Opportunities for Greenways Through Development of Ecological and Green Corridor Landscape Planning in Hungary

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1. Introduction

In the specialist literature on landscape design, greenways are multi-functional routes which optimally have both recreational and ecological functions. The recreational function of greenways is primarily use by pedestrians, cyclists and horse-riders. The ecological role of greenways means that optimally they are part of a given landscape's ecological system. In the course of our research – taking into account the natural, social and economic conditions, as well as landscape and design precedents – we are seeking answers to questions within the following categories: (1) justifications for the creation of greenways in Hungary; (2) the geographical areas in which greenways may be required; (3) the type of landscape features that facilitate the establishment of greenways.

2. Data and methods

2.1. Historical context

In Hungary there is a centuries-old tradition of walking trips in natural environments. Organized walking tours emerged in the age of industrialization and the rise of the middle class. In 1873 the development of hiking trails, shelters, viewpoints and other tourist facilities in the Tatra Mountains started under the auspices of the Hungarian Carpathian Society, and in 1929 a unified national route-marking system was introduced. In 1938 Hungary saw creation of the National Blue Trail – a nationwide route which is popular to this day. Since 1981 a system of timed hiking has been organized, which has proved increasingly popular: in 2012 nearly one hundred thousand people took part in such hikes.

The first bicycle in Hungary appeared in 1878, with the first group cycling tour being organized in 1881 at Easter, between Budapest City Park and the town of Gödöllő – a distance of around thirty kilometres. Starting in 1911 the Hungarian Cycling Association organized Sunday road and track racing. After the Second World War cycling traditions entered a slight decline, but by the beginning of the 21st century national movements emerged to promote and create further opportunities for cycling. At present the main initiatives are the construction of cycle paths alongside roads, while at the same time an increasing number of cycle routes are being created in natural environments.

The horse and horse riding have played a fundamental role in the history of Hungarians, from the audacious warrior campaigns of the medieval conquest period to the golden age of horse breeding in the 19th century and the emergence of the hussars as a military force. After the Second World War horse breeding fell to a new low, but since 1990 riding has revived, and now

the *Kincsem* National Equestrian Programme is being developed, with the main goal of designating riding trails throughout the country.

2.2. The appearance of the concept of 'greenway' in Hungary

2.2.1. Landscape design research

Since 2000 the Faculty of Landscape Architecture at Corvinus University of Budapest has been conducting research on the landscape design of greenways. Research so far has resulted in several design proposals, which mainly focus on the integration of green corridors in the vicinity of Budapest into the urban and peri-urban spatial structure.

The main obstruction to the optimal landscape development of greenways in Hungary is the fact that the concept of 'greenway' does not officially play a part in regional and landscape planning. Another problem is that the definition of 'greenway' is unclear in the scientific ecological concept system dealing with ecological and green corridors, and also in relation to other existing routes with recreational roles (walking, cycling, horse riding).

Therefore our main research goals have become the following: to arrive at a definition of greenway (as a new land use form playing several major ecological and recreation roles) which can be integrated into Hungary's regional and landscape planning system, and which is compatible with the concept system of related disciplines; and to lay the methodological foundations for greenway planning in Hungary.

2.2.2. Civil society movements

Since 2005 greenways have been formed at the initiative of the Hungarian Environmental Partnership Foundation, based on guidelines from the Central and Eastern European Greenways programme. These have followed the guidelines of the Central and Eastern European Greenways programme. The main goal of greenways planned by NGOs has been the designation as greenways of existing routes suitable for non-motorised use (especially walking and cycling), and then, associated with this, an increase in these areas' attractiveness for tourism.

2.3. Investigation of the potential for greenways

2.3.1. Needs

Considering historical antecedents of hiking, cycling and horse-riding trails, and current development concepts, the question that arises is whether there is justification in Hungary for planning routes in the classic sense, for a variety of non-motorized uses. From the 1990s onwards, motorized traffic in Hungary has increased exponentially. A result of insufficient physical exercise is a statistical rise in cardiovascular diseases, and the emergence of a generation of the overweight. The need for creation of routes and networks for hiking, cycling and horse riding has been clearly expressed in a variety of programmes and plans.

From a landscape design point of view, the following question arises: Where is there the need or

the opportunity to establish greenways to meet the emerging demands? In terms of the classic greenway model and Hungarian practice, the response can be formulated thus: there is a need in Hungary for greenways where optimal routes for at least two of the main greenway functions – walking, cycling and horse riding – coincide. On such routes specific measurement or practical experience will show the expected level of non-motorized traffic to be substantial. Our specific measurement data for a given route only relates to cycling and one location. Our practical experience, however, shows that there are routes on which various non-motorized uses appear spontaneously or by design: Budapest's Danube embankments, alongside watercourses in provincial towns, routes near riding centres, agricultural and forest paths, etc.

