Visual cross-border research on common croatian and hungarian riparian landscapes

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VISUAL CROSS-BORDER RESEARCH ON COMMON CROATIAN AND HUNGARIAN RIPARIAN LANDSCAPES

Dina Stober, Imre Nagy

Original scientific paper
The first part of the paper gives an overview of research papers on the landscape with special emphasis on the visual and environmental studies. Long-time development of visual research landscape provides a basis for a critical review pointing to the need to increase the validity of visual research, the category selection, visual perspective of a landscape, as well as the technical characteristics of the performance of visual material. In this paper the results of research of attitudes of Hungarian and Croatian students, conducted through visual materials and questionnaires on river landscape transformation are interpreted. The results indicate the need for harmonization of cross-border categorizations of the observed landscape, as well as the complement of the objective parameters by the parameters which include cultural accumulation.

Keywords: *cross-border landscape, riparian landscape, visual research*

Vizualna prekogranična istraživanja zajedničkog hrvatskog i mađarskog riječnog krajolika

Izvorni znanstveni članak
U prvom dijelu rada dan je pregled radova koji analiziraju istraživanja krajolika s posebnim ostvrtom na vizualna i ekološka istraživanja. Dugogodišnji razvoj vizualnih istraživanja krajolika pruža podlogu kritičkom osvrtu koji upućuje na potrebu povećanja validnosti vizualnih istraživanja u kategori odabira, prezentnosti krajolika kao i u tehničkim karakteristikama same izvedbe vizualnog materijala. U članku se interpretiraju rezultati istraživanja stavova mađarskih i hrvatskih studenata vizualnim materijalima i upitnikom o promjenama riječnog krajolika. Rezultati upućuju na potrebu usuglašavanja prekograničnih kategorizacija promatranog krajolika kao i dopunu objektivnih parametara parametrima koji uključuju kulturne akumulacije.

Ključne riječi: *prekogranični krajolik, riječni krajolik, vizualno istraživanje*

1 Introduction

European Landscape Convention [1] presented a definition of landscape, broad accepted and cited in scientific literature. The core of the definition is that landscape is in action and interaction with human perception. River area planning comprises complex dynamic ecosystems and human cultural systems. Relationship variables can be found in the group of objective characteristics of landscape and in the subjective-objective characteristics of the observer and his/her conditions [2]. River basins are also cross-cultural links as well as conflicting elements in different thematic discourses (energy use, agriculture, biotope protection, transportation flow, border territory, upstream-downstream, etc.). The existing positive example [3] of cross-border cooperation in the management of the Alpine – CIPRA - is the basis for the reflection of other valuable natural units stretching across several countries. In line with this, this study explores the variety of attitudes and values of different nationalities on common natural feature. The focal area is the cross-border area of Slovenia, Hungary and Croatia with the Rivers Mura and Drava. The Drava River forms a big part of the Croatian-Hungarian border while the Mura River forms a small part of the Austrian-Slovenian, Slovenian-Croatian and Croatian-Hungarian border.

2 Visual and ecological concepts related to landscape structure

There has been an attempt to bridge the chasm between the subjectivist and the objectivist paradigm in researching the relation between the ecological and the visual quality of landscape. According to Lothian [2] there is a subjectivist theory in the core of the objectivist paradigm and, vice versa, in the subjectivist paradigm we strive to measure some experience in an objective way. It is supposed that the category of quality for this paradigm has been derived according to the clear, objective criteria for some decided indicators. In keeping with this is objective assessment, too by using the psychophysical methods which use statistical instruments and mathematical models to classify visual quality of landscape. In that way we have quantificational methods to define landscape we find more beautiful than the others. Lothian [2] based his analysis on a basic dichotomy between the source of value and a moral subject: whether the value of landscape is inherent or whether it is in the "eye of the beholder". By analysing both theoretical and review articles the author presents the basic differences in the subjectivist and the objectivist paradigm.

