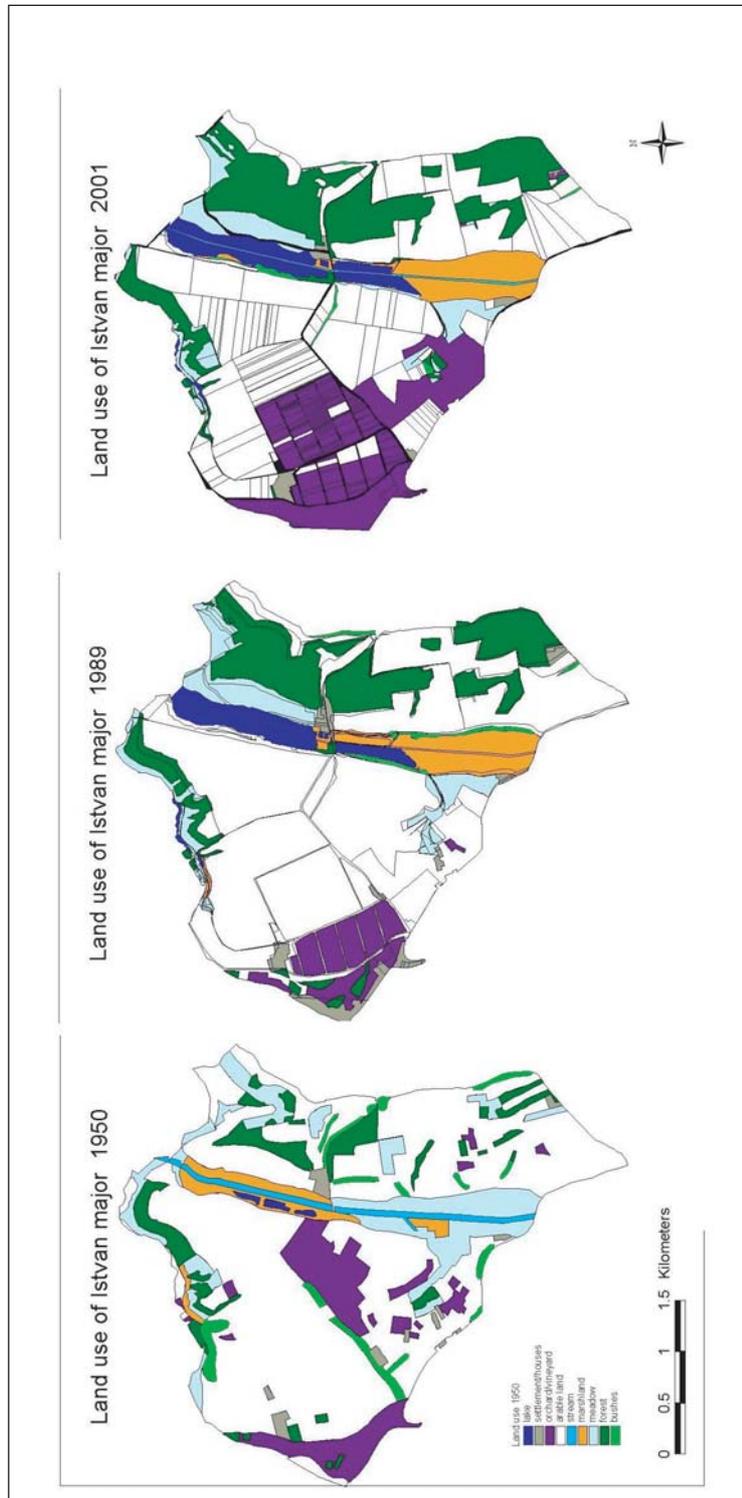


Figure 3. Development of land use in the Istvan major case study area

In the study area one can observe extreme conditions in terms of land size. The structure of space alternated between too big pieces of land and too fragmented plots. None of them is favourable for the formation of sustainable farming structure.

