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INTEGRATING APPLIED LAKE ECOLOGY INTO SPATIAL PLANNING: TOWARDS A SOCIALLY ACCEPTABLE LAKE-SHORE RESTORATION AT LAKE VELENCE (HUNGARY)

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Abstract
A good chance of a socially accepted shore-restoration that is sustainable for the long run stands only, if all those, concerned in lake-use, are also interested in the ecological interventions, if shore-restoration serves social and economic purposes, as well. In the previous phase of our research, assessments were made to find the sections of the shore zone that are suitable for restoration: to detect the sites where the existing artificial shoreline stabilization works could be removed. So that social demands should be involved in the assessment process, to begin with, structured interviews were made. According to the results, the share of the plots, being suitable or partially suitable for shore-restoration, slightly exceeded 7%. The analysis of restoration's limiting factors has shown that the type of shoreline stabilization, the width of zone covered by emergent macrophytes, the extent of human pressures, and the relevant regulations on zoning (fixed in urban plans) together set limits to restoration. The interviews have made it clear that as a result of the changed demands on recreation-tourism, also the natural and landscape values have become more significant.

Keywords: lakeshore, hyromorphological alteration, restoration, riparian zone, spatial planning, urban planning, structured interview, Lake Velence

1. Introduction

Shores perform significant social and ecological functions as to the status of the whole lake, being especially exposed to human pressures, at the same time. Practically, each and every form of lake utilisation uses shores to some extent, yet, there are some forms of utilisation, which do focus on the lakeshores, and in many cases, the open water surface can be accessed and used through the lakeshore, only. Intensive utilisation is often coupled with altered hydromorphologic conditions of the lakes, with waterlevel regulation, shore and lakebed regulation, and with urbanised riparian zone. Because of the extremely high pressures on the lakes and of all intensive types of utilisation, lake restoration may become necessary, a multiple-benefit way of lake restoration is shore restoration. Lake and lakeshore restoration in a broad sense, is an integrated management process that in addition to transforming shoreline stabilization, involves all the key landscaping and maintaining tasks, which improve and restore the lakeshore's functions (Molnár 2013). Ecologically, lakeshore-restoration is of high importance, as the habitats, which have become degraded through human interventions, can have again their pre-disturbed, natural state, which is significant for both the material cycle and the food-web of the whole lake. A good chance of a socially accepted shore-restoration that is

sustainable for the long run, stands only, if all those, concerned in water-use, are also interested in the ecological interventions, if shore-restoration serves social and economic purposes, as well (Naiman, 2013).

In this research special emphasis has been laid on the social conditions of an ecological intervention that affects also the littoral and riparian zones. This study aims at testing an assessment method, which facilitates decisions on shore restoration of medium (0.5 km^2 – 100 km^2) - and large-sized (>100 km^2) lakes, utilised mainly for recreational purposes, by combining ecological and social factors, alike.

Several studies discuss the functions, ecosystem services of lakeshores, the review of Engel and Pederson (1998), Felföldy (1981), Naiman and Décamphs (1997), Ostendorp et al. (2004), Schmieder (2004), Sebestyén (1943), Strayer and Findlay (2010) belong to the most complex approaches. The buffer/biofilter-functions are especially key issues in case of shallow lakes, being sensitive to eutrophication (Bragg et al., 2003; Scheffer 2004).

Land use (mainly: recreation-tourism) and visual aspects get less attention in scientific literature, though it is the natural attractions that raised the most interest of those involved in world tourism (Csorba – Bodnár, 2007; Michalkó, 2012). Out of the different types of surface waters, standing waters belong to the most popular landscape features (Bulut et al., 2010). The so-called lake-tourism is a separate form of tourism, having in mind that lakes are either natural resources, motivating factors, playing also dominant role to provide experiences for visitors (Dávid – Németh, 2005; Hall – Härkönen, 2006; Mészáros, 2014). Urban planning and spatial planning, through influencing the changes in landscape pattern, can be an efficient tool addressing ecological issues, as well (Illyés, 2009; Kabai, – Földi 2011; Sallay, 2008).

The review by Engel and Pederson (1998) on the visual-aesthetic assessment of lakeshores, shows that the social judgement of different generations is rather decisive and the relation to lakeshores is also significant from different opinions of lake restoration measures (for example owners of lakeshore plots and casual visitors form different opinions). Vegetation is also of high importance from the visibility aspect of water surface (Engel – Pederson, 1998), being one of the most significant features for aesthetic judgement. In addition to riparian vegetation, arboreal stocks, may play an important role near the horizontal water surface (Haider – Hunt, 2002). In the case of surface waters it is just the visual effects of restoration, that really matter for the society (Junker – Buchecker 2008), which makes this issue even more significant.