Kaplan et al. [4] defined in four categories the dimensions relevant for preference and tested them empirically. The results of regression analysis showed that the variable *perceptual* domain is the strongest predictor, whereas *physical* domain did not show any relevant influence on preference. From the set of twenty dimensions the authors extracted the following dimensions as influential for landscape preference: mystery and smoothness as positive variables and weedy field, scrubland and openness as negative variables for landscape preference.

Ode et al. [5] combined the research connected both to the subject and the object and researched landscape preference in relation to various socio demographic factors and to three indicators of perceived naturalness. The theoretical framework comprised four dimensions according to which three indicators were set: level of succession, number of woodland patches and shape index of edges. The results showed that socio demographic

factors influence preference to a lesser degree than naturalness indicators. Among socio demographic indicators it was gender and profession and country as factors which showed some indicative influence on the observed. The study showed a strong relationship with preference for both the level of succession and number of woodland patches, and a weaker relationship with shape index of edges.

Jacobs and Buijs [6] adopted a different approach to reveal various dimensions of sense of place. Instead of a theoretically determined categorization, they formulated dimensions on the basis of an open, in-depth account of people's place meanings as elicited in two studies. Five categories of abstract place meanings emerged from the data-driven analysis: beauty (place meanings related to aesthetic judgments), functionality (place meanings that express ways of using the landscape), attachment (place meanings that convey belonging relations between subjects and the place), biodiversity (place meanings pertaining to species and nature), and risk (place meanings that articulate worries about current or expected problems).

3 Research on landscape in Croatia

Although it was published and translated in Croatia thirteen years ago, the document of European Spatial Development Perspective (ESDP European Spatial Development Perspective) [7] now provides a legal basis for the idea of sustainable development for the European continent. The fact that two years earlier, the first strategic document - Strategy of the Spatial Planning of the Republic of Croatia [8] had been published, and that terminology does not follow the European document, the Croatian document follows the principles of a sustainable planning.

The chapters Landscape and Nature Conservation present goals and deal with the term "landscape". Simultaneously with the Program of the Spatial Planning of the Republic of Croatia [9] the publication Landscape - Content and Methodical Background of the Landscape Basis [9] was issued, consisting of the suggestions for the methodology of landscape management plan, as well as texts by various authors indicating the criteria to ensure the protection and proper evaluation of spatial units that due to their qualities, values or sensitivities require adequate attention in the preparation of regional plans. The publication ends with recommendations for further work on the basis of a landscape, which highlights the need to develop a unified model for the level of the state as a basis for developing the Croatian landscape management plan, preceded by the landscape typologies research as well as spatial trends and changes.

Currently, the protection of the landscape in Croatia implements management plans of protected areas, zoning documents, the instrument of the impact assessment (PUO) and the instrument of the strategic assessment of plans and programs on the environment (SPUO).

4 Visual research on landscape in Croatia

Authors Andlar et al. [11] provide an overview of the concept of landscape in the following systems: within legislation, spatial planning, environmental protection, nature conservation, cultural heritage and in the system of sustainable development and rural development. In a review of previous research related to cultural landscapes, the group of authors [11] present a number of Croatian papers critically placed in relation to the principles of landscape classification, highlighting the need for a comprehensive evaluation of the landscape that takes into account all its components. In the same review the authors emphasize the positive examples that have contributed to the identification and evaluation of cultural landscapes and determining the landscape typology. The review of national literature and scientific papers about the landscape also emphasises the ones that use visual materials [12, 13, 14], Pereković et al. (2007) [15], Cifrić and Trako (2008) [16], Butula et al. (2009) [14] and Stober et al. (2012) [17].

Aničić [12] in her work on the house-garden relationship deals with the structural relationship between exteriors and interiors in the context of traditional and modern culture of habitation. The study uses a semantic differential instrument. The same instrument was used by Cifrić and Trako [16] to differentiate various types of landscapes in the distribution of natural and cultural landscapes. Students' population research results [17] indicate that the young population prefers intact natural landscape, having, on the other side, no preferences for the polluted industrial landscape. The instrument of the semantic differential confirmed the four dimensions of subjective perception (aesthetic, stability, activity and religious), for all six types of landscapes.