What did the above mentioned developments mean for the actual land use in this area? The land use map of 1950 is dominated by a huge acreage of plough land in the centre of the study area (Figure 3). Even the sides of the hills were cultivated. The plots were small and their shape was unfavourable as long and narrow parcels were prevailing. In the little plots various crops were grown. The roads ran parallel to each other. The emerging co-operatives did not utilise the wet habitats of the area, so the Vörösmarty stream (for local names turn to Figure 2) and the bed of the Rák stream remained untouched. The upper course of the Vörösmarty stream was marshland, with meadows and pastures on both sides. The upper course of the Rák stream was marshland as well, with vegetation giving increasing cover and with lakes emerging.

On the hilly area to the east of the Rák stream mostly crop production was prevailing. Serious erosion can be observed on the aerial photo. Besides plough land forests and grasslands occurred, mainly in areas that are too steep for crop production.

Vineyards were also present in the study area, the biggest parcels lying in the centre on the Hosszú slope (Hosszú dűlő), but also in the western part of the area, on the outskirts of Bonyhád. Some small parcels lay in the hills eastern from Rák stream. Bushes were dispersed overall through the study area, interrupting the monotonous ploughland, and dividing the area into smaller units (also see Lőrinczi, 1997).

The overall picture of the area in 1989 shows considerable changes (Figure 3). The small and parallel parcels, as well as the roads disappeared. A few huge agricultural parcels dominated the whole central area south from the Vörösmarty and west from the Rák stream. Even the hilly and steep central area of the Hosszú slope became ploughland. The original vineyards disappeared, but new vineyards were planted on the plain area next to the outskirts of Bonyhád.

The area of the Vörösmarty stream did not change much. Still, the intensity of grass farming and forests decreased. In the area sheep pasturing was typical. The wet, and waterlogged northern area of the Rák stream had become a lake. The southern part remained a marshland.

In the eastern part of the study area the proportion of plough land decreased in the favour of grasslands and forest areas. Vineyards disappeared from the area. Also the previously dispersed bushes disappeared (Lőrinczi, 1997).

The 2001 land use situation shows a discrepancy compared to the ownership situation at the same moment. According to the ownership structures the big fields of plough land are divided into small parcels (Figure 3). But the recent aerial photos suggest, that the ownership changes did not necessary also change the types and structure of land use. The biggest change we can observe at the Országúti legelő

fields (Országúti legelő földek) where a large area was redistributed. Now the area is under grape production by different users. This area is relatively plain.

The new fragmented ownership structure did not appear physically. The previous huge parcels cultivated by the co-operative are still in big units. The new owners probably do not want to cultivate their land themselves and therefore rent it to the co-operatives. The allocation of lands of different owners make the cultivation less economical. Land re-allocation would be necessary, but further research and also some surveys are still needed to confirm this assumption.

In the more natural part of the area, changes are few. In the area of the Vörösmarty stream the proportion of forest grow slightly, but the change is not significant. The eastern part of the study area and the Rák stream area remained as it was before.

3.2 Ecological impact of land use changes at István major

This section presents and evaluates the changes in terms of ecological consequences, according to the type of land use. Do remember exception of the orchards next to the settlement, the whole study area belonged to the co-operative. In the course of privatisation big parts of the area changed owner and got into private property. Still, there is a part which remained in the property of the co-operative.

The main forest areas can be found along the Vörösmarty stream, and the northern part of the study area in the steeper slopes of the Vörös hill (Vörös-hegy), Big Forest slope (Nagy Erdő dűlő) and Piskó hill (Piskó-hegy). Over time the size of forest areas show a permanent growth, and luckily the privatisation process does not show any harmful effect on these areas. The Vörös hill remained in the property of the co-operative, but also in the other areas, which got into private hands, the vegetation was not changed in the last 15 years either.

