

The planning principles of standing waters' shore zones demonstrated by the example of Velence-lake

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Introduction

The importance of investigating shore zones is justified, on one hand, by the numerous functions the land zones have (that of bio filter, preserving the assortment of species, in addition to being habitat, ecological network's unit, as well as destination and attracting factor for recreational and tourism opportunities etc.). On the other hand, however, many interests are crossing as to shore zones, the increased utilization's demands may – in many cases – limit or cease the above mentioned functions, e.g. as a result of regulating the water level, the shore, the water-course or the built-in shore zone. Having in mind the balance of the a/m processes, that keeps on changing dynamically also at present, it is absolutely topical to make research and planning focused on Velence-lake, one of the greatest lakes in Hungary, being primarily utilised as recreational area.

Literature review

The peculiarities and biodiversity of standing waters' shores and the role they play in the self-purification of standing waters were already stressed by the first comprehensive sources of Hungarian limnology, hydrobiology (Sebestyén 1963, Felföldy 1981). You may find several examples in the international professional literature as to survey-evaluation of standing waters' shore zones (Abrahams 2008; MNR 2007; Ostendorp et al. 2004; Schmieder 2008), or concerning their landscape management-regulation routine (Barret 1997; Cooke et al. 2005; MDNR 2009; Radomski 2006). In the Hungarian planning practice it is generally the considerations of water conservation that matter when landscape management and regulation of lake shores are made (Kulturmérnöki Szolgáltató Iroda Bt. 1998; Zorkóczi 1985), whereas in the regional and shore-restoration studies made on Balaton the view-points of environmental protection, landscape protection and those of tourism are also included (VÁTI 1998).

The first significant scientific researches on Velence-lake were performed between the two world wars (Sédi 1936). Since the 1960's – 1970's a great number of scientific researches have been made on great interventions focused on the lake's recreational utilization, regarding – among others – the lake's hydrographical capability (Szilágyi-Baranyi 1972), biology and water quality (Tóth 1970). The planning procedures served mainly the utilisation demands and reflected practically technical-economical approach (KDTVZIG 1974). Since the 1980's much greater emphasis has been laid on the aspects of ecology and landscape protection in the

plans, and during the review of earlier interventions (Csima et al. 1996; Karászi 1984; Károlyi Zoltánné 1991; Tombách 1993; Víz-Inter 1995; VÁTI 2001).

At the Department of Landscape Preservation and Reclamation of Corvinus University in Budapest the research of Velence-lake was focused mostly on surveying and evaluating the shore zones (Boromisza-Csima 2008; Boromisza 2009a and 2009b).

Goals and objectives

Both tendencies of changed conditions in the shore zone of Velence-lake and of many Hungarian standing waters as well as the land-use conflicts that exist also at present; justify rethinking the shore zones' planning practice. The research has the goal to elaborate investigation and evaluation methods, with special regard to landscape management and to define the planning principles for shallow standing waters utilized mainly as recreational sites. In the present phase of research - as main task - the landscape management specialities and the pressures of lake shores should be discovered, then on basis of same an investigating-evaluating system serving as basis for the planning procedure should be stipulated.

Methods

As chief method I made a literary research and studied the Hungarian and international sources concerning functions, pressures and planning practice of shore zones. I looked over the ecological and water quality investigations on Velence-lake as well as the spatial planning preliminaries in the neighbourhood. Special attention was given to the water conservation's planning documentation made for the lake's regulation procedures. By historical maps and earlier plans I surveyed the changes in the shore zone's condition during the past 50 years. Present stage of the shore zone was examined by analysing air-photos, topographic maps and by making field surveys.

Results

By investigating the sample area I found that the change in the shore zone's natural condition was started by the water-level regulation. As the water-level fluctuation was reduced to the minimal for utilization interests, the shore zone lost many basic characteristic features, the essential biological conditions changed significantly, thus the biodiversity decreased. The natural capabilities on the direct shore zone became similar to those of the far away land, what gave green light to building operations. The above process may raise many problems from the point of view of water supply-, and fisheries-management, nature protection and recreation. Because of the subsequent lake regulation courses (dredging, filling, bank protection works) the shore line, the landscape character, access-reach have changed and the proportion of reed diminished substantially. After the riparian areas had been built in, heavy communal pollution sources appeared on the near nature areas that performed buffer

functions, the standing waters' self-purification capacity grew worse, thus becoming more susceptible to external loading, pollutions, many habitats on or near the shore ceased to exist (Zoltánné Károlyi et al. 1991; Tombách 1993, Tóth 1970).