Butula [14] also uses a semantic differential, for the purposes of the evaluation of visual material of the river landscape, but with the aim of identifying preferences of different stakeholders, potential and direct users of the observed landscape. The study was aimed to determine the differences in opinions and attitudes of different social and stakeholder interest groups about the recognition of the river landscape, the need to participate in decision-making, in relation to the environment. The results confirmed the growing need for the participatory nature of the planning process, for the preparation and design of landscape evaluation criteria.

Identification of the interests of different groups in the river landscape was explored by Stober et al. [17] but in a transnational scope. The results showed differences in the perception and evaluation of the transformation of river landscapes, applied on the sample of both, students and professionals.

Group of authors Andlar et al. [11] gave a general critique on all domestic landscape and cultural researches, which pointed to an uncoordinated terminology, excessive dispersion of defining cultural landscapes and lack of development of techniques and procedures in the study. None of the studies directly addresses the development of innovations in techniques, but assumes already tested methods of the western, more experienced scientific and technical experts (Slovenian, Dutch, English, and German). But as a key issue in the review of national publications resulting excessive drift from the recent strategic document that announced the momentum in research, inventory and protect the landscape of Croatian

territory, which resulted in a non-directional, randomized positive studies, but with insufficient results.

5 Research on landscape in Hungary

The adoption of the Law on Spatial Development and Urban Planning 21/1996 allowed the possibility of defining the spatial landscape of the protected zone in the spatial planning at the national level in Hungary. Structure of the content of spatial plans is determined by the Ministry having a jurisdiction over urban planning, regional planning, rural development, etc. The system of spatial planning includes a part under a title – Plan Proposal for Landscaping and Nature Conservation [18].

Landscape issues, landscape planning, protection of landscape area have all been dealt with in national environmental programs, the regional development strategies, operational plans at different levels (national, regional, micro level).

The main objective of the National Programme for the Environmental Protection (NPC II) is to ensure the principles of sustainable development, and integration of environmental objectives and the nature into various development plans and programs. Parliamentary decision 96/2009 (XII 9) adopted the National Programme for Environmental Protection (NPC III/2009-2014) that, among other things, consisted of the following aim:"...the maintenance and protection of areas that require rehabilitation of the landscape." The objectives of the National Programme for Environmental Protection within agriculture (NAKP), which was adopted by the Government Regulation 2253/1999, were related to the protection of landscape values as well:

-Retention of rough grassland or abandoned arable land by bringing them into a form of cultural landscapes by extensive forms of business activities

-Development of the tourism potentials of the region and improvement of the ecological landscape and rural tourism.

Regional Plan of West Transdanubian Region (RPWTD) defines the protection of characteristic landscape, maintaining the character of typical landscapes with characteristic landscape crops. The program for environmental management in Western Transdanubia defines two priorities including measures to protect the landscape.

At the beginning of this century, landscape defined categories were misaligned, nor were there unique principles according to which they were defined in the counties having protected landscape areas. Having the insight into several regional spatial plans, it was determined that the defined protected landscape areas did not provide a good basis for the establishment of a unique national landscape territory of valuable landscape areas, because of the lack of unified methodology. When creating a new national spatial plan, a new methodology of defining the national territory of protected landscape areas has been made, this became the basis for the definition of these patches in the physical plans of counties [19].