In the 1950s the size of lakes was not considerable, but in 1989 the upper part of the Rák stream was dammed, and used as a fishpond. The size of the lake shows further growing. The whole Rák stream and the banks on both sides were and are still owned by the co-operative. That is why the lakes were preserved. Also the marshland area in the Alsó meadows (Alsó rétek) belongs to this owner.

The area of meadows in the study area is not significant. Meadows are situated along the streams, and serve as a buffer area between the forests and other types of vegetation. The biggest contiguous meadow belongs to the co-operative and was not changed in the last 15 years.

The size of vineyards grew considerably, and also the location changed in the last 50 years. In the 1950s the biggest areas could be found on the steep slopes of the Hosszú slope, but after the 1980s the area of grape production moved on the less steep area close to Bonyhád. Since the ownership changes viticulture became more important in the area, and it expanded to the area stretching from the Országúti legelő fields to Új hill (Új-hegy). Along the western border of the case study area (main road No. 6) 200 years old vineyards can be found.

Ploughland is still the most important one in the area. The central steep areas have always been used as arable land, although the relief is not favourable. Also the hillsides east of the Rák stream are ploughed, only very steep slopes limit cultivation.

The parcelling changed in the last 50 years. The previously small plots were united by the co-operative and divided again after 1990 into small plots. The cultivation of these plots due to the shape and location is uneconomical, even impossible in some cases. That is why the owners of the Bonyhád area, like many other owners throughout the country rent the small plots to the co-operative.

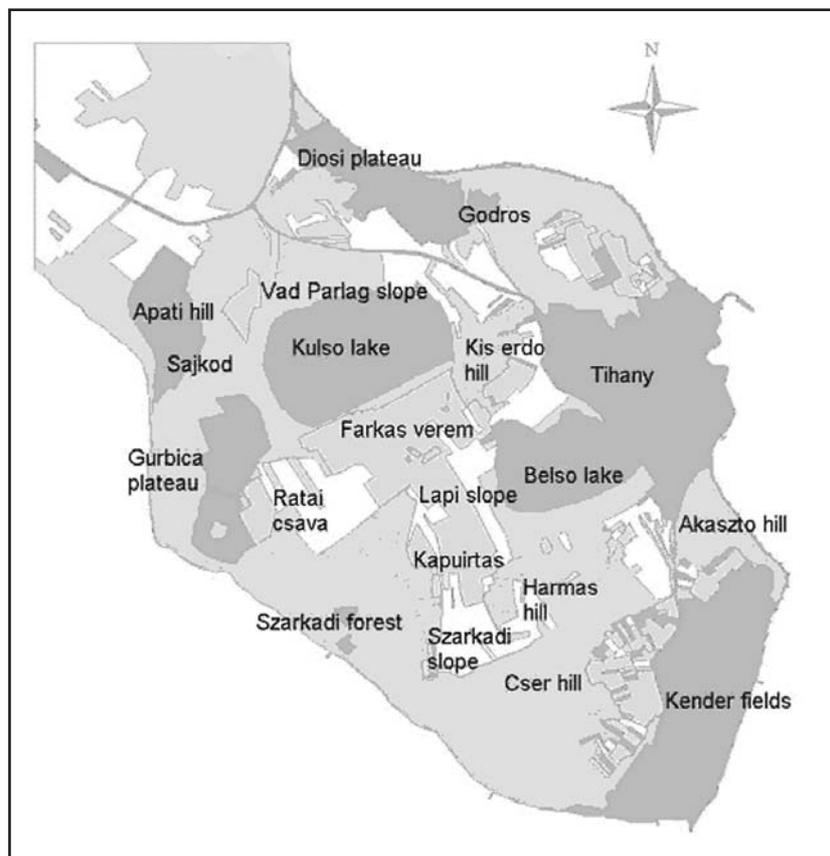


Figure 4. Local names in the Tihany case study area.

3.3 Land use changes at Tihany

Unfortunately no maps of the land use were available from the 1950s, but we managed to get archive aerial photographs from the years 1950 and 1955. On these images, the urbanised areas of the peninsula are not as developed as they are now, and the main land use form of the peninsula is agricultural crop production.