The reason, as you can notice in many cases, is the lack of an adequate regulation system. This may apply both to the lake- and the shore- utilization's activities, which have not been duly co-ordinated, e.g. certain forms of tourism that disturb also each other, as well as to the maintaining obligations. The local building regulation system practically disregards the shore zone's typical features and it cannot manage the manifold forms of appearance, the various short types in a differentiated way. The unsuitable management – maintenance of shore zones may often mean further pressure. At the same time, however, the problems during the maintenance courses were many times caused by earlier interventions, e.g. in case of Velence-lake: the inadequate draining, slump of filled shore areas, the worsening technical condition of the bank protection works, sedimentation of boat harbours (Víz-Inter 1995). The basic ground for most of the problems mentioned above lies practically in the fact that the social class (population, farmers, authorities) that may exert influence on the shore zone's condition, is not environmental conscious, there is not enough knowledge about the shore zone's functions, importance and proper management, people do not realize the relationship between use, environmental condition and life quality (Boromisza 2009a).

In the second phase of research, after having looked over the Hungarian and international professional literature and the planning practice, I have found that concept, interpretation, survey and evaluation technique of shore zones have rather diversified approach and contents. You may notice that the methods having complex attitude to shore zones interpret lake shores as transient habitats, land zones which extend both over water-body and land. This hydro biological approach can be applied only, if it means an exact distance reckoned from the shore line. Most methods comprise survey and evaluation of the standing waters' full shore independently of the jurisdictional borders. The investigations are based on field surveying in many cases, what shows a relative lack of information about the shore zone's condition. Assessment of larger standing waters' shore is generally made on two scales (comprehensive view of the shore zone's condition and detailed survey on certain sampling sites). There are also examples that the local inhabitants can be drawn into some parts of investigation procedures.

As regards contents, the most frequently examined points are as follows: the shore's superficial cover, morphological capability, vegetation type, appearing forms of shore regulation, form and character of utilisation. The a/m researches, plans included the aspects of ecology, land-use and water management, at the same time, however, the capability of shore zones, landscape aesthetics have not been examined. The establishments of the inspections can often serve as basis to prepare decisions by defining various shore types. Out of the shore type separating objectives, the very shore zones that are important for their buffer functions and the territorial units being sensitive for their natural values and the habitats, should be stressed (Boromisza 2009b).

The conclusions drawn from the outlined methods can be used also under Hungarian circumstances; the survey on Velence-lake was aimed at their actual application. As there are diversified shore zones – as to landscape and natural facility– it is necessary to confine the various shore types, what requires a surveying, evaluating methodology confirming to the lake type concerned and the local conditions, alike.

The shore zone, belonging to Sukoró and Velence administratively, has been surveyed and evaluated according to 6 viewpoints: width of the emergent littoral macrophytes' zone, bank protection type, character of riparian vegetation, topical land use, filled shore zone, accessibility of shore zone. Accordingly, 44 shore types, being different as to land use, ecology and landscape, have been defined.

The most determinant shore type is the following combination: „vertical concrete shorewall – 0-0,8 m wide zone of emergent littoral macrophytes, grass shore – green area-land use – free access – filled area” (Figure 1). The next type is also frequent and can be perfectly laid off: “slope bank protection work in concrete – 0,8-6 m wide zone of emergent littoral macrophytes – grass plot – green area-land use – free access – on filling” (Figure 2). This is typical along boat harbours, but you can see some in other situations as well in the jurisdictional area of Velence. The following territorial units, being mostly on the western part of Sukoró's shore zone, form longer adjoining unities: „near nature shore – 6-20 m wide zone of emergent littoral macrophytes – special area-land use – free access - on filled area”. There are further types in mosaic-like arrangements, chiefly in Velence, split in small zones, what is attributed to the manifold littoral macrophytes. Anyway, it is noteworthy that the regulation categories of the local plans can slightly follow the shore zones that have different ecological significance and appear in rather diversified arrangements.