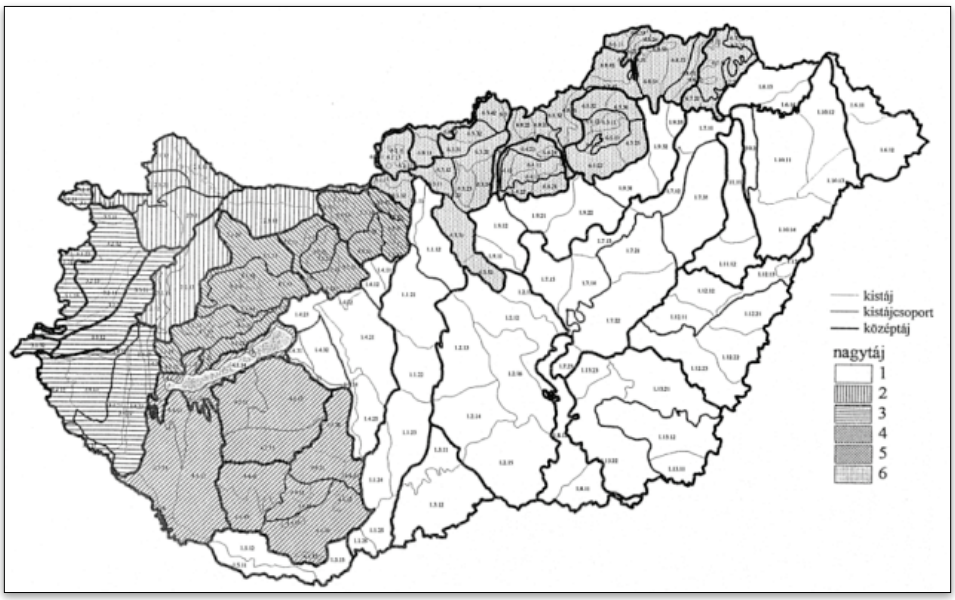

Figure 1 Hungarian landscape typology [20]

The landscape system in Hungary had been made by the Institute of Geographical Research of the Hungarian Academy of Sciences at the end of the last century [20] and in 2010 the system was revised and expanded. Standardization is in a three level form and consists of macro-, mezzo- and micro- types of landscapes, whereas the macro-landscape types retain traditional physical and geographical features (Fig. 1). This system of landscape types is trying to integrate several mutually irreconcilable and contradictory scientific disciplines.

6 Visual research on landscape in Hungary

Within his textbook, Csemez [18] analyses in details the concepts of landscape planning and landscaping. The author defines landscaping planning and landscape designing based on environmental, technical and

economic impacts, and on the aesthetic principles enhancing the physical changes, productivity, space and visual values.

Mezősi [21] was the first one in Hungary to accomplish the evaluation of landscape using GIS. In addition to environmental, social and quantitative methods, he uses a photo-analytical method as well as a measurement of visual absorbing capacity ("Viakom") - the ability to change the landscape despite the fact that some scenery objects remain undetected due to the relief inaccessibility. In determining "Viakom"-the author uses the following indicators: the angle, relative relief, location and size of forest areas [22],[23]. According to Mezősi [21], the combination of the aesthetic values of the landscape and the "Viakom" results in criteria for both, the management strategy of aesthetic resources, and areas for the purposes of rural and regional development.

In the evaluation of landscape aesthetics, Karancsi [24], in his study of landscape aesthetics of space around Medvesa, uses a variety of scientific methods for determining the aesthetic value of the landscape. Starting from Mezősia [21], using a database that relates to changes in land, with a help of a computer graphics program he seeks to visually reconstruct historical landscape paintings, photographs, aero- photos for the period of the last 50-60 years. At the same time, he uses, as data, art paintings, landscape paintings. Thus systematically gathered photographic material is suitable for further research, using quantitative photo-analytical methods.

Within a sociological method, the concept of aesthetic landscape value tends to be objectified. The author, Karancs [24], using a questionnaire, includes residents of the investigated area in the survey, people from other parts of the state and foreign citizens. The study was conducted on a representative sample of 2000 people. The sample of respondents was planned according to the respondents' experiences, with other respondents included, who had not previously observed the landscape. The representativeness of the sample was ensured by the relevance of the results as a landscape evaluating category.

Taking into account the evaluation of physical factors using computer methods (Point Lookout, visibility, accessibility, slope) it is possible to identify the areas that are of a great touristic importance.

According to Csemez [18], and Karancsi [24], the landscape indicators for the evaluation of the environment in Hungary are grouped based on two aspects: on the one hand there are measures of counting and frequency of landscape elements; on the other hand we determine a schedule, location and character of the landscape elements. For the purposes of a quantitative description of landscape elements, internationally accepted indicators are used: (a) biological, physical, an indicator of biodiversity, (b) socio-economic indicators, and (c) an indication of aesthetic landscape, grouped on visual indicators, the effect index and the index of coherence.