As a rule, the topics of ecological functions and human use of lakeshores are discussed together just in the studies, which make analyse pressures. Many times, the assessments made on pressures, search for the impacts of one special factor (e.g. hydromorphological changes, artificial shoreline stabilization, urban development, sediment removal, waterlevel control), on one biological taxonomic group. The shoreline stabilization of different types (mainly reinforced concrete structures, and/or using rip rap stones) are typically colonised with new vegetation- and animal-species, their diversity fall often short of that on natural shores (Entz – Sebestyén, 1942; Gabriel – Bodensteiner, 2012; Jennings et al. 1999). In some cases the artificial shoreline stabilization works when assessed separately, may as well provide advantageous habitat conditions for some animal species, in other cases, however, when evaluating shore regulation at lake-wide scales, the reduced biodiversity of habitats tends towards a disadvantageous process for the total ecosystem (Brauns et al., 2007; Lange, 1999).

Shoreline stabilization modifies the hydrodynamic conditions of lakes (Józsa, 2006), through which partially they also affect the water's material-exchange. Most of the shoreline stabilization works reflect

more energy, than the natural shores (Strayer – Findlay, 2010); it is mainly the altered currents in front of the shore-walls which may increase the water's turbidity (Engel – Pederson, 1998). In front of the altered shores the quantity of emergent riparian plants and floating-leaved aquatic plants is decreasing (Elias – Meyer, 2003; Radomski – Goeman, 2001). Practically, the intensive landuse is resulting in reduced structural complexity of lakeshores (Ness, 2006). As a result of altered, urbanised lakeshores, the number of fish-species (Bryan – Scarnecchia, 1992) and amphibian individuals are decreasing (Woodford – Meyer, 2003). Shoreline morphology exerts a significantly stronger influence on littoral macroinvertebrates compared to lake trophic state (Brauns et al., 2007; Miler et al., 2013).

Integrated assessment methods in some studies highlight the special characteristics of lakeshores (Boromisza, 2012; Boromisza et al., 2014; Furgala-Selezniow et al., 2012; Perleberg et al., 2009; Rowan, 2008; Siligardi et al., 2010 - manuscript). Regarding the method and means of interventions, shore restoration in many cases is implemented by re-establishing the near-natural vegetation, what can be realized by waterlevel regulation (Cooke et al., 2005; Keddy – Fraser, 2000), active planting (Cooke et al., 2005; Xu et al., 1999), spreading sediment seed bank (Nishihiro – Washitani, 2007), or by enclosures that protect emergent riparian vegetation (Ostendorp et al., 1995). For example, at the Chinese Lake Taihu a large-scale restoration was carried out, applying – among others – waterlevel regulation, re-introduction of vegetation and land use control (Ye et al., 2011).

Because of the increasing social demands a great number of attempts were made to develop sandy beaches for recreational purposes. At Lake Constance in Germany the existing shore-walls were completed with gravel slopes and ramps, which provide easier water-access on one hand, and also control the location of pressured areas, on the other hand (Ostendorp, 2008). In Hungary, plans were made on Lake Balaton in 1984, with a view to develop new, sandy, beach-like shores (Soha, 1986), later such investments were actually realized on several sites this lake (Horváth, 1987).

In some states of USA (e.g. in Washington) a program has to be compiled according to the prevailing ordinance for the shoreline of wetlands (Barret, 1997; Radomski, 2006), that includes survey, evaluation and restoration draft, as well. The lakeshore-related programs of Lake Balaton (Hungary) focus on development of public alleys, regulation of the shoreline, and on optimal land use along the shore (Gerzanics, 2006).

2. Materials and methods

Study area

Lake Velence is known as one of the largest Hungarian shallow lakes having a surface area of 24.17 km^2 , the average depth is 1.45 m (Szilágyi et al., 1989). The western basin is mainly covered by emergent macrophytes, for the eastern one, however, the open water-surfaces are typical. As from the 1960's, large-scale sediment removal and lakescaping interventions were performed. The full length of the shore built with artificial shoreline stabilization equals approx. 17.7 km (Papp 1995). As a result of the interventions made in the 1960-1990's, 9.8 million m^3 sediments were removed and 3.8 km^2 reeds were dredged and filled (Papp, 1995).

Structured interviews

To begin with, in 2012-2013, structured interviews (applicable also in social sciences) were made (Babbie, 2008) to consider also the social demands in the assessment process. Accordingly, personal visits were paid to 4 settlements along the lake (Velence, Gárdony, Pákozd, Sukoró) including local governments, competent national park management, water management and environmental protection authorities, as well as the local office of the Hungarian Anglers