In our present study, therefore – in the absence so far of specific, quantitative data – we attempt to identify those landscape elements which may be suitable contexts for the optimal spatial development of multifunctional non-motorized routes in the manner of classic greenways; we pay special attention to Hungarian landscape features, and current planning systems.

2.3.2. Alongside rivers and streams

Hungary's two main rivers are the Danube and the Tisza. The environs of the Danube are part of both the National Ecological Network and the Danube section of the Pan-European Ecological Network. The Danube floodplain forests, in particular, are of great ecological value. The Danube flows through Budapest and several of our larger cities, and many settlements have created promenades or cycle paths along the banks of the river. These routes appear intermittently, however, and are often only suitable for one use or another. In some locations routes for pedestrians and cyclists appear next to each other, and horse riding can also appear alongside these. In some cases use has been designed, and in others it is the spontaneous result of existing opportunities. The Hungarian sections of the EuroVelo European cycle route alongside the Danube and the Tisza represent a coordinated route, connecting existing and planned cycle routes. Similarly to American greenways, the EuroVelo routes can be seen as based on non-governmental initiatives: sections suitable for cycling are formed using existing features and as a result of local initiatives. Among non-motorized modes of transport, the study focuses primarily on the development of cycle routes. Use of the Budapest section of the Danube for public recreational use was tabled decades ago, and this is now an element of the city's long-term development concept.

The first cycle route to be planned along a tributary of the Danube was that alongside the raised embankment of the Raba. Smaller watercourses can provide ideal opportunities for greenways. Problems are hydraulic engineering features which are alien to the landscape surroundings and a lack of trees, due to riverbed maintenance criteria. A significant number of streams are part of the National Ecological Network. Recreational opportunities can be established after examination of the width and diversity of the accompanying vegetation zones forming ecological corridors. Greenway development alongside streams should be connected to plans for revitalization of watercourses.

2.3.3. Areas alongside railway lines

The first Hungarian railway line – between Pest and Vác – was opened on July 15 1846. The

railway network developed continuously up until the outbreak of the First World War, with several thousand kilometres of local railway line being built in Hungary by the turn of the 20th century. For historical or economic reasons, however, partial or complete closure of railway lines has repeatedly occurred. The first line closures took place after the First World War on lines severed by the new borders dictated by the Treaty of Trianon. A second wave of line closures took place after the Second World War, as a result of development of the road network. In the 1960s electrification of railways began, in the process of which there were amendments to routes, and so stretches of line of varying length became abandoned.

The largest package of line closures occurred as a result of the 1968 transport plan: 1,200 km of standard gauge, low-traffic line and all narrow gauge freight line was eliminated. At the end of the 20th century necessary improvements were neglected due to the increasingly difficult economic situation, and a new wave of line closures began. In the first half of the 1990s three passenger lines were lost, and in December 2009 a further twenty-four were closed. There are several arguments for reinstatement of railway lines, however. A line running alongside the River Ipoly was reinstated with the aid of a study launched by Euroregion regional railways, following the example of re-launched German railways.

By the beginning of the 21st century, because of high levels of pollution, the environmental impact of different modes of transport became an increasingly important consideration. Rail transport is one of the most environmentally-friendly in terms of energy use and emissions, as well as in terms of space requirements and capacity.

Disused railway lines from different periods are in various states of repair. There are lines which currently only carry freight, and others where track has been taken up, so any use is impossible. On certain sections only the old railway embankment can be identified, but old bridges and stations remain – although in a steadily deteriorating condition. There are sections where cycle paths or bypass roads have been created on the routes of abandoned lines.

The question arises: in Hungary, is the creation of greenways alongside abandoned railway lines justified? An important argument in favour of such greenway construction is that railway lines were built at very low gradients – a feature which is especially suited to walking or cycling. Secondly, the space requirements of railway lines are excellently suited to multifunctional non-motorized transport. Thirdly, the substrate for railway lines can be the basis for greenways – with minimal work, proper maintenance and appropriate flexible surfacing. However, as previously stated, existing and abandoned lines have significant potential as transport routes in the future.

In each case the appropriate response can be made according to a given area's geography, social and economic needs and potential. In general, during the modernisation of routes greenway development is most appropriate on sections which have been abandoned. On other initially disused sections, technical solutions for establishment of greenways are possible which allow for reinstatement of rail services in the future if needed. If enough space is available, greenways may be created alongside railway tracks.