7 Common Drava and Mura Rivers landscape

The landscape of Hungary in the regional plans is categorized according to the new categorization of protected landscape areas at the national level. The valleys of the River Drava and the River Mura are situated in the counties of Zala, Somogy and Baranya. The based system of landscape reveals a mezzo-type landscape in the territory of Baranya County: the regions (Drava mente), which consist of landscape micro units: the Drava valley (Drava-sik), The Black water (Fekete-víz) and Nyarad-Harkanj lowlands (Nyárád-Harkányi-sik). The whole course of the Drava River valley is a part of the Drava-Danube Rivers National Park. In the Somogy county, the micro-type landscape represents the "middle Drava River". The Somogy County encounters a micro-type landscape "the middle Drava River", which according to the spatial plan of the County falls into the category of the protected landscape area. The regional plan includes landscape rehabilitation for the following settlements: Gyékényes and Somogyudvarhely, located in the valley of the River Drava. In the county of Zala "valley of the river Mura" (Mura River part) is a landscape micro unit which entirely belongs to the category of "protected landscape districts" [25] [26] [27].

The principle of vertical integration and coordination of the interests promoted by the Regional Planning and Construction Law, (Official Gazette 76/07, Article 11), requires that the terminology and categorization on the national level are both integrated into the level of regional plans of counties. The Croatian border area aiming at Hungarian border, marked by the river Drava and Mura landscapes, includes the following counties: Međimurje county, Koprivnica-Križevci County and Virovitica-Podravina County. All counties' regional plans have a section dealing with landscape protection, although the terms of the landscape and scenery are to be found in some other chapters (cultural heritage, natural heritage, protection of natural values and cultural-historical entities, the rational use of natural resources, preservation of ecological stability and valuable parts of the environment, and others). According to the Croatian landscape regionalization (Spatial Planning Strategy of the Republic of Croatia), the observed cross-border area is a part of the lowland landscape of north-west Croatia, the Drava area (Podravina) and Kalnik -Bilogora - Moslavina area, and according to the visual regionalization (classification by visual experience of a landscape) it belongs to the area of the Mura river valley. The landscape of Međimurje, according to the regional plan, is categorized into several sections:

- Urbanized landscape
- Cultivated landscape of Lower Međimurje
- Cultivated landscape of Upper Međimurje
- Close to nature landscape of the Mura river
- Close to nature landscape of the River Drava (a very small proportion which relates to the old Drava River).

A more detailed land usage of the protected area along the Mura and Drava was planned when creating PPPPO –the Mura and the Drava, later, in further plans, renamed PPPPO the Drava River, and is currently being developed.

In the Koprivnica-Križevci county, in its particularly valuable areas - natural landscapes, the Kalnik Mountain area is highlighted in the County plan, as well as the wider area of the River Drava, including a protected confluence of the Mura, the forest Repaš with the surounding units like ponds and lakes, and the forest area Kolačke and Rasinje, the Bilogora area, the forest area of Križančije, sand surface areas of Đurđevac and the surrounding forest lands and valuable individual smaller localities.

The Spatial Plan of the Virovitica-Podravina County points to the fact that the document cannot define in details the structurally different forms of a landscape. The task is transferred to the lower level of regional plans considering towns / cities, which dictate that it is necessary to define the landscape of the area by its features (natural, cultivated, built landscape).

Published results of the workshop on Natura 2000 from 2009 [27] are significant for the subject interested in the observed area. The results indicate the need for identification of valuable elements within each county, and as a recognized value in all counties are the elements of the landscape of the Drava River.

8 Study instrument and analysis

The purpose of this study was to investigate environmental attitudes on the development of the common area of the Mura and Drava Rivers in the trans-border area of Hungary and Croatia. The research was undertaken with the hypothesis that a large number of respondents, in accordance with their age, would confirm the proecological position of the younger population as confirmed on a global [29] and regional level [30, 13, 14, 15, 31].