The main canopied forest areas at that time are: Sajkod, Gurbicza plateau (Gurbicza tető), Akasztó hill (Akasztó hegy) and the coastal area next to the village of Tihany (for local names turn to Figure 4). There were no big coherent meadow areas on the peninsula in the fifties. The main area was the Kender meadows (Kenderföldek).

The main land use is ploughland. No vineyards can be found in the 1950's, because they were destroyed by phyloxera, and not re-planted again until 1966. The plots of plough land are very small, long and narrow parcels. The structure is strongly scattered and the landscape resembles a checkerboard. The areas belonging to this land use category are: Rátai csáva, Farkas verem, the Northern area of Belső lake (Belső tó), Vad Parlag slope (Vad Parlag dűlő), Lápi slope (Lápi dűlő), Kapuirtás and Szarkadi slope (Szarkadi dűlő). In the Levendulás Area, lavender and almond production already exists.

The most striking difference compared to the recent land use is that the area of the Külső lake (Külső tó) is also under use. At that time it belonged to the abbey, and since they lacked land, the lake was drained with the help of a channel. The water was conducted to lake Balaton (surrounding the peninsula), and the land was used as grassland. After the channel was closed, the original water coverage appeared again. This phenomenon can be already seen on the photo of 1955.

In the 1980s, the land use and the relief relate to each other, judging by an aerial photo from the year 1984 and a Military map from the year 1980 (scale of both 1: 10 000). The steep and hilly areas are mostly covered by forests and vineyards, while the plain areas are mostly used as grassland or ploughland. Forests grew along the coast, consisting mainly of oak, and some wattle and hornbeam. The biggest coherent forest areas were Sajkod, Gurbicza plateau, Szarkadi forest (Szarkadi erdő), Gejzir mező, Cser hill (Cser-hegy), Akasztó hill (Akasztó-hegy) and the coastal area next to Tihany centre.

On the slopes of the hill, there were big areas of vineyards. The ploughland was almost exclusively situated on the state farm property in the centre of the study area: Lápi slope, Kapuirtás and Szarkadi slope. The meadows, were mainly concentrated on the slopes and most plain areas of the area. They surrounded the Belső lake and the Hosszú hill area as well.

Other distinctive elements were the marsh and the Levendulás area. The marshland area of the Külső lake has unique swamp vegetation. This area was used as plough land after drainage in the beginning of the twentieth century, but after agricultural use was stopped, it got back to the original condition. The Levendulás area is used for herb (mainly lavender) and almond production, which is one of the most important herb plantations producing for the Hungarian pharmacy (Grónás V., 2001).

The 2001 maps do show some changes in the land use compared to the map and aerial photo from the 1980s. Still, these changes are not as significant as they are in other cases, since in the study area nature protection and agricultural production (mainly viticulture) have the same importance (Figure 5). The forest

areas of the peninsula do not show changes in the last 20 years. In some areas, in the south of the Belső lake, and in the 'neck' part of the peninsula there is a slight increase in the vegetation. More bushes can be observed in the aerial photographs.