2.3.4. Historical trails and local cart tracks

In the 18th and 19th centuries fine maps based on military surveys and containing a wealth of information were made of the settlements of Hungary and the road system connecting them. Clearly visible on the surveys are the main trade roads and less heavily used cart tracks, which were easily passable for horse-drawn carriages, and so for centuries proved to be reliable routes. In later centuries some of them became part of the evolving road network, while others are now mainly used for agricultural and forest management purposes.

Historical routes are characterized by rational courses with optimal distances and topographical characteristics, so these routes may also be suitable for pedestrian and cycle traffic. In some areas these tracks have spontaneously acquired these functions, and in many cases local initiatives exploring the potential they have as cycle routes have led to proposals for their designation as such. Therefore these routes can be valuable parts of a given landscape for a variety of recreational non-motorized transport. The task in each case is that the recreational use must be reconciled with the existing forms of land use, and in the interest of the further usefulness of routes they should be integrated into regional and landscape plans.

In many cases certain sections of historical trails are the best routes for walking, cycling and horse riding. In low traffic conditions this is not a problem, but where there is more traffic there is a case for the establishment of greenways suitable for several uses. For optimal solutions an appropriate width (as determined in regulations) is required, to include tree planting.

Greenway development along historical routes can link well to tree planting and road surface improvement – both necessary from an agricultural point of view.

3. Results

3.1 The potential for greenway planning in Hungary

On the basis of our analyses we have concluded that in Hungary the creation of greenways suitable for various non-motorized uses is justified where significant levels of traffic in at least two non-motorized modes must be accommodated. The potential areas for greenway development are Budapest and certain other cities, together with their surroundings. In Hungary there is the opportunity to establish greenways primarily along existing or proposed routes typically following rational paths and related to ecological and green corridors. Therefore potential greenway routes are to be found alongside watercourses, railway lines and historic trails.

Tried and tested foreign examples can serve as the basis for the optimal spatial design of greenways. A survey of local conditions, needs and opportunities should always be carried out as part of the landscape design of any greenway. During the design process, special attention must be paid to the unique natural and historical features of the locale and the design environment of the given area.

3.2. A definition of ‘greenway’ that can form part of the planning process

Our research indicates that in Hungary we should interpret the greenway concept as a linear

green space which: offers recreational and various non-motorized transport opportunities in a physical context which is free of environment and transport hazards, or in which they are at acceptably low levels; and which contributes to the maintenance– or optimally the increase – of ecological assets in a given landscape. The determination with scientific accuracy of acceptable levels of environmental and traffic pressure and the expected traffic loads in the area of greenways is necessary for their optimal design. We see the linking of other green areas and landscape assets to routes and the expression of the particular character of a given landscape in the detailed design as further important objectives in the landscape design of greenways as multi-functional linear landscape elements.

3.3 Possible basic cases for the establishment of greenways in Hungary

From our studies so far we have found that the introduction of the original concept of 'greenway' appropriate to Hungary's circumstances is primarily justified in Budapest and its surrounding agglomeration. Furthermore, the concept should be utilised in the system of partly existing and partly unrealised green spaces in the city and its agglomeration. The national network of ecological areas to be protected – such as environmental corridors – appears on a separate zoning page in the Regional Development Plan for the Budapest Agglomeration (2010). However, green corridors (such as shelterbelts of woodland and lines of trees), which are also of significant ecological value, are not included. The reason for this omission is that the concept of 'green corridor' is not clear from a legal viewpoint. In our opinion greenways can be included in the ecological zoning page of urban and regional plans, alongside ecological and green corridors.

Perhaps the most fundamental aspect of the design of greenways is the clarification of the relationship between greenways, other recreational routes, and ecological and green corridors. This is because ecologically valuable ecological and green corridors and routes with recreational value cannot automatically be classified as greenways. They may become greenways if the ecological and recreational functions are simultaneously present and form linear space of structural importance in the landscape. Our findings so far have shown four basic potential models for these functions' simultaneous presence in Hungary, as illustrated in the diagram below:

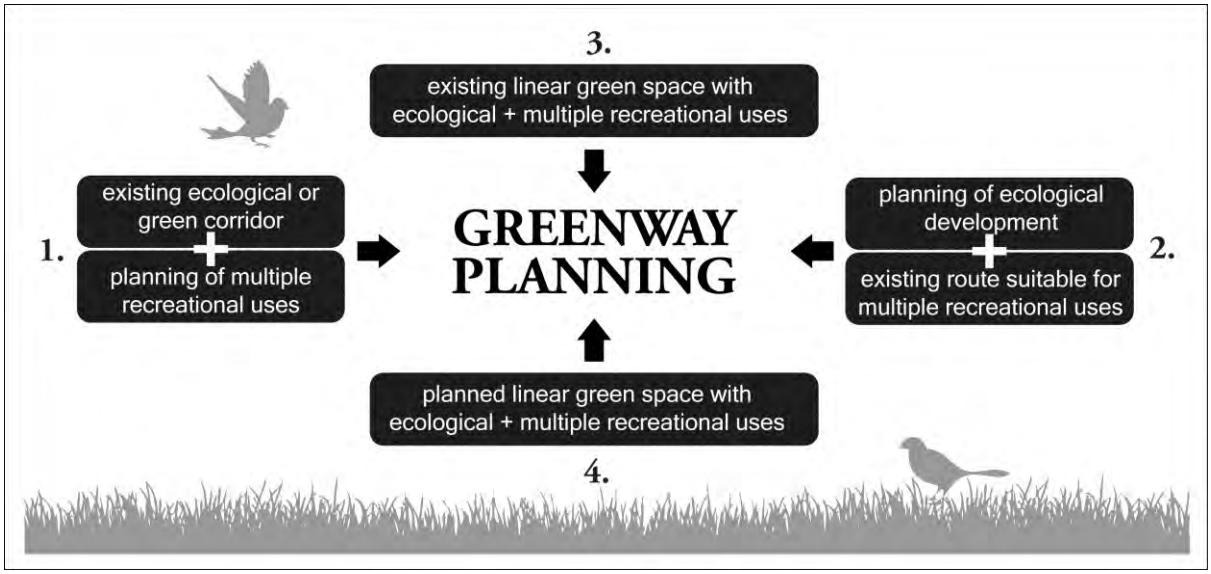

Figure 1: Basic potential models for creation of greenways in Hungary

Based on Hungarian circumstances, the main questions for the potential integration of greenway design into urban and regional planning can be stated as the following:

(1) What solutions can provide existing ecological and green corridors with various recreational functions appropriate to the expected level of use, whilst at least avoiding a reduction in ecological diversity, and possibly increasing it?
(2) Which of the existing routes suitable for walking, cycling and horse riding can become ecologically valuable elements in the landscape, and with what means can this be achieved?
(3) Which existing routes with multiple recreational uses and associated green areas can be considered to be greenways, and how can they be optimally developed?
(4) In certain regions, which areas show the need or potential for creation of new green corridors with multiple recreational uses?

4. Discussion

The introduction in Hungary of greenway design can provide a new opportunity to meet the growing demand for outdoor activity. Forest hiking trails can be augmented by tree-lined agricultural roads. Greenways far from roads in surroundings with no (or acceptably low) environmental or traffic dangers are an alternative to cycle paths alongside roads, while also offering active recreation. The greenway design of certain sections of horse riding trails can resolve or avoid conflicts of use arising from a variety of non-motorized transport modes on one route.

The introduction of greenway design can result in the landscape-scale expansion of green space system planning in Hungary. Expansion of the recreational function of ecological corridors can lead to the harmonization of protection of ecosystems and satisfaction of recreational demands. Greenways can create a good opportunity to exploit river banks. Along railway lines the

formation of greenways is suitable for abandoned areas' change or extension of function on a temporary or permanent basis. Greenway routes which can be formed along historical routes and local dirt tracks can be important elements in the much-needed process of tree planting in the landscape.

A number of other possibilities can be built on developments based on a composite approach to greenway design: the protection of natural and cultural heritage, environmental education in schools, the expansion of local services, and development of tourism (especially water tourism).

5. Conclusion

In the last two decades, the sudden development of personal motorized transport in Hungary has also seen a growing demand for outdoor activities. Traditionally, a variety of recreational routes have been constructed with separate functions. Tourist trails typically run through forests. Cycle paths primarily occur alongside roads. Horse riding has been unconstrained by fixed routes. The development of major proposed horse riding trails is under way. On some routes lack of the necessary space causes use conflicts between the needs of walkers and cyclists or cyclists and horse riders. The formation of greenways is thus justified and expedient on routes where a variety and significant amount of non-motorized traffic is expected. The routes appropriate for the spatial development of greenways are selected sections along watercourses, railway lines and some parts of the historical and local network of unsurfaced roads. Greenway design related to ecological corridors and the design of green space systems should be introduced. Existing non-motorized routes with independent functions are also potential greenways. In every case the design of greenways must be based on the coordinated analysis of the natural features of a given landscape, economic possibilities and the predicted level of non-motorized traffic.

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