As to buffer functions (bio filter and preserving species' assortment) the shore zones with a wide lane of emerged macrophytes in the water or with extensive wet-fresh meadows (hay meadows, non-tussock sedges) on the shore are considered to be advantageous, coupled with near nature bank protection. Out of the existing types, it is the a/m shore zone of Sukoró that corresponds particularly to these points of view. It is very important that concerning buffer functions there is not any absolutely advantageous shore zone on the surveyed area in compliance with the tested aspects, whereas the type that can be considered as most disadvantageous is present. The bank protection systems that have near nature feature can be regarded basically as near nature ones, mainly with macrophyte vegetation, extensive utilization, located on unfilled area. Since near nature bank protection can be found only on the a/m shore zone of Sukoró, in addition, more than 90 % of the surveyed area are on filling, solely smaller territorial units are regarded as near nature ones.

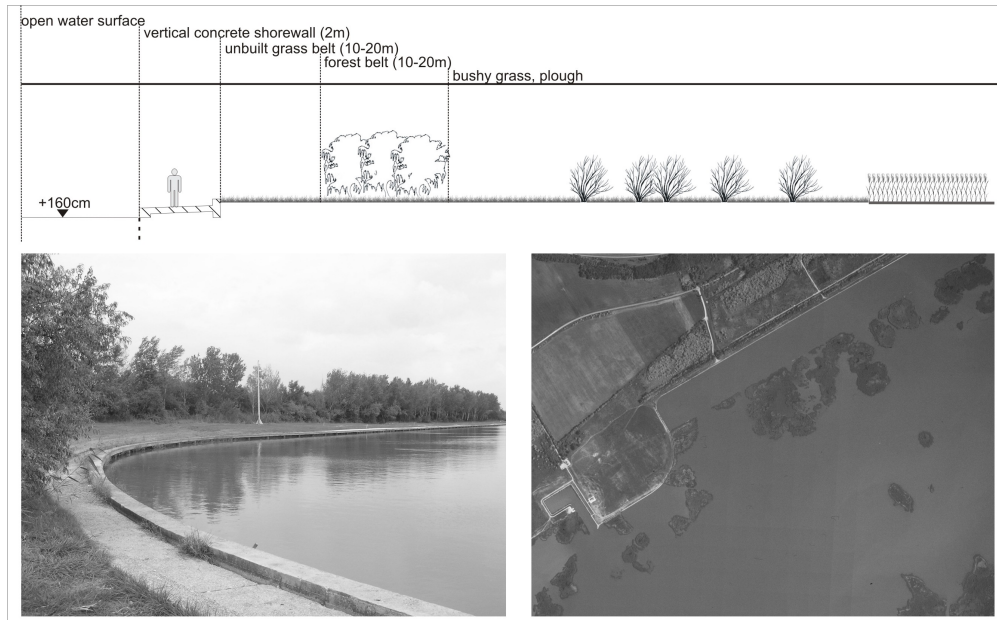


Figure 1. The rowing field of Sukoró is an example for the most characteristic shore type of the surveyed area