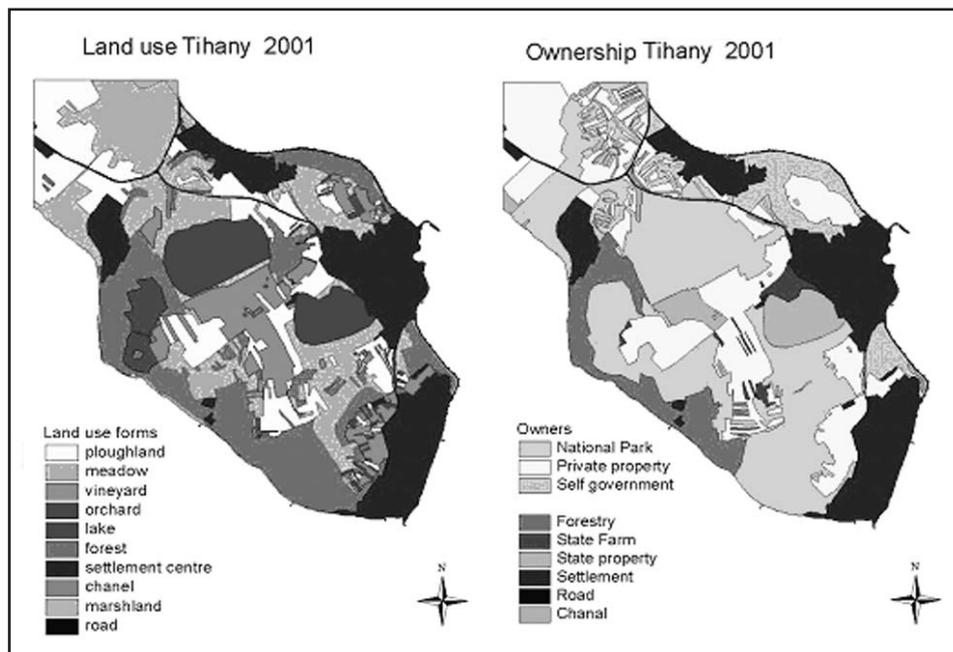


Figure 5. Recent land use and land ownership in Tihany

The grasslands did not change notably either, but the areas of vineyards did lose territory. For example on Vad Parlag slope, north of the Külső lake, the former vineyards have changed into grasslands, as the area was converted into National Park. In other areas, like Farkas verem and Rátai csáva plough-land and new plantations of vineyards appear. Here, former state farmland was redistributed and the land use changed accordingly. The structure of the fields and plots now show fragmentation. The proportion of plough-land decreased considerably in the last 20 years. The main plough-land area of Kapuirtás changed to vineyard, no big plots of plough-land can be seen.

The Levendulás area which was famous for herb production was devastated considerably. The tree stock got more rare than it was before. Another deterioration can be seen on the photos on the western coast of the peninsula. The reed vegetation is slowly disappearing, the formerly complete reed belt is opening.

3.4 Ecological impact of land use changes of the Tihany area

In the forested sections only small changes have happened in the last 50 years. Since the importance of the preservation of these core areas was explored, as the

Protected Landscape Area and the National park was established, the majority of the areas received protection. The Gurbicza plateau and Sajkod area, for example, have always belonged to the Forestry Agency, which was also working under the control of the National Park.

In general in the course of privatisation, interest in forest property was considerable. A forested area represented immediate revenues, much greater than arable land. And although it would be unwise on the long term, there was an actual danger that the new owners in this particular area would immediately clear large areas for quick money. However, since forests had been decisively in state ownership, there was a tendency of privatising the least possible amount of forest area (Csorba, 1995). Since the above mentioned procedure happened here as well, the valuable habitats could be preserved from the danger of getting into private ownership, and getting exploited.

Originally the Apáti lapos, the Diósi plateau (Diósi tető) and the Gödrös area were covered by grassland. In the last 50 years the ownership of these areas did not change and this habitats were not disturbed by any other form of use. The biggest change can be observed in the Vad parlag slope area. This area originally belonged to the state farm, but in the course of privatisation the State farm was liquidated. This area remained the property of the state. Fortunately the importance of the protection of Külső lake was recognised. That is why the land use of this area was changed from plough-land to meadow. The former vineyard was transformed into grassland, now this grassy area provides a buffer zone in the eastern part of the lake.

Vineyards and plough-lands formed the base for the compensation during the privatisation process. Liquidation of the state farm brought big areas into private hands. The land use types did not change considerably, but the location of plots shows a new pattern. The size of plots, however, does not change considerably.

