

The role of project components for the acceptance of an inner city river restoration project in Bad Bergzabern, Germany

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ABSTRACT

The poor conditions of rivers worldwide make restoration an issue of great importance and urgency. The acceptance of restoration by society is crucial, however, the factors determining such acceptance are still poorly understood. In particular, the understanding of the complex interplay between the acceptance or rejection of specific project components and the acceptance of the overall project require further exploration. To address this research gap, we analyze a restoration project in Bad Bergzabern, Germany to (1) investigate the acceptance of the overall project and its components, and (2) explore why people accept or reject specific components. Three hundred and twenty-one in-person interviews were conducted and the factors of acceptance were analyzed using logistic regression. Our findings show that while acceptance of the overall project is generally high, many respondents reject one or more project components. Complementary social project components, like a playground, find less support than purely ecological components. Overall, our research shows that differences in the acceptance of components depend on individual concerns, the quality of communication, attachment to the site, and age. Our results contribute to a better understanding of preferences for river restoration projects and help water managers design restoration projects that are highly accepted by society.

Key words: Acceptance, Acceptance factors, Concerns, River management, Urban river restoration, Water Framework Directive

HIGHLIGHTS

- To increase the acceptance of WFD objectives and thus accelerate implementation, public concerns need to be taken seriously.
- Social project components add value for the population, but also lead to new concerns that can jeopardize the acceptance of river restoration projects.
- Cost and flood concerns are partly based on wrong assumptions and needlessly lower the acceptance of river restoration projects.

1. INTRODUCTION

Rivers fulfill a wide range of functions in cultural landscapes and are, thus, of great importance to people worldwide (MEA, 2005; Everard & Moggridge, 2012; United Nations, 2021). However, many rivers are in poor condition. In Europe, only 41% of them have a good status; in Germany, this applies to only 7% of rivers

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(European Environmental Agency, 2018). Progress in improving the quality of water bodies, especially in urban areas, has been rather slow to date (Palmer *et al.*, 2014), and urban rivers are often much more degraded than rivers in rural areas (Klein, 1979; Paul & Meyer, 2001; Gurnell *et al.*, 2007). In order to improve this situation, the European Union introduced the Water Framework Directive (WFD) in 2000. The WFD replaced the previous policy