Surveys are one of the most common forms of research to reach for collecting cross-cultural attitudes [32, 33, 34]. The methodology is quantitative in sampling, data analysis, and data inference. Answers were quantitatively analysed on a 5-point Likert scale. The research was conducted on a convenience sample which cannot be generalized to the level of culture/nation but it tests the attitude of the young at observed universities.

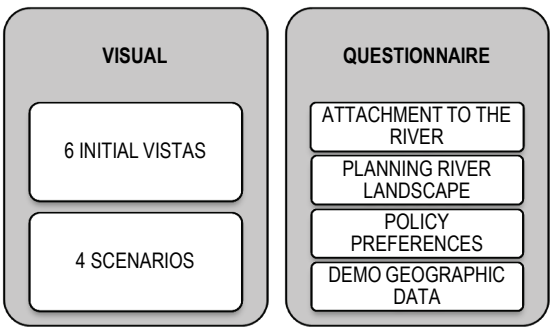

Figure 2 Concept of questionnaire

A structured questionnaire consists of two parts: visual material and written questionnaire (Fig. 2). In the first part there is a visual material displayed representing the original and the modified scenes of the Drava and the Mura Rivers within four scenarios (Fig. 3). The second part of the survey researched a wider system of values related to nature, man, technology and culture, as well as the attitudes on protection and development linked to the river area.

Figure 3 Initial and modified vistas from the Mura and Drava Rivers landscape

Photo shoots of the Drava and Mura Rivers were picked up on the criteria of accessibility [35]. All locations are accessible from roads, unpaved roads, agricultural and fishermen's paths. The vistas selected represent a typical landscape of the Mura and Drava Rivers which does not stand out from other landscapes of lowland rivers.

During selection, special attention was paid to balancing the display of the water body, lack of scenicity, presence of elements, visibility from both river banks, the possibility of implementation of modifying elements (residential, traffic infrastructure and hydro power plants) and the lack of presence of humans and animals in the picture.

The data collected in the survey were analysed by using the methods of descriptive and inferential statistics. A χ^2 test was used for selecting the worst/best scenes as a dichotomous situation. For testing the differences in vista ranking among three groups, Kruskal-Wallis H test was provided.

9 Cross-border sample

A total of 421 students were involved, from three universities – the University on Ljubljana, Slovenia; Kaposvar University, Hungary, and the University of J.J. Strossmayer in Osijek, Croatia. The study explored expected differences among three nationalities but the theme exceeded the scope of this paper. The present study elaborates results from Hungarian and Croatian students. Two included universities lie on the river, Kaposvar on Kapos and Osijek on the Drava River. The number of students from different countries was balanced, 142 from Hungary and 151 Croatian students participated in the survey.

10 Results

10.1 Results for best and worst vistas

The criterion of naturalness as a guiding influence in the evaluation of the scene has been assumed according to what was suggested in previous researches [35, 36, 37]. The assumption that in the planning of new features along water courses (the Mura and the Drava Rivers) the suitability of new phenomena will be dependent on the evaluation of naturalness of the observed location has not been confirmed. The hypothesis was disproved by the fact that the maximum influence was more acceptable in a completely natural environment than in the area where there was already a pedestrian bridge. In the case of the scene with a beach with a water slide, a mill or a ferry as indicators of minor human impact (*visible stewardship*) the transformation of the area into the Energy production Scenario was ranked the lowest (Tab. 1).

The evaluation of the best and the worst images was conceived in the manner that the students evaluated all images simultaneously and selected the best and the worst by inspecting all thirty images. The students saw all photos on two occasions, when they were projected on the wall at the beginning and at the end of the introduction to the survey. There were put six sheets of paper in the A4 format in order, one next to the other, for a total display of all images.