4 Policy context

Several plans and programs in Hungary serve as a basis for conceptualising and implementing strategic environmental priorities. The National Environment Protection Strategic Plan prepared in 1994 almost fully adopted the main objectives, priorities and set of measures of the EU 5th Environmental Action plan. In accordance with this plan the National Nature Conservation Master Plan was signed up. It assesses the condition of natural values and nature protection areas and identifies endangering factors and processes. In accordance with this, it explores middle and long term aspects of establishing and managing systems of green corridors, green networks and environmentally sensitive areas. And for preserving natural values and areas as well. For agriculture in specific, several aims are formulated. Small and medium size agricultural businesses and plots are to be stimulated. Meadow and pasture management is to be developed and extensive stock farming as well. Natural landscape elements and relict habitats are to be preserved and restored. Roadsides, plot boundaries, banks of watercourses

and other dominant division lines must be planted with native tree species in accordance with the character of the landscape.

Furthermore, a network of Environmentally Sensitive Areas (ESAs) has been established. The objective of designating ESA's and establishing their network is to preserve natural values and biodiversity by maintaining traditional land use, agriculture and farming practices. The network is to preserve landscapes where the landscape itself, the flora, the fauna and the cultural values are nationally important. The network has well defined geographical boundaries, covers non-protected or partly protected areas valuable for nature conservation where the survival of the flora and fauna and natural values depends on extensive agricultural practice.

Since the efficiency and size of habitat redevelopment are restricted, the prevention of habitat deterioration must play a leading role. The natural or near-natural habitats must be protected from anthropogenic interventions and exploitation as much as possible. Under the present conditions, the establishment and functioning of an ecological network are particularly important since the original natural habitats have been permanently or temporarily fragmented and isolated.

The designation of Environmentally Sensitive Areas (ESAs) and thereby the conservation of their natural values is one of the most important steps of Hungary's agri-environmental approximation to the European Union. It is at the same time a new, internationally tested and supported instrument, which gives a possibility for the harmonisation of nature conservation and agriculture.

Special attention is paid to the landscapes in Hungary, which have been preserved by traditional farming techniques. After they first have been severely affected by large-scale and intensive agriculture, the establishment of an intensive, western type farming system may entail unfavourable changes in these ecologically valuable regions. This demands the introduction of a scheme already run in the EU that stimulated sustainable agricultural practice. By designating and extensively managing ESA's, the remaining characteristics of cultural landscapes and isolated, near-natural habitats can be preserved. Moreover, by connecting the habitat islands with a "green corridor" system, an ecological network can be established which can guarantee the natural movement of populations even through non-protected areas.

Considering that most of these areas are less or not suitable for agricultural production, owners and tenants (who generally do not have the financial and material means of intensive production) can be encouraged to apply extensive or environmentally friendly management, with the help or relatively moderate, but reliable supports (Szabó *et al*, 2001).

As a third instrument, the National Agri-Environmental Program (NAEP) is established. It resulted from an analysis of the legislative framework of EU Regulation 2078/92 as well as EU member states' experience on its implementation by the Hungarian Ministry of Agriculture and Rural Development (MARD). It is

based on several horizontal schemes that apply to all agricultural land. The schemes provide support for environmentally friendly production methods (reduced use of fertilisers and pesticides, environmental farm plans) and nature oriented land use systems targeted at quality food production. Horizontal measures combine environmental protection (soil, water) with nature conservation targets. On top of the horizontal schemes, there are area specific schemes that target high nature value areas. These schemes focus on nature conservation and landscape protection (OECD, 1999).

Complementing the above described EU-oriented Hungarian programs, there also is direct EU-funding through SAPARD. The title of the SAPARD agri-environmental program is "Agricultural production methods designed to protect the environment and maintain the countryside". Five program directions were developed in the agri-environmental part of the SAPARD plan, including organic arable land farming, extensive grassland, organic or integrated orchards and vineyard farming, wetlands, and a demonstration farm package. The agri-environmental measures will be applied in selected pilot areas. In every area a limited number of projects (management contracts) and at least one demonstration farm will be supported. For the selection of the pilot areas the land use zoning study results were used. These databases served as a scientific tool for the development of the NAEP also. The designation of the areas is made on settlement unit level (MARD, 2000).

