

Landscape – Soundscape – Waterscape Concept for an inter- and transdisciplinary framework for regional integrated water and land management and the water-, energy- and food security nexus

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Abstract

This paper argues that integrated resource management (both stocks and fluxes) must be embedded into a transdisciplinary context. Preliminary, yet essential debates, plans and formulation of aspirations need to be formulated with the active participation of legitimate stakeholders and affected citizens. This implies, that next to the key integration of land- and water resources management voices articulating local needs, expressing and protecting cultural values and social preferences are to be heard and understood.

The context of Landscape-Soundscape-Waterscape is recommended to serve as a conceptual model of dialogues to set consensus-based objectives and constraints for the detailed professional elaboration of development, restoration and protection plans for water-dominated landscapes and resource use. This multi-dimensional dialogue is even more important when several sectoral concerns are to be taken into a so called nexus consideration.

The trans- and interdisciplinary model framework of Landscape-Soundscape-Waterscape is proposed to be tested first in case studies where the spatial extent of most of the resource use and protection interactions correspond with the living space (or homescape) used, intimately known and loved by those whose “sounds” should be captured and considered for the sake of sustainable future.

Keywords

Landscape, soundscape, waterscape, integrated management, water-, energy-, food security nexus.

Tájkép – hangkép – víztáj

Egy regionális integrált víz- és tájgazdálkodás inter- és transzdiszciplináris keretének koncepciója a víz-, energia- és élelmezésbiztonság kapcsolatában

Kivonat

Ez a tanulmány azzal érvel, hogy mind a készletekkel, mind a fluxusokkal való integrált gazdálkodást egy transzdiszciplináris kontextusba kell ágyazni. Az előzetes, de lényeges vitákat, terveket, törekvéseket a legitim érintettek aktív részvételével kell mind lefolytatni, mind megfogalmazni. Ez azt jelenti, hogy a táj- és vízkészlet-gazdálkodás kulcsfontosságú integrációja mellett a helyi igények megfogalmazását, a kulturális értékek és társadalmi preferenciák kifejezését és védelmét nemcsak meghallani de megérteni is kell.

A Tájkép-Hangkép-Víztáj kontextusa javasolt hogy párbeszéd modelljeként szolgáljon, amelyek során konszenzus-alapú célok és korlátokat megfogalmazó koncepciókhoz juthatunk el, melyek a víz uralta tájak és az erőforrás-használat fejlesztési, helyreállítási és védelmi terveinek részletes szakmai kidolgozásához kiindulópontként szolgálhatnak. Ez a többdimenziós párbeszéd még fontosabb, ha több ágazati érdeket és célt kell egy ún. nexus kapcsolatban figyelembe venni.

A Tájkép-Hangkép-Víztáj transz- és interdiszciplináris modellvázlat először olyan esettanulmányokban javasoljuk tesztelni, ahol a legtöbb erőforrás-használati és védelmi interakció térbeli kiterjedése megfelel az érintett emberek által használt, közletről ismert és szeretett élettérnek (vagy otthonjának). Ezeket a „hangokat” kell felfogni és figyelembe kell venni a fenntartható jövő érdekében.

Kulcsszavak

Tájkép, hangkép, víztáj, integrált gazdálkodás, víz-, energia-, és élelmezésbiztonság nexusa.

INTRODUCTION

This concept is developed further on the basis on an article published in the Vasi Szemle journal in September 2021, introducing the Institute for Advanced Studies (FTI-iASK) operating in Kőszeg, which was written by myself, Gergely Tóth and Zoltán Mizsei under the title "Landscape, Soundscape, Waterscape: Outline of the principles of future-oriented regional development" (Bogárdi et al. 2021). The fact that this article appeared first in Hungarian language in a journal published for a general audience in Vas County can be considered a program in itself. According to its message, the basis

for successful integrated stock and resource management must be wider, "more integrated" as we previously thought. At the beginning, the debates, plans, and ideas of traditional professional circles need to be "socialized" involving representatives of the civil society, affected citizens and other legitimate stakeholders. Perhaps this is the way to "level the playfield" for successful and sustainable integrated water and land management. The "Landscape, Soundscape, Waterscape" (L-S-W) concept was introduced (also in Hungarian language) to the water resources management community in late 2022 (Bogárdi 2022).