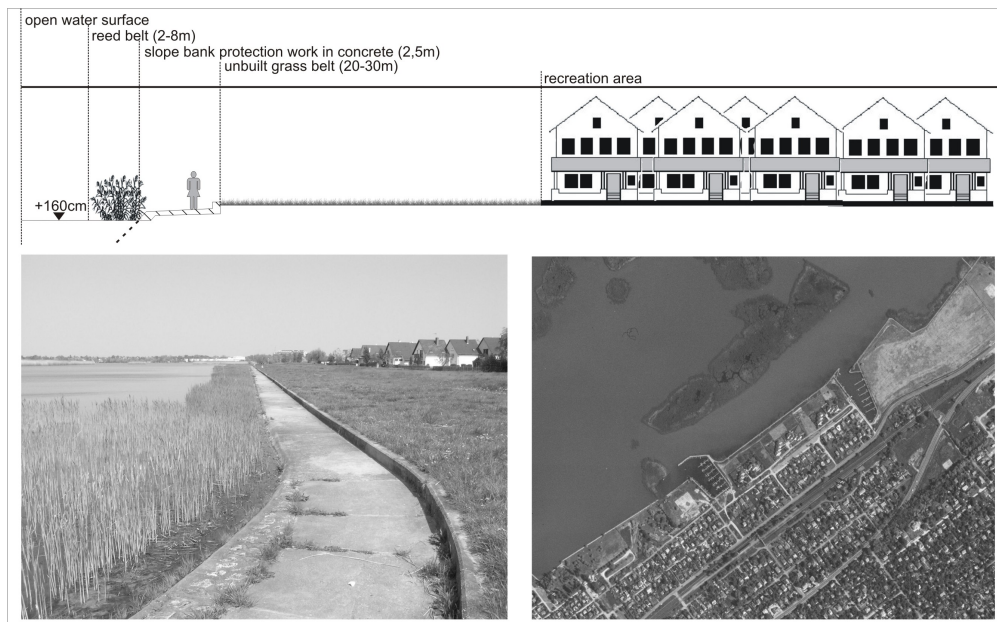


Figure 2. Typical shore type mainly for the southern and eastern parts of the lake

It can be stated that on the surveyed area there are actually shore types that had been changed to large extent, being disadvantageous for buffer functions. Nevertheless, on the north-west shore line of Sukoró and on certain areas of Velence there are still shore types which would require different management because of their buffer capacity and condition.

Discussion and conclusion

The changing tendencies of shore zones at Velence-lake and the grounds for disadvantageous processes prove unanimously that plans for shore zones can be made only with complex approach, while considering also the main features of land zones. For the sustainable utilization it is essential to amend the value scale and environmental customs of all being interested in the change of land zones. Forming attitudes, teaching-education can be connected with the planning-managing process of shore zones, while also the society has to be involved in the decision-making.

The planning process must include not only the landscape arrangement, but the regulating, managing tasks, too. The basic unit to define measures, interventions may be the shore types, developed by the evaluation system. When stipulating objectives and targets for shore zones it is not the achievement of a momentary condition that is essential, but rather the diversity of nature-landscape, the values, functions and landscape potential are to be retained, whereas utilization demands and natural processes are changing dynamically.

In the long run the following result can be expected after the research had been carried out on the whole shore line: testing applicability of the method for other natural standing waters, having primary recreational utilization, furthermore working up the planning principles of landscape reclamation and urban planning for shallow standing waters – based on surveys and evaluations.

References

- Abrahams, C., 2008; *Climate change and lakeshore conservation: a model and review of management techniques*. Hydrobiology 613. pp. 33-43.
- Balaton Kiemelt Üdülőkörzet Területrendezési Terve. Egyeztetési anyag, Regional Development Plan for the recreation area of Balaton. Check up material, 1998; VÁTI Magyar Regionális Fejlesztési és Urbanisztikai Kht., Budapest. 217 p.
- Barret, J.R. (ed.), 1997; *Shore land management program assessment*. Wisconsin Department of Natural Resources. 102 p.
- Boromisza Zs., Csima P., 2008; *A Velencei-tó parti sávjának értékelése a partalakítás és a táj-terhelhetőség összefüggése szempontjából. Evaluation of the shore zone at Velence-lake as to relation between bank form and carrying capacity* pp. 125-132. In. Csima P.; Dublinszki-Boda B.; *Tájökológiai kutatások*. Land ecological researches BCE Tájvédelmi és Tájrehabilitációs Tanszék. Budapest.
- Boromisza Zs., 2009a; *Állóvizek parti sávjának jelentősége és veszélyeztető tényezői. Significance of and pressures on standing waters' shore zones* pp. 129-134. In. Szabó V.; Fazekas I. (ed.); *Települési Környezet. Settlement environment* DE Tájvédelmi és Környezetföldrajzi Tanszék.
- Boromisza Zs., 2009b; *Állóvizek parti sávjának tájrendezési szempontú vizsgálati és értékelési módszerei. Investigation and evaluation methods of standing waters' shore zones from the point of view of landscape management*. pp. 102. In. Sallay Á. (ed.); *Lippay János – Ormos Imre – Vas Károly Scientific Session. Summaries*
- Csima P., Bugyi I.; Csihar L.; Kabai R.; Kincses K.; Kosztolányi I.; Sólyom R.; 1996; *A Velencei-tavi térség üdülési alkalmasságának és terhelhetőségének vizsgálata* Analysis of the recreational suitability and carrying capacity in the Velence-lake's area. Megbízó: KTM Területi Tervezési Főosztály. Kertészeti és Élelmiszeripari Egyetem, Tájvédelmi és Tájrehabilitációs Tanszék. 36 p.