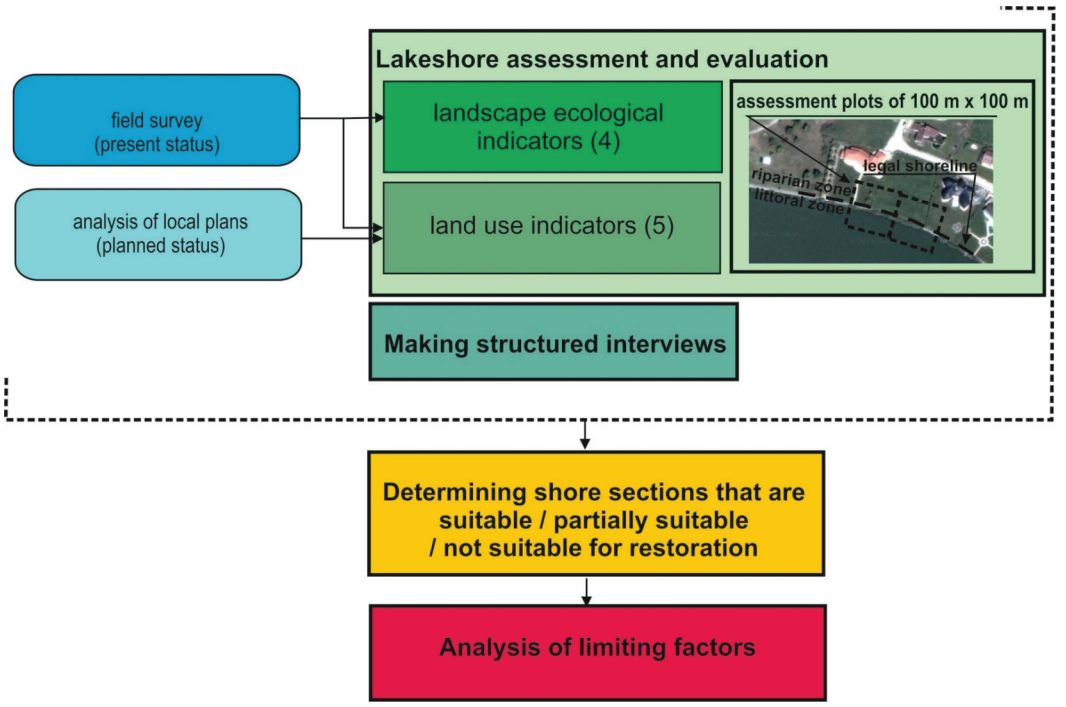

Fig. 1. Scheme of multi-step assessment and evaluation method: the assessment of the lakeshore's conditions (e.g. vegetation, landscape features) was combined with the results of interviews and analysis of local plans

Association (one representative person were asked in each case). Among the 11 pre-defined, mainly generic questions, also specific questions were asked concerning a possible shore-restoration:

- What do you see as the most important changes on the lakeshore in the last decade?
- What are the most serious problems on the lakeshore, and what are the causes of them?
- Where are the most favourable lakeshore sections from your aspect?
- What are the main goals on the lakeshore from the urban development point of view?
- What kind of demands are emerging concerning lakeshores by the local residents, NGOs?
- What are the most efficient tools to make changes on the lakeshore?
- Are the local plans enough to represent your interest?
- What kind of data is missing for your work?
- With which organizations do you need to work with in the future to achieve your goals?
- Has the idea of lakeshore restoration emerged until now?
- What is your opinion of the ecological restoration of the lakeshore, illustrated on our map?
- How do you imagine the lakeshore 20 years later? (What would you like to see/what do you expect?)

Assessments were made, in which planning and local legal process these principles can (are intended to) be enforced.

Assessment and evaluation of lakeshores's condition

In order to evaluate the lakeshore from an ecological restoration aspect, a multi-step system was used (Fig. 1.). In the first phase of our research (Boromisza et al. 2014), assessments were made to find the shore-zone's sections, that are suitable for

Table 1. Deriving of the final categories

		Land use		
	Suitable	Partially suitable	Not suitable	
Landscape ecology	Suitable	Suitable	Suitable	Not suitable
	Partially suitable	Suitable	Partially suitable	Not suitable
	Not suitable	Not suitable	Not suitable	Not suitable

restoration: to detect the sites where the existing artificial shore stabilization could be removed. For the assessment, the shore-line was intersected into 100 m long and 100 m wide assessment plots (in a distance of 50 m from the shoreline, both towards the land and the water-surface). Out of the total 351 plots, 155 were in near-natural state, thus they were not assessed from restoration's point of view.

The remaining 196 plots were evaluated according to landscape ecological and land use indicators, by a score-system. The assessed landscape ecological conditions involved: (i) width of the zone covered with emergent macrophytes, (ii) naturalness of vegetation, (iii) vegetation zonation and (iv) typical shoreline stabilization. The evaluation, according to these indicators was mainly made on basis of on-site surveys. The plots have been considered the most advantageous ones, the existing shoreline stabilization of which can be removed relatively easily technically, a reed zone is protecting the shore physically, without the presence of near-natural vegetation and the vegetation zonation is partially altered.

