

Public perception of river naturalness: insights for education and social support of river restoration efforts

Perception publique du caractère naturel des rivières : perspectives pour l'éducation et le soutien social des efforts de restauration des rivières

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RÉSUMÉ

La dégradation des cours d'eau en Europe est évidente pour les scientifiques mais peut ne pas être aussi bien comprise par tous les membres du public, dont le soutien se limite à la restauration des cours d'eau. Nous avons utilisé un questionnaire photo avec des images de rivières modifiées et non modifiées dans les Carpates polonaises pour étudier la perception du caractère naturel des rivières auprès de 174 étudiants en sciences naturelles et non naturelles. Nous avons vérifié si les différences entre les rivières modifiées et non modifiées sont perceptibles en termes de naturalité fluviale perçue, de nécessité d'une intervention humaine et de sécurité fluviale, et si cette perception est affectée par les connaissances académiques. Nous avons également contrôlé d'autres variables pouvant affecter la perception de la rivière (par exemple, l'expérience d'une catastrophe liée à la rivière, le temps passé sur la rivière). Les différences entre les rivières modifiées et non modifiées ont été reconnues par les répondants indépendamment de leur discipline. Les étudiants en sciences naturelles ont estimé que les cours d'eau non modifiés étaient moins sûrs que les étudiants n'ayant aucune formation sur les cours d'eau, mais étaient moins enclins à réduire le risque perçu par une intervention humaine (modification de la rivière). Bien qu'il y ait eu une forte corrélation entre l'esthétique et la naturalité perçue, la nécessité d'une intervention humaine sur les rivières est demeurée relativement élevée. Comme des modifications encore moins visibles des cours d'eau sont évidentes pour les non-spécialistes, le manque de reconnaissance du caractère naturel d'un cours d'eau ne semble pas être un facteur limitant le soutien public à la restauration des cours d'eau.

ABSTRACT

Degradation of rivers in Europe is evident to scientists but may not be equally understood by members of the public limiting their support for river restoration. We used a photo-questionnaire with images of modified and unmodified rivers in the Polish Carpathians to investigate the perception of river naturalness among 174 students of natural and non-natural sciences. We checked if the differences between modified and unmodified rivers are discernible in terms of perceived river naturalness, need for human intervention, and river safety, and if this perception is affected by academic knowledge. We also controlled for other variables that may affect river perception (e.g. experience of river-related disaster, time spent on the river). Differences between modified and unmodified rivers were recognized by respondents regardless of discipline. Students of natural sciences perceived unmodified rivers as less safe than students with no training about rivers but were less inclined to reduce the perceived hazard with human intervention (river modification). Although aesthetics and perceived naturalness were highly correlated, the need for human intervention in rivers remained relatively high. As even less conspicuous river modifications are apparent to non-experts, the lack of recognition of river naturalness does not seem to be a factor limiting public support of river restoration.

KEYWORDS

Public perception, river management, river naturalness, river restoration

1 INTRODUCTION

Significant transformation of rivers in Europe and the need for their restoration is evident to scientists and increasingly also to river managers but it is not equally understood among members of the public, which may limit their support for restoring natural river form and dynamics. Although the concepts and definitions of reference conditions are debated, they nevertheless provide restoration designers with a consistent set of desirable characteristics to be achieved as a result of river restoration. However, members of the public who are asked or expected to support restoration activities have no such precise template: the expectations of a desirable river appearance may be based on a range of factors including aesthetic preferences, personal experience, memories or even romanticized nineteenth century images of rivers present in art and literature. Indeed, public perception of landscapes and of rivers with high ecological value has been shown to differ from that based on the expert knowledge (Cockerill 2016).

Because of the long history, extent and persistence of human-induced changes to river channels their artificial form or technical structures have become permanent elements of present-day riverscapes and may no longer be perceived by non-experts as introduced or unnatural. This can be particularly true in mountain areas which are commonly considered pristine but where majority of watercourses have been altered (cf. Gregory 2006). Such situation occurs in the Polish Carpathians which are commonly associated with scenic beauty and protected areas but where rivers are significantly changed as a result of channelization, gravel-mining and incision that exceeded 3 m over the twentieth century. Also, as systematic maintenance of many channelization schemes has been abandoned, local river self-recovery and encroachment of riparian vegetation may give these rivers the appearance of naturalness, masking their actual ecological state and, in the absence of expert knowledge, deem restoration unnecessary.

Thus, in this study we investigated the perception of river naturalness among university students to understand if the differences between modified and unmodified rivers are discernible in terms of the perceived naturalness of the river, the need for human intervention, and river safety, and if this perception is affected by knowledge derived from university training. When addressing this question, we controlled for other variables that may affect the perception of rivers (e.g., the experience of river-related disaster, the amount of leisure time spent on the river).