- Cooke G.D.; Welch E.B.; Peterson S.A.; Nichols S.; 2005; *Restoration and management of lakes and reservoirs*. Third edition. Taylor and Francis Group. Boca Raton. pp. 131-140.
- Felföldy L., 1981; *A vizek környezettana. Általános hidrobiológia*. Environment of waters. General hydrobiology Mezőgazdasági Kiadó. Budapest. pp. 73-80.
- Gárdonyi tópart hasznosítási tanulmányterve, Utilization study of the lake shore in Gárdonyi 2001; VÁTI Regionális Fejlesztési és Urbanisztikai Kht. Budapest. 20 p.
- Karászi K. (ed.), 1984; *A Velencei-tó rekreációja*. Recreation of Velence-lake. Vízgazdálkodási Intézet. Budapest. 145 p.
- Károlyi Zoltánné, Magyar E., Tombácz E., Varga Gy., 1991; *A Velencei-tavi vízminőség javítását célzó intézkedések környezeti hatásvizsgálata*. Environmental impact assessment of the measures aimed at the improvement of water-quality. Környezetgazdálkodási Intézet Környezetgazdaságtani Intézete. 96 p.
- A Kiskörei-tározó (Tisza-tó) víztereinek és partjainak környezethasználati terve és szabályzata I. ütem*, 1998; Plan of environment use and regulation for the water spaces and shores at the reservoir of Kisköre (Tisza-lake) I. phase. Kulturmérnöki Szolgáltató Iroda Bt. Budapest. 117 p.
- Lakeshore capacity assessment handbook*, 2007; Ministry of the Environment, Ministry of Natural Resources (MNR), Ministry of Municipal Affairs and Housing. Ontario. 52 p.
- Ostendorp, W.; Dienst, M.; Jacoby, H.; Kramer, I.; Peintinger, M.; Schmieder, K.; Werner, S., 2004; *General Framework for a Professional Evaluation System for Lakeshore Conservation and Water Body Protection, using Lake Constance as an Example*. Expertise of the Arbeitsgruppe Bodenseeufer (AGBU) for the Bodensee-Stiftung and the Global Nature Fund, Radolfzell. Constance. 24 p.
- Minnesota's Sensitive Lakeshore Identification Manual: a conservation strategy for Minnesota lakeshores*, 2009; State of Minnesota, Department of Natural Resources (MDNR), Division of Ecological Resources. St.Paul. p.62.
- Radomski, P., 2006; *An assessment and rationale for the alternative shore land management standards*. State of Minnesota, Department of Natural Resources, Division of Waters. St. Paul. 100 p.
- Schmieder, K., 2004; *European lakeshores in danger – concepts for a sustainable development*. *Limnologica* 34. pp. 3-14.
- Sebestyén O., 1963; *Bevezetés a limnológiába. A belvizek életéről*. Introduction into the Limnology. About the life of internal waters. Akadémiai Kiadó. Budapest. pp. 123-125.
- Sédi K., 1936; *A Velencei-tó vízrajza*. Hydrography of Velence-lake. Királyi Magyar Egyetemi Nyomda. Budapest. 12 p.
- Szilágyi J., Baranyi S. (ed.), 1972; *A Velencei-tó és vízgyűjtője*. Velence-lake and its catchment. *Vízrajzi Atlasz sorozat 12*. Vízgazdálkodási Tudományos Kutató Intézet 26 p.
- Tombácz E. (témafelelős), 1993; *Velencei-tavi fejlesztés értékelése, program javaslat*. Evaluation of Velence-lake's development, program suggestion. Öko Rt. Budapest. 101 p.
- Tóth L. (témafelelős), 1970; *A Velencei-tó átfogó kutatási terve*. Comprehensive Research plan of Velence-lake. Vízgazdálkodási Tudományos Kutatóintézet. 60 p.
- A Velencei-tó part és mederrendezés munkáinak általános terve*, 1974; General plan of shore -and bed control works at Velence-lake Közép-dunántúli Vízügyi Igazgatóság (KDTVIZIG). Székesfehérvár. 36 p.
- Velencei-tavi partvédművek felülvizsgálata*, Review of the bank protection works at Velence-lake, 1995; Vízügyi Mérnökiroda Kft. Székesfehérvár. 75 p.
- Zorkóczy Z., 1985; *Folyó- és tószabályozás*. River- and lake regulation. Tankönyvkiadó. Budapest. pp. 212-225.