And finally, there is the original national legislative framework. Nature conservation and forest management have a long tradition of regulation in Hungary. In the middle of the 1990's, Hungary's desire to join the EU triggered a more intensive environmental legislation period. The most important point of which was the adoption of the Act LIII of 1995 on the General Rules of Environment Protection. This law declares the need for setting up a National Environmental Program that has to be renewed every six years and should be approved by the Parliament.

Hungary's nature conservation legislation has developed rapidly since the mid-1990s. The 1994 Agricultural Land Act states that consideration must be given to the protection of Hungary's natural and semi-natural areas, natural water bodies, geomorphologic formations, etc. It also requires farmers to protect land from erosion and acidification. The 1996 Act on Forests and Forest Protection, and the 1996 Act on Protection of Game, Game Management and Hunting actions aims to conserve biodiversity.

The 1996 Nature Conservation Act is based on the National Environment and Nature Protection Concept (1994) and refers to all natural values and areas. The Nature Conservation Act details the general rules of protection nature (landscape, wildlife, habitat, geomorphologic features), the procedure of declaring an area protected, the general rules for protected areas and species and wildlife associations as well as the organisation and management tasks at different levels. The need for planning the system of Environmental Sensitive Areas (ESA)

was introduced by this act during the legal harmonisation process, following the example of the European Union.

In 1997 the National Assembly ruling on the National Environmental Protection Program (NEPP) was passed. "The NEPP represents a six-year intervention plan system designed to result in solutions to, or to initiate the solving of, the present environmental problems of the country, and to endeavour to prevent such future problems" (HOJ, 1997). The formulation and introduction of the NAEP supports the realisation of the National Environmental Protection Program and the National Regional Development Concept. The establishment of the Environmentally Sensitive Areas network is also a related task, that forms a part of the planned measures of the NAEP (Szabó *et al*, 2001).

5 Conclusions

The results from the case study analyses point out that the ecological networks in the case study areas were not damaged by land privatisation, with different reasons for both areas. The István major co-operative was privatised, but the relatively large demand for land resulted in small parcels, bad allocation and unfavourable plot structure. That is why individual farming did not start in the area, the plots are cultivated by the co-operative in the same structure as 15 years ago. If individual farming would be started, the new plot boundaries, alleys, dirt roads could start functioning as landscape ecological corridors. In Tihany, where nature protection always played an important role, the land of the state farm was turned over into private ownership. The relative size of the area is not very big and no serious fragmentation happened, possibly because of the traditional agriculture (vineyards) in the region.

In retrospective, the creation of the large production units under socialism had a much larger impact on ecological values. This scaling-up meant monoculture, the reduction of the total length of borders, and taking formerly barren sites into production. From an ecological perspective, therefore, privatisation appears to have been a positive development in the case study areas, since little natural patches were converted into agricultural land use, and substantial border length was added, resulting from smaller parcels.

Although networks in the Hungarian case studies have stayed intact during the 1990s, and were even expanded to some extent, the concern about Central-European nature domains remains. The low level of damage in these Hungarian cases can be traced down to (1) the applied privatisation mechanism in which it was possible to dress around sensitive areas, and (2) the advanced nature protection regulations that have proved effective for preventing large-scale disruption of ecological networks in Hungary. Both circumstances do not apply to all Central European countries.

Especially in countries where land was restituted in original boundaries, disruptions may be much greater, as in case of restitution, there is only one

location where the former owner can be indemnified and that is at the exact place where his ownership used to lie before collectivisation. Existing patches of natural habitat may be erased more frequently in such a mechanism, compared to the Hungarian system that allowed the new land use situation to be adapted to the ecological structure. On the other hand, restitution may newly create relatively many boundaries, adding to a benefit on the long term. It may therefore be interesting to make a similar study in other countries in the region.

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