The indicators selected for land use analysis involved: (i) extent of human pressures, (ii) accessibility of shore-line, (iii) ownership-conditions of riparian zone, (iv) zoning (fixed in urban plans) and (v) regulation. Out of the assessed land use indicators, (i) and (ii) were assigned to the plots on basis of field-surveys, whereas the others on basis of long-term (15-20 years) intentions, declared in the local plans of the settlements along the lake. Those sections were considered to be the most disadvantageous ones, where the riparian zone belonged to an urbanised area.

The plots, being (i) suitable, (ii) partially suitable and (iii) not suitable for restoration have been selected according to both indicator-systems. The plots are partially suitable, if only a single section is suitable for transformation, or if they are suitable for restoration by a slight change (e.g. by the spreading of the emergent macrophytes along the shoreline, or by an advantageous change of the local plan). The final score of the assessment was based on combining the two indicator-systems according to the following rules (see Table 1.).

Discussing shore sections that are partially suitable, or not suitable, the key question is, which indicator, to which extent set limits to restoration and if these conditions can be modified in a simple and economical way, in accordance with the lake's utilisation for recreation-tourism and with the local plans. The opportunity and way of amendment (if – in fact – there is a possibility to exert any influence) are really variable, thus the landscape ecological and land use indicators were assessed separately. At first, all the 196 assessment plots were analysed as to limiting factors, to get a wider, overall picture of the lake's characteristics, being dominant for its restoration possibilities. Afterward, the assessments focused on the factors, because of which the plots, – being not- or only partially suitable according to one indicator system – are mostly limited, if they were suitable or partially suitable for restoration according to their indicator system. From practical view, the analysis of limiting factors

made on a limited share of the plots, is of vital importance, as those factors can be detected, through which even more shore-sections can be made suitable for restoration, after having changed them. The landscape ecological evaluation was based on the present conditions of the study-area, yet, also dynamic factors have to be respected. The change and changeability of the conditions assessed and evaluated do vary in time. For instance the width of the zone covered with emergent macrophytes may change in a few months (e.g. due to reed cutting, higher water level) what might affect suitability for restoration. However, the near-natural status, the zonation structure of vegetation – cannot change within a few years without a drastic, unexpected intervention. Regarding land use factors, for those indicators, the scores of which were defined on basis of the local plans (zoning - fixed in urban plans -, regulation), it was the status included in the plans that was taken into account, whereas accessibility of the shoreline, human pressures and the ownership-relations of the riparian zone reflect the present state. The land use indicators are basically far from being dynamic (not easy to be modified). Having in mind the possibility for modification and influence, distinction should be drawn between the beaches, camping, and harbours, meeting public demands and dwelling houses, bungalows, hotels, serving partially or entirely private interests.

3. Results

The results of the interviews

The answers received during the interviews are discussed in two topics: the lakeshore-related problems mentioned by the interviewees and the judgement of a prospective shore-restoration. In this case, the statements basically reflect the opinion of the interviewees.

Present shore-use problems on basis of the interviews

According to the replies, the shoreline stabilization of harbours and beaches are in crucial conditions. A part of the shoreline stabilization works has not been adjusted to the changed utilisation's demands. There are several use-forms which – financially – do not contribute to the management of the lake (e.g. surfers). It can be noticed that the local governments do not regard the problems of shoreline stabilization as technical issues and they do not set apart any money for maintenance, proportionally to the establishments' value. Typically, the harbours do not have the adequate facilities for ordinary use; many of them have no shipping licence, either. As declared by a major „the lake has good attributes, however, nothing has been established thereon for the living." The lakeshore is untidy and uncared-for at several sites. The wild camping spots on the northern shore annoy many people, besides causing sanitary troubles. Developments were made mainly by lakeshore investments: spa, hotel, water-skiing track. As a consequence of the large investments – in a part – inaccessible private areas on the lakeshores have become more and more typical. It is a significant change that people have an increased demand to stay in the nature, what is served by bike-roads and study trails, alike. According to the environment authority the investors, local governments look for new utilisation opportunities for the establishments of 80' years, however, the new utilisation's ideas sometimes do not comply with the lake's scale. The fact, that there are no standard, harmonized concepts and decisions, means a problem also from nature conservation's viewpoint. Because of the urbanised shore and the developments directly near the shore, it is impossible to have sufficient quantity of water in the lakebed in the winter season.