Table 1 Ranking of Scenarios according to mean scores

	Original Vista	Restoration	Outdoor Recreation and Tourism	Settlement	Energy Production
No Human Impact	2	1	3	4	5
Visible Stewardship	3	1	2	4	5
Scene with National Slovenian and Croatian Cultural Heritage	1	3	2	4	5
Dominant Human Impact	4	1	3	2	5
Summary of rankings	**10**	**6**	**10**	**14**	**20**

Ranking 1(best) to 5 (worst)

They had to choose the three best and the three worst solutions for the observed areas. The next evaluation of the images was done by ranking the scenarios in the frame of the modification of the original vista. An A4 sheet displayed the scenarios in the following order: original vista, Scenario Restoration, Outdoor recreation and Tourism, Settlement Scenario and Energy production Scenario. The ranking instrument was chosen because of the expected small range of grades between the scenarios where the variables were altered to a smaller degree. Statistically significant differences are found in 11 out of 30 of the first images for the best vista and in 9 for the worst vista (Tab. 2).

From an overview of the percentages (Tab. 3) we can see that the Croatian cluster of respondents selected for the most parts those vistas in which recreation and tourism by the mill on the Mura were displayed, whereas Hungarian respondents did not select this image among the first three (Tab. 4).

Table 2 Overview of the three best Vistas by groups of Hungarian and Croatian students

The best Vista						
Nation		%		%		%
HU	1A	11,7	3A	10,9	2A / 4A	9,5
HR	3B	14,2	1A	7,6	2B	7,2

A difference appears with the selection of the worst scene. The Hungarian respondents selected it by the highest frequency (15,8 %). The greatest difference was expressed for scene 4A (the Renaturation Scenario/Beach

on Mura Confluence) in the set of the best and for the scene 1D (the Energy Production Scenario /Total Nature).

Table 3 Overview of the three worst Vistas by groups of Hungarian and Croatian students

The worst Vista						
Nation		%		%		%
HU	4D	15,8	3D	10,9	6D	10,0
HR	4D	13,8	1D	13,0	2D	11,7

The responses of the Hungarian respondents stand out; their choice of the best scenes is as a rule the scenario of renaturalization. The Hungarian respondents linked the transformation of the environment as desirable with the notion of birds, non-presence of humans, non-existence of infrastructure, appearance of river plants, low greenery and extending the river edge for possible retention.

10.2 Results for vista ranking

Ranking results for six sets with five vistas differ for the national groups in most vistas.

However, differences do not appear for the Energy Production Scenario in either of the variants. There is a consensus on ranking all the scenes with the hydropower plant. There is also no difference with the Restoration/ Total Nature, Origin Vista/Mill on the Mura and Settlement/Pedestrian Bridge Križnica. Statistically the most significant difference can be found for the Restoration/Pedestrian bridge Križnica vista.

The Croatian respondents awarded this radical spatial move in most of the cases (58,0 %) a better rank (1 or 2), whereas the Hungarians to a lower degree (22,6 %).

By comparing mean scores acquired according to the ranks, the Hungarian students ranked the Restoration Scenario to the first place in all sets. The Croatian cluster chose most frequently the Outdoor Recreation and Tourism Scenario as the first.

10.3 Results on frequency of visiting river area

Imposing the framework *Attachment to the river*, the second stage of the result analysis attempted to identify different groups of respondents in relation to their interaction to the river landscape and their behaviour in it. Correlations on the total sample are provided for the frequency of visiting the river in Tab. 4.

The connection of the visits to the river landscape is expressed for 18 out of 38 items related to the framework Environmental orientation, and 4 out of 16 for the framework Policy preferences. Lower frequency of visits to the river is positively correlated to the items defining environmental orientation Anthropocentric-egoistic, negatively correlated to one Ecocentric item and negatively correlated to two Anthropocentric altruistic items according to Shultz and Zelezny [38] definition of socio environmental orientations. According to Buijs [39], the frequency of being beside the river is also a factor that affects the formation of attitudes about the image of the river, which is a part of shaping the attitude towards the observed landscape. Differences in the frequency of visiting the river landscape is most expressed in the case of national grouping of respondents (χ^2=91,114; p=0,000).