2 STUDY DESIGN

To assess the perception of river naturalness and the potential influence of academic knowledge on this perception, a total of 174 students belonging to two distinct groups: natural science students (n=87) and non-natural science students (n=87) were presented with a photo-questionnaire containing a set of six photographs of either modified or unmodified rivers. The photos were chosen from a pool of 150 images of three gravel-bed Carpathian rivers (the Czarny Dunajec, the Dunajec and the Biała Tarnowska) in a two-step procedure: selection using pre-defined criteria was followed by evaluation of nine independent judges (experts in river science). To counteract carryover effects from one experimental condition to another participants were randomly assigned to see pictures of either modified rivers or unmodified rivers. This resulted in a 2 (Field of study: natural science students, non-natural science students) x 2 (River type: modified, unmodified) between-subjects study design. Each photo was rated on nine 100-point slider scales referring to the naturalness of the river, riparian area and vegetation, land use, river aesthetics and safety and need for intervention and repair. This section was followed by a short quiz evaluating respondents' essential knowledge on the hydromorphology of Carpathian rivers (further referred to as "river knowledge") and a personal questionnaire (collecting data on gender, gender, discipline, the amount of leisure time they usually spend on the river, and their favourite riverside activities).

3. RESULTS

As expected, a 2 (Field of study: natural science students, non-natural science students) x 2 (River type: modified, unmodified) between-subjects analysis of variance (ANOVA), confirmed that the two groups of students differed in terms of river knowledge. Natural science students scored higher in the

quiz ($M = 1.75$; $SD = .89$) than non-natural science students ($M = 1.25$; $SD = 1.02$). Of importance, the groups did not differ in other variables potentially affecting the perception of the rivers.

Based on the results of factor analysis and Cronbach's alpha coefficients, we identified three dimensions of river perception: (1) river naturalness, (2) river safety, and (3) the need for human intervention. A 2 (Field of study) x 2 (River type) ANOVA, with *river naturalness* as a dependent variable, revealed a significant main effect of River type, indicating that participants presented with the images of unmodified rivers rated them as more natural ($M = 67.32$; $SD = 12.71$) than participants presented with the images of modified rivers ($M = 53.27$; $SD = 9.99$). The two remaining effects were non-significant, which suggested that participants' perception of the rivers did not depend on river knowledge. A similar 2 x 2 ANOVA, with *river safety* as a depended variable, showed a significant main effect of the Field of study, as well as a significant interaction between the Field of study and River type. Non-natural sciences students rated unmodified rivers as safer ($M = 58.23$; $SD = 19.68$) than natural sciences students but both groups did not differ in their ratings of the safety of modified rivers (see Figure 1). The last 2 x 2 ANOVA, with *the need for human intervention* as a depended variable, revealed a significant main effect of the Field of study. A main effect of River type and an interaction between the Field of study and River type did not reach significance. In general, non-natural sciences students rated the need for human intervention as higher ($M = 47.09$; $SD = 16.75$) than natural science students ($M = 42.36$; $SD = 15.39$), regardless of whether that were exposed to images of modified or unmodified rivers.

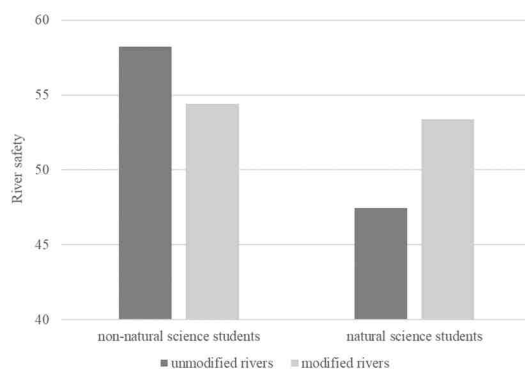


Figure 1. Participants' ratings of River safety as a function of the Field of study and River type

3 CONCLUSIONS

This study has shown that despite the 'hybrid' appearance of Polish Carpathian rivers, their modification or naturalness were clearly distinguished by respondents regardless of their academic discipline. Although aesthetics and perceived naturalness were highly correlated, the need for human intervention in rivers remained relatively high. Interestingly, students of natural sciences perceived unmodified rivers as less safe than students with no training about rivers but were less inclined to reduce the perceived hazard with human intervention (further river modification). This suggests that even relatively limited but professional training may be sufficient to change attitudes toward river management among non-experts. As even less conspicuous river modifications are apparent to non-experts, the lack of recognition of river naturalness does not seem to be a factor limiting public support of river restoration.

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