Possibility of shore-restoration

Prior to stating the issue-related views, it is worthy of note that the interviewees interpret the terms of shore-restoration and

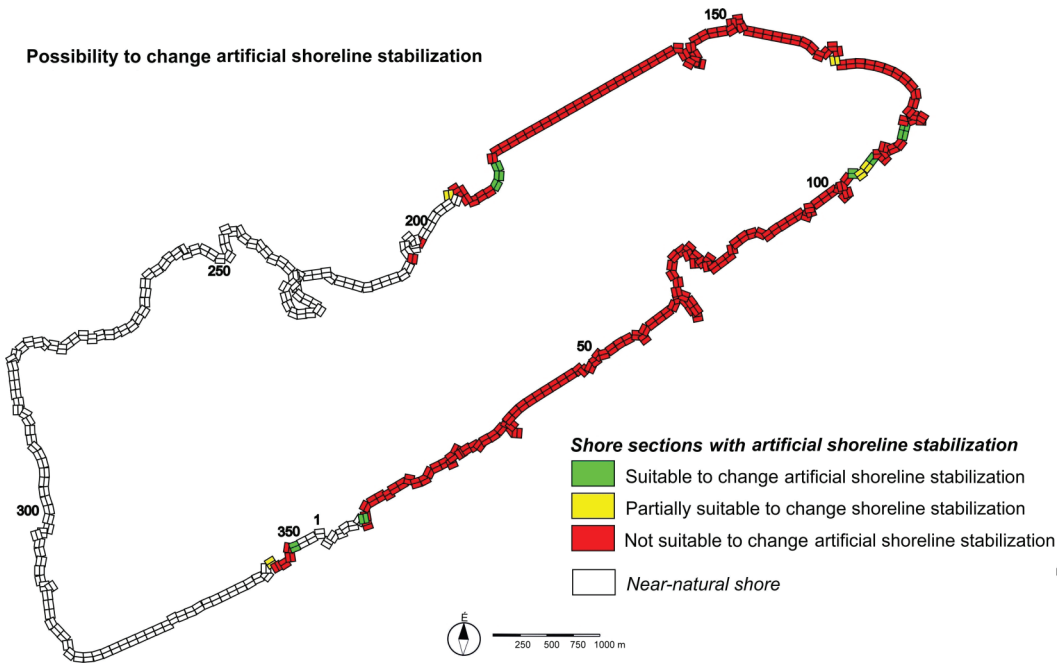

Fig. 2. Location of the assessment plots being suitable for shore-restoration

near-natural shore-sections in a different way. For the anglers association it is the good spawning site and the easy access to the shore-section that are near-natural and shore-restoration should tend to serve these purposes. The local governments, however, regard sandy beaches as the main goal of restoration and as near-natural shore-section.

Anyway, almost all the interviewees – but for one local government – do feel restoration necessary for future development. The practical importance of this research is confirmed by every interviewed organisation, which took stand for the significant transformations of the shoreline, what was expressed in landscaping-, maintaining- and regulating issues, as well. Shoreline stabilization works should be broken-down first of all on the southern shore (there are many of them and also the silt moves in this direction) because of the lake's self-clearing process.

Water authorities are about separating the shoreline stabilization works from the attached pavement, since maintenance – in a part – means that of the pavement, at present. Where there are reeds on the shoreline stabilization, the authorities practically maintain the pavement. The maintaining costs of wooden shore-walls, developed as alternative facilities, are rather high. As a matter of fact, restoration could be realized on smaller sections, affected strongly by ownership relations. As pilot project, break-downs (demolishing the existing artificial shoreline stabilization) of lakeshores should be started, as some sections still have place therefore, being justified also by environmental protection's points, at present.

Results of lakeshore assessment

According to the results, the share of the plots – being suitable or partially suitable for shore-restoration – slightly exceeded 7% (Boromisza et al., 2014). On Fig. 2. it is definitely noticeable that the shore-sections – being near-natural, or having artificial shoreline stabilization, yet not suitable for restoration – divide the lake into two well separable parts. Among these larger units there are some assessment plots being partially, or fully suitable for restoration, situated there as a few islands. Out of the

Fig. 3. Typical view of the shore-sections being suitable and not suitable for restoration
a – b) shore-sections being suitable for restoration on the southern shore – with slope concrete shoreline stabilization attached to pavement
c) shore-section being not suitable for restoration from land use view (intensive utilisation – boat harbour, high human pressures, seasonally)
d) shore-section being not suitable for restoration from landscape ecological view
(shore-protecting emergent riparian vegetation is missing; reconstruction of concrete shore-wall is problematic technically)

9 pcs assessment plots being suitable for restoration, 6 pcs are located on the southern shore, whereas 3 pcs on the northern one.