The word *landscape* may have an undisputed meaning for both professionals and the public. However, if we are looking for the action-related (verbal) form of the word (landscaping), the concepts of park creation or landscape modification come up, while for example landscape management is interpreted as an agricultural concept. If we wanted to take into account everything that characterizes a landscape, either aesthetically or economically, as well as everything we want to consider in its utilization, transformation, or even preservation and we would try to summarize that all in one word, we could easily get confused. Yet, if we wanted to express the physical appearance, functionality, and cultural aspects of a certain part of land (which of course includes the built environment) in a broader context simply, in one word, we could do it best with the single word "landscape".

We would search in vain for the word *soundscape* in English or American dictionaries 30 or 40 years ago. However, its definition appears on the internet as a virtual emotional environment that we create with the help of sound. The expression clearly gets a musical interpretation, which another definition of the word expresses as "electro-acoustic composition". But similar to landscaping, there is also a different interpretation. I do not want to elaborate on these in a paper dealing primarily with water and land management. However, it should be added to what has been said so far that, for example, "soundscaping" refers to the architectural creation with which we can create special sound effects. The origin of the word dates back to the 1950s, from when it began to be used primarily in relation to the description of a city's sound environment. The thinking together and collaboration of music teachers, composers, and urban planners began, which is at least as ecological as it is musical. The process seems to develop in both ways. The integration of music and sound into efforts to implement the sustainable development goals is discussed by (UN 2021) and (Grant et al. 2021) whereas research in musical history started to investigate how non-musical sound events and effects are reflected in musical compositions. The term "soundscape" can be also interpreted as a "reincarnation" of antique/medieval terminology using a classification of the different spheres of the world based on their sounds like "musica mundana" (music of the cosmos, referring to the harmony in nature), "musica humana" to describe the unity and harmony of soul and body and "musica instrumentalis" to describe audible music, human singing but also industrial sound pollution.

The word *soundscape* therefore, as a collective name for the acoustic characteristics of the built and natural environment, includes the perception of the sounds and echoes of a landscape through our hearing. They can be mapped, recorded on sound recordings.

Formulating development or change proposals and recommendations can have an impact on the livability of the present and future of a given landscape. Broadening the concept further, the *soundscape* can characterize the cultural and social "sounds" of a landscape or region, which can be harmony or even dissonance depending on how proposed changes, or development ideas are perceived. Moreover, moving away from the acoustic sphere, we can also characterize the history, heritage, and intellectual radiation of the landscape with this collective term. Similar to the

term *landscape* describing the concept related to the landform, settlements, vegetation and use of the considered area, we can say that the *soundscape* is the most poignant term that summarizes the intellectual, cultural, political, in short, social vibrations of a region and the "noises" they cause, which we must take into account from the perspective of both the *landscape* and the *waterscape*.

The word *waterscape* is defined by the *Merriam Webster dictionary (1980)* as a water or sea view. Of course, water, in whatever form it appears, is an integral part of the landscape. With the word *waterscape*, we want to emphasize two important roles of water. Those landscapes whose main feature is the presence of water can be called *waterscape* due to this fact. This includes valleys of larger rivers, islands, interconnected lake systems, river deltas, but also marshes and wetland habitats. Even if the water that gives the name is not necessarily visible, like in a posh spa or karst cave system, both can be mentioned as a waterscape. The essays of Z. Karvalics (2016) and Takács (2023) can be mentioned as excellent examples of the description and interpretation of waterscapes in contexts of urban settlement type land use and rural landscape respectively.

The term *waterscape* does not monopolize the landscape for water, but emphasizes the landscape-forming role of water, its dominance in the landscape, and its interweaving with the other elements of the landscape. Beyond this role, water is not only a prominent part of the given landscape, but – especially in the case of watercourses – it is also a connecting link between several consecutive or even distant landscapes. Due to its liquid state, its dissolving and transporting capacity, a certain dependency relationship is also established between the landscapes formulated along the watercourses. It is no coincidence that in this interpretation, human civilization began to develop in those landscapes whose existence and productivity were associated with the presence of water. We could also say that the ancient river civilizations were predominantly *waterscape*-based.

In our country, primarily the Danube valley, the backwaters of the Tisza and the Tisza Lake, the inner continental delta of the Danube in the Kisalföld (Little Plain, the areas around Szigetköz and Hanság) and our lakes can be referred to as a *waterscape*. Despite being a standing water, Lake Balaton is a decisive connecting and landscape-forming factor in the integration of the northern and southern coastal regions including the surrounding natural and managed wetlands.

WHY IS THE LANDSCAPE – SOUNDSCAPE – WATERSCAPE CONCEPT NEEDED?

It became clear in the last decades of the 20th century that the management of natural resources, goods and ecosystem services within the development of regions at any scale will not be sustainable if the proposed interventions consider the different factors of development separately. The plans and the subsequent interventions, infrastructure, and other technical solutions needed to implement them were generally discussed and developed within a traditional, technically defined professional system. All this during a process in which the voice and opinion of those involved mattered little. This so-called top-down planning

and implementation practice is not only outdated within the frameworks of pluralistic democratic societies, but increasingly unfeasible. Continuing the terminology of the above-mentioned triple "scape" concept, we can say that traditional development paradigms almost completely neglected the *soundscape* as an integral part of planning and implementation. At that time, the *soundscape*, if at all, could have been imagined as the noises of belated social resistance. The example of the planned nuclear power plant on the Rhine River at Wyhl, Germany showed that a "soundscape", which articulated previously ignored emotions and resistance loudly, albeit late, was enough for the project to be shelved and abandoned at the level of hydraulic laboratory experiments (Bogárdi 2022).

The disadvantages of the practice of implementing separate efforts are sought to be eliminated by numerous initiatives. Using the example of water resources management, the idea of integrated water resources management has a history of more than three decades (Ibisch et al. 2016). Some sources trace its origin even further back, but the practical efforts were not really attempted in implementations before the early 1990s. According to the principle of integrated water resources management, it focuses on the different forms of water, the different uses and their stakeholders, but also explicitly considers other related natural, social and planning processes. This multifaceted definition indicates that integrated resources water management is highly case-dependent. This can easily lead (and has led) to the practice of trying to get all completely different approaches accepted as integrated water resources management by the protagonists of the given use.

Integrated landscape management similarly goes beyond the aspects of the suitability of natural elements for a given form of use, and also considers factors related to the purpose of the use of physical elements. These can be economic, social and environmental elements and impacts. The land evaluation guidelines published by the Food and Agriculture Organization of the United Nations (FAO 1976) already reflect this approach when it formulates the following aspects:

- The characteristics of the landscape (suitability) should be examined in relation to the purpose of land use.
- The evaluation should take into account the investment (input) and profit (output) factors required on different types of land. (Material, energy and other expenditures and profits.)
- In accordance with special needs, there is a need for cooperation between professionals working in different fields (ecology, pedology, agriculture, economics, etc.).
- The evaluation should be carried out with extensive consideration of the individual characteristics of the area under investigation. It is natural that the land use proposal must be realistic, for this purpose local socio-economic factors should also be taken into account when preparing the complex study.

- Appropriate land use also implies sustainable land use.

In the nearly half a century since the publication of the FAO's cited guidelines (FAO 1976), efforts to implement integrated landscape management in practice have most often aimed at integrating agricultural and ecological aspects, rarely reflecting the cultural and emotional needs of the people living in the landscape. It seems that we still have to wait for the holistic approach to fully unfold. The FAO's latest "Landscape for Life" publication also reflects the sustainable food production priority of landscape management (FAO 2017). Of course, ecological considerations cannot be disregarded, nor can efficient landscape use be adopted without taking into account the nature and potential of the available resources. This should be rooted in tradition, open to innovation, and consider aesthetic and other aspects (local social groups and various perspectives of visitors to the area in order to achieve a truly integrated landscape management).

The situation is similar with integrated water resources management. While professional representatives of water resources management tried to implement integrated water resources management by considering the relationship between surface and groundwater, balancing the competing demands of user sectors, ensuring coverage based on compromise, and simultaneously ensuring the health of ecosystems, for the interested and affected citizens, integration meant much more about how much their opinion was heard or how much they were able to influence or prevent certain plans.

The consideration of the soundscape here primarily means not Johann Strauss's *Blue Danube Waltz*, numerous popular songs about the Tisza River, or Smetana's symphonic poem titled *Moldau*, but the loud manifestation of the will of the inhabitants of the *landscape* and *waterscape*. Nota bene, the connection of the aforementioned musical gems to the *waterscape* indicates the aesthetic and emotional importance of the landscape and water, which should not be underestimated. I recall the effect of the Russian song "Volga, Volga, maty radnaja" (Volga, mother of our homeland), which did not even need to be sung, it was enough to mention it in a heated professional debate for the opponents of the integrated approach to soften their stand against interdisciplinary approaches in describing possible futures for the Volga Basin in Russia (UNESCO 2004, Bogárdi 2022).

In such a situation, it is difficult to take into account the interests and values of those affected, even if the willingness exists, because not everyone is considered to be affected by the given water resources management project, even in the case of a smaller country. There are civil organizations which automatically consider themselves authentic representatives of any affected area anywhere and act as if this were completely their case, irrespective of being residents of the area or not. It is important that the *soundscape* really characterizes the affected region's "sounds" and does not degenerate to some ideological cacophony.

Despite the problems associated with practical application, the sustainable development goals adopted by the United Nations General Assembly in 2015, contain, as part of the 6th, the water-related goal, that integrated water resources management is to be used in achieving the set targets of the goal.

In addition to integrated water resources management, as the "internal" method of water affairs, the "nexus" principle has gained more and more ground in the last two decades. Here we primarily refer to the most commonly considered „Water-Energy-Food" (W-E-F) security relationship, although one can imagine other nexuses with even more dimensions. The essence of the nexus is the mutual consideration of sectors that have been managed separately so far. The difference between integrated water resources management and the nexus can perhaps best be described by considering the nexus as a "framework condition" for a modern (integrated) water resources management to establish connections to other concern areas (e.g., energy and food security, soil and waste management) beyond its principal focus on water. This role of setting the framework naturally applies to other sectors involved in the nexus as well. The idea of the nexus is a result of the Davos World Economic Forum, which has been widely spread since the Nexus Conference held in Bonn in 2011 (Hoff 2011, Lawford et al. 2013). The originally sectoral integration-oriented, resource-centered integrated (water) management has expanded into a multi-sectoral task with the introduction of the nexus concept.

Like integrated water resources management, the principles of the nexus are widely accepted. However, the application of both presents serious difficulties in practice. In relation to the nexus, beyond the complexity inherent in it, we can refer to the historically developed strongly different governance and value structures of the sectors involved in the W-E-F nexus, which can be extremely diverse in themselves. In energy supply, we face prices dictated by the world market and mostly private, or at most semi-state suppliers. In many countries (and not only poor ones), food supply, although mostly in private hands, still enjoys massive political and financial support - whether we think of regulated food prices or EU agricultural subsidies. In water-using sectors, primarily in the highly water-demanding agriculture, water charges – if at all collected - are often set below real costs. While no one would doubt that water and daily food are more immediate needs than anything else, the value system and monetary power of the respective sectors are far behind that of the energy sector. Therefore, maintaining the balance of the nexus is only possible by defining and maintaining political priorities. From the perspective of water resources management, this means that it is not just an engineering or other professional/scientific problem but is inseparable from the social aspirations of the time, the value system that defines them, and social discourses. It is with a heavy heart to say, but the sad fact is that water resources management is primarily politics, or in other words, it is led by the reins of politics.

Both the *landscape*, and the *waterscape* economic exploitation, protection, or other transformation usually affects long periods and is, with few exceptions, irreversible.

The consequences of misguided steps can thus become a problem for generations. The significant investment needs of the projects involved further underline their social importance and mutual dependence. This, of course, also means political dependence, which cannot be ignored. The *soundscape* to some extent is the social, historical (and of course musical) accompaniment, or even initiator – and as we have seen in the planned nuclear power plant at Wyhl, in Germany – can also be the thwarting of these physical and biological changes.

WHAT DOES THE LANDSCAPE-SOUNDSCAPE-WATERSCAPE CONCEPT OFFER?

The above summary has pointed out some fundamental problems related to the real-world application of the current principles and methods of water and landscape management. Many of these stem from the fact that it is not clearly defined to what extent integrated management and the various nexuses can be considered a philosophy, a professional principle, or even a method, the application of which could (and should) be formulated in user manuals. It is also difficult to decide at what scale and in how many dimensions of the nexus we need to think and act in order to qualify the search for a solution to a problem as integrated, nexus-appropriate and ultimately, which is our main goal, sustainable. The situation is similar with landscape management, with the many approaches to integrated land use, the foundations of which also look back over many decades (see, for example, the FAO land evaluation guidelines from 1976), but the practice of which is still far from harmonious solutions. Worth to mention in this context the politically very "opaque" land- (and hence also water) grabbing practices by certain countries and international firms, especially in Africa. Corruption, the lack of governance and government control would render all of our integrating and nexus efforts futile in face of the fait accompli created by secret land deal contracts.

The starting point of the Landscape–Soundscape–Waterscape concept is similar to integrated management in that it is based on the natural features and stocks of the area considered. In contrast to integrated water resources management, the proposed Landscape-Waterscape integration adopts the repeatedly formulated (and professionally "demanded") integrated consideration and joint management of land (soil) and water resources. This integration, which seems inevitable in the long run, would be greatly facilitated if sectoral governance were in one hand (under the purview of one common agency or ministry). It should not be concealed that this integration is not simple, because these two basic natural treasures - similarly to what I mentioned in connection with the nexus - face the problem of different governance systems that have historically developed. We can mention that we can buy land, which can thus be private property, which, however, cannot apply to waters. Water is a mobile resource. Partially it can be considered as a stock, but for sustainable use even more its feature as a flux with an annual cycle should be emphasized. In comparison land is practically "fixed", although its quantity (through land use changes like construction, or erosion) and quality (soil degradation) are also variable. This signifies a fundamental problem. We are convinced that we can only attempt the integrated management of

land and water primarily in well-defined, human-scale regions. Such a region could be a landscape with its contained settlements, infrastructure, agricultural or forestry, and nature conservation areas, or a *waterscape* (relatively homogeneous watershed, island, lakes with their coastal zones, etc.) which may be perceived by the affected citizens as their “homescape”.

A project area to be tangible by the principles and emerging practices of the Landscape-Soundscape-Waterscape concept should remain perceivable (able to oversee it at one glance) by the individual stakeholders. It may be called a “human scale” approach. Consequently, the dialogue within the Landscape-Soundscape-Waterscape framework must be based on genuine “sounds” originating from the landscape/waterscape, rather than resonating ideologically formulated general opinions.

We are convinced that the Landscape-Soundscape-Waterscape connection does not define a method where the successive steps could almost be “ticked off”, regardless of whether we are talking about an agricultural or industrial landscape, whether we are on a plain or in the mountains. The concept of “three scapes” is an attempt to go beyond the strongly technical and administrative nature of previous development ideas, and to formulate goals and seek solutions to problems with active transdisciplinary participation. No doubt that the Landscape – Soundscape – Waterscape consideration and associated discourse and target setting exercise should be started well before any technical planning and implementation.

Although the proposed integration is based on the joint evaluation and exploitation of natural and human resources, we do not consider it exclusive that the line of thought necessarily has to start from a problem related to water or land. The Soundscape, as the voice (or echo) of the region, can articulate an important social value or need, a future-oriented aspiration and hence the Soundscape can also be the starting point of contemplations and setting goals, targets and constraints for the subsequent professional planning.

The researchers and colleagues belonging to various scientific and cultural fields working together within the Institute for Advanced Studies in Kőszeg (FTI-iASK), and their research partners, need to make a joint effort to develop further the concept outlined here and test its practical usability.

The integrated water resources management (IWRM) has been conceived more than three decades ago. While the principle is widely accepted, officially endorsed and recommended, its practical use and the targeted improvements in water resources management are still lagging behind expectations. This is partially due to the different definitions and interpretations of the concept (*Johannesburg Plan of Implementation 2002, Bogardi and Szöllősi-Nagy 2003, Karthe et al. 2021*).

A proposed PhD research should be based on a comparative analysis of the diverging conceptual and attempted practical applications. Based on these results the

research should lead towards a widely acceptable and practically relevant model of IWRM. Particular emphasis is needed to highlight and tackle the differences between integration of various professional concern areas and disciplines (such as water engineering, soil science, land use, agriculture, environmental protection, transportation etc.) and the incorporation of societal actors (affected citizens, civil societies etc.) in the decision making and implementation processes.

In this regard the viability of the landscape-soundscape-waterscape concept and its possible linking with IWRM (and eventually also that of appropriate nexuses) should be elaborated and tested.

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