The Hungarian sample visits the river less frequently in a daily or everyday rhythm, while the Croatian respondents visit it more frequently (Fig. 4).

Table 4 Spearman Rho correlation between frequency of the visits to the river landscape and other statements in the instrument

Questionnaire Item	Correlation coefficient	Sig. (2-tailed)	*N*
I visit the river more frequently because of taking walks	,695**	,000	418
I visit the river more frequently because of sports	,373**	,000	416
I visit the river more frequently because of education	,244**	,000	409
I visit the river more frequently because of spending time in a cottage	,182**	,000	417
Building of hydroelectric power plants is important for the development of the river area	,257**	,000	393
Gravel excavating is important for the development of the river area	,199**	,000	391
Arranged environment is important for planning the purposes in the river area	,213**	,000	414
Flood protection is important for planning the purpose in the river area	,181**	,000	418
Floods should be fought by concrete embankments and fortifications	,171**	,001	403
Floods should be fought by bank extensions and digging of river armlets	,144**	,004	404
Floods should be fought by creating lakes and hydroelectric power plants	,219**	,000	398
Hydroelectric power plant looks attractive by the river	,209**	,000	409

**. Correlation is significant at the 0,01 level (2-tailed).
*. Correlation is significant at the 0,05 level (2-tailed).

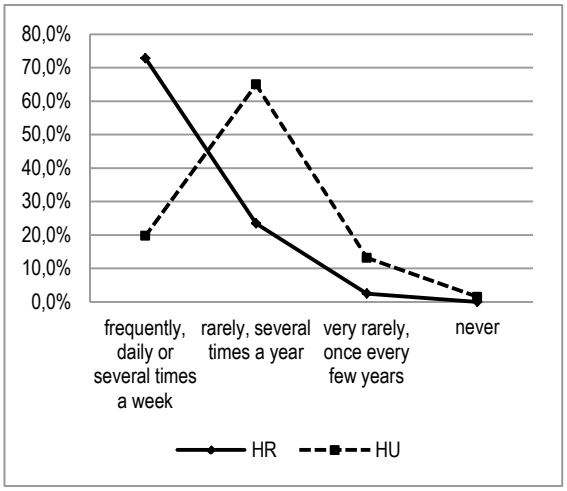

Figure 4 Frequency of visits to the river area by Hungarian and Croatian students

That corresponds to the characters of the area along the rivers Drava and Kapos, which were mentioned as the last river the respondents visited in the majority of cases. The Drava River in Osijek is a town river, from one side connected to the town area, on the other to the recreational area. The Kapos is a river at the town periphery which does not connect to its existence either recreation or designed nature.

11 Discussion and conclusion

Water landscapes are preferred to all landscapes due to their scenic beauty and, on the other side are in the focus due to a large pressure on ecosystems. Young participants of the total sample prefer river areas more than other natural landscapes and show pro-environmental position toward the transformation of river landscapes. The transformation of river landscapes explored by visual stimuli shows that the respondents tend to rate landscapes with moderate human influence as "more vulnerable" than those of complete nature scenes. It was shown that the presence of one element carrying an emotion may influence the value system of acceptability of a new human influence in the river area. It can also be assumed that different character of rivers in Kaposvar and Osijek also affected responses according to results in attachment to the river frame. This research shows that the complexity of researching landscape, of individual and social values must be applied in the process of planning and decision making as well.

The results of the visual part of the questionnaire indicate that the Drava and Mura landscape should be categorized not only as natural, cultured and anthropogenic, but also according to perceived symbolic values. This survey, according to the differences in the evaluation of a river landscape of the Mill on the Mura, confirmed the need for a cross-cultural discourse study of the mutual natural area including differentiations on innovation culture to neighbouring transition countries [40].

Water management and spatial planning should find a way to join cultural, global environmental, territorial and legislative discourses in order to respond to a global task of sustainability of natural resources. A long-term dimension of the strategic plan should satisfy global aspirations for resource sustainability whereas short-term actions should respond to potential conflicts of stakeholders or to environmental shock events.

12 Literature

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