On basis of the analysis covering all the assessment plots – among the landscape ecological factors – first of all, the width of the zone covered with emergent macrophytes, is to be stressed, since 94% of the plots qualified for unsuitable, belong to the most disadvantageous category (zone is narrower than 1 m). On these sections the artificial shoreline stabilization cannot be replaced by the emergent vegetation, having shore protecting feature: for the lack of the emergent vegetation, the mechanic effect of waving and ice would get directly to the shore-line, in case the artificial works were broken down, it would cause erosion and relocation of the shoreline, being intolerable with the present utilisation demands and the extent of urbanisation. In fact, colonization of the emergent macrophytes may improve the restoration opportunities of some shore-sections. The other significant limiting factor is the present shoreline stabilization: almost 60% of the assessment plots, being not suitable, have shore-wall, where a possible break-down would require a larger intervention, technically. In case of zonation-structure, also, there are some plots, belonging to the most disadvantageous category; however, their proportion is very

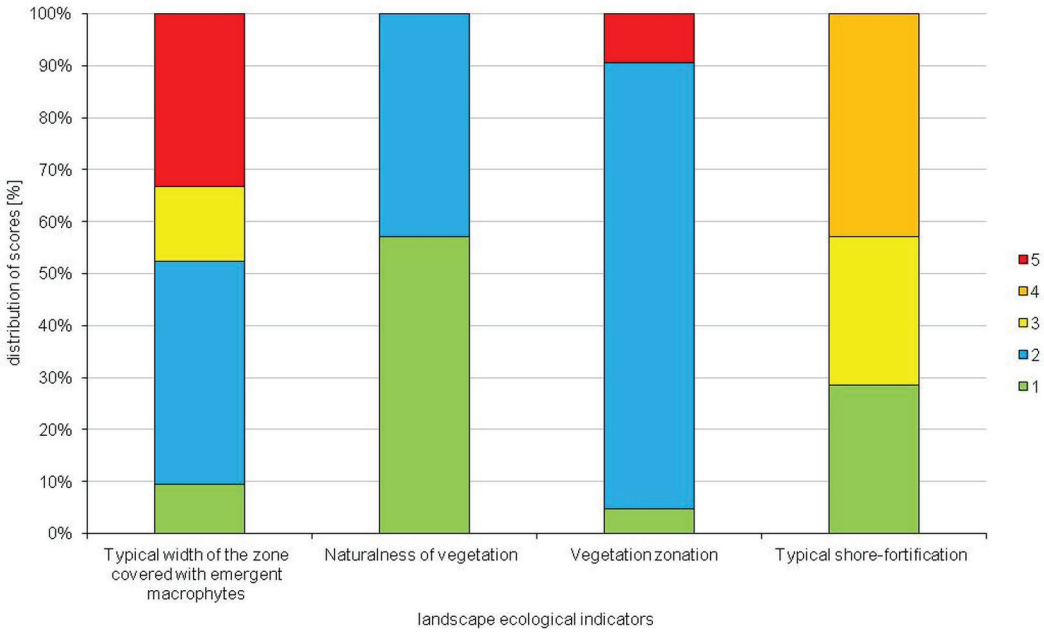

Fig. 4. Distribution of the scores of landscape ecological indicators' category among the plots, being suitable / partially suitable from land use viewpoint, yet partially / not suitable as to landscape ecology. From the lakeshore restoration aspect, score 1 is regarded as the most advantageous, score 5 is the less advantageous

low (less than 2%). Since it is very difficult to change the zonation-structure, being a long-term process, to be regarded as endowments, fortunately this factor does not limit the restoring possibilities so much. The near-natural vegetation – as limiting factor – is not of high importance, the assessed shore-section had no plot with artificial shoreline stabilization and the species composition of vegetation can be considered to be absolutely near-natural one. Regarding land use factors, the extent of human pressures are highlighted, as abt. 86% of the plots, deemed not suitable, got the most disadvantageous value, i.e. these sections are highly pressured by human use seasonally, because of their tourism-attractions and the traffic going past. As shoreline stabilization works serve also as pavements, shores may be used intensively also on the shore-sections without recreation infrastructure. Regulation and zoning (fixed in urban plans) are also dominant, as restoration's limiting factors, with former 42%, with latter 34% of the plots show the most disadvantageous situation, what means that according to the regulation a building site, or in compliance with the zoning (fixed in urban plans), urban developments are planned on the shore-section.

In case of the 21 assessment plots – being suitable/partially suitable from land use viewpoint, yet partially /not suitable as to landscape ecology – it has been found that the type of shoreline stabilization and the width of the zone covered with emergent riparian vegetation together set limit to restoration, as they have 9 pcs shore-walls, in front of which the zone covered with emergent vegetation is narrower than 1 m (Fig. 4.). In the littoral zone the lack of macrophytes, and the shore-wall, alone are disadvantageous and presumably these conditions may bear a relation to each other. In the other plots, again, the shoreline stabilization is not optimal, or the zonation shows a near-natural sight and in this case, a would-be technical intervention is not justified. Out of the 21 pcs plots mentioned above, 12 pcs are situated on the northern shore of the lake; out of them 7 pcs are intensively utilised rowing courses,

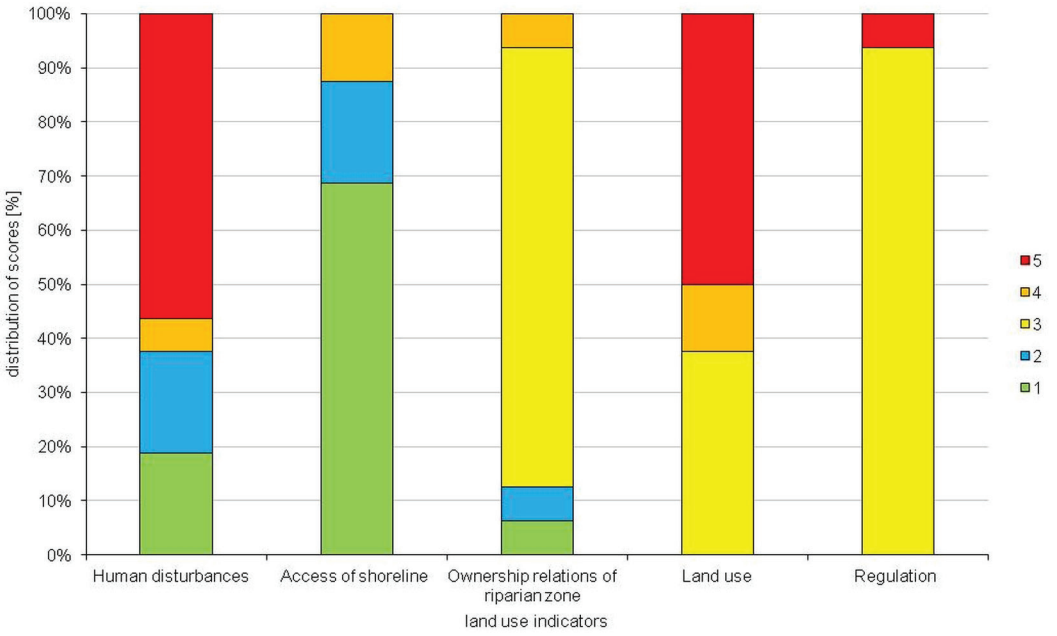

Fig. 5. Distribution of the scores of land use indicators' category among the plots, being suitable/partially suitable from landscape ecology viewpoint, yet partially/not suitable as to land use. From the lakeshore restoration aspect, score 1 is regarded as the most advantageous, score 5 is the least advantageous

in a transient zone among the near-natural spots.

It applies to 16 pcs plots that landscape ecologically, they are suitable/partially suitable, however, from land use viewpoint they are partially/not suitable, but for 1 plot (No. 195) all of them are located on the southern lakeshore, or on the eastern one (Fig. 5.). Looking at these shore-sections it is unambiguous that the possibility of restoration is limited because of the human pressures and the zoning (fixed in urban plans). Out of the 16 plots, human pressures are seasonally high in 9 ones. This situation was evaluated as disadvantageous, being typical for intensively utilised shore-sections.

It is worth assessing what significant human pressures in these plots mean. In one plot (No. 58) there is a free beach, the shoreline stabilization of which as well as the lakebed in front of it were developed between 1973-77. In this case there are significant human pressures because of the traffic aimed actually at this shore-section; nevertheless, present utilisation is limited by silting and the spreading emergent macrophytes (Phragmites australis, Schoenoplectus litoralis, Schoenoplectus lacustris), being typical in the littoral zone. It is worthy of note that also a 400 m long (No. 97-100), contiguous shore-section belongs to it on the southern shore: in this case, it is a place in front of a residential area, mostly utilised as alley for through traffic of pedestrians between two boat-harbours and parking places. The intensive spreading of the emergent macrophytes (Phragmites australis) can be observed here, too. One plot – out of those on the eastern shore – is situated near a boat-harbour (No. 148), and one next to a boat-station (No. 123). Further two side by side plots (No. 129 and 130) are located on an alley in front of a hotel and buffets, where both destination- and through traffic of pedestrians are typical in the summer season. One plot (No. 195) is located next to a boat-harbour, thus, also in this case, a lake-related shore-use generates the destination traffic.

As for the plots, being partially suitable from land use viewpoint, regarding the zoning (fixed in urban plans) and regulation, those zones got the most disadvantageous scores, which supported urbanisation up to the shores , even if they are connected with lake-related use (e.g. such as: hotel, camping, beach). All the settlements at the lakeshore – uniformly – leave free the zone of 30-50 m directly along the shore, for public use or make it suitable for limited public use. The zoning (fixed in urban plans), however, is not standardized in the plans. In one version the zone, along the shore, belongs to a separate category of public land use, with a maximum development possibility of 2/3, serving mainly for leisure and recreation functions. (No. 94, 148). The other version sets out a zone up to the shore-line for special development, yet, in the zone of 30-50 m along the lake, no building sites are allowed (No. 162, 163). In these cases developments (10-15%) can be realized on the whole territory of the plot, yet, because of the missing areas, directly along the shore, developments are concentrated in the back parts. In the undeveloped zones along the shore, it is mainly the pavements, alleys attached to the shoreline stabilization, which render shore-restoration difficult.

4. Discussion

The lakeshore assessment and evaluation method outlined above, can be regarded as pre-assessment for shore-restoration, an overall and comprehensive method. At the same time, however, as it is based on a diversified indicator system, it can be well applied to find – out of all – just the shore-sections, which are worth being assessed in details. The interviews and their consequences perfectly complete the on-site surveys, besides supporting their applicability. No contradiction occurred between the results of the two kinds of assessments. In the evaluation method, the present technical stage of the shoreline stabilization works, was not involved as indicator, yet, almost every interviewee deemed it a hot topic. If the shoreline stabilization works are of extremely poor technical condition, their restoration/break down maybe more reasonable, than full reconstruction of the original structure, having in mind, the costs of investments and of the long-term maintaining, alike. Anyway, decreased maintenance costs are possible "pros" of shore-restoration, being a mostly attractive alternative for local governments and water-authorities. Accordingly, while improving the shore-assessment method, also the assessment of the shoreline stabilization works' technical condition should be integrated.

The interviews highlighted several viewpoints that justify shore-restoration. One of the most important issues is that – on basis of the research made in the last decade – the reed stocks in the lake are degraded: the reeds on the whole lake covered in 1985 - 996 ha, in 1998 - 961 ha, in 2011 - 919 ha (Pomogyi 2013). Though shore-restoration, as a matter of course, cannot stop the presumable causes for degradation, however, by breaking-down the artificial shoreline stabilization works, the share of reeds is likely to increase, what may compensate for the disadvantageous ecological effects of died out remote reed-islands. It is worthy to note that also for the habitats on the shore it is essential to preserve the near-natural areas, left, to moderate the pressures, whereas restoration seems to be a supplementary activity for them. From this viewpoint new ways should be applied both in use and maintenance of lakeshores, which lay more emphasis on the ecological conditions (location of the areas having near-natural zonation, that of spawning-sites) and also involve the rules on using water surface – littoral zone, in space and time, alike.

The key issue of the practical applicability: whether a major part of shore-sections can be made suitable for restoration by some intervention. Since in case of land use, scoring is based on the local plan, approved by local government, theoretically, there is always an opportunity to make any kinds of changes and amendments (as they are often made, indeed,

just on basis of an investor's report, without having looked into it, adequately). Anyway, it is to be cleared if the intensive holiday-use – which made present development necessary – can be altered, as the demand on lakeshore-holidays and the pressures caused by them did not change in the last decades. If the different use-forms and users can be controlled in space, there is a real chance to alter the demands on developments, since the more intensively an area is used, the higher need is there to develop capacity-growing artificial establishments, what is definitely against shore-restoration. A great part of the assessed local plans (10% urbanised area along the shore) reflects rather the present condition and provides little opportunity to develop further establishments (e.g. those for tourism). The settlement of Sukoró is an exception to this, because of the unrealised investments, the planned status (considered to serve as basis for the evaluation) significantly differs from the present one. Here is still a possibility for a feed-back on basis of the other settlements' example, to develop - right at the start - shore-use forms and shore-sections, which meet the demands of local people and of the tourism, prior to a later/ future shore-restoration, following its basic principles, to be operated in an economic way, while having in mind the ecological aspects, too. In this regard, the score of the above shore-evaluation – similarly to the strategic environmental assessments – provides a feed-back for the settlement, whether the dimensions of the developments ecologically suitable are or not. If the settlements develop an independent alley, separated from the shoreline stabilization (this can be expected in the medium term, according to the interviews), a further limiting factor is eliminated to restore these sections.

5. Conclusion

As outlined in earlier studies, the share of shore-sections with free access is a significant limiting factor for the use (Boromisza, 2013). Similarly to the lake-related nature-conservation's restrictions, also restoration is up against the accepted, everyday routine of land use, the local people often consider similar interventions to be restricting, superfluous and inexplicable (Vinkó et al., 2012). According to the interviews' results, the technical solutions, where the restored shore-sections are not excluded from the public use either (e.g. by wooden docks of larger surface, getting out to a zone covered with near-natural emergent riparian vegetation) may mean a compromise, bringing different development intentions closer. Restoration may become potential means for tourism-developments, providing new utilisation forms, unique attracting factors and products. The interviews have made it clear that – as a result of the changed demands on recreation-tourism and the new approach thereof – also the natural- and landscape-values have become more significant: for an optimal eco-tourism utilisation, that is matching the lake's conditions, it is absolutely necessary to develop new, near-natural-like shore-sections.

Besides establishing possibilities for public use and eco-tourism utilisation, it is essential to provide information about the significance of restoration as well as about near-natural habitats involving the entire society. Science-communication is regarded as an activity, being vital for success, prior to carrying out the technical interventions. The necessary commitment can be achieved by making local people and holidayers well-informed, up-to-date and for all those concerned in shore-utilisation a common goal and interest are to be formulated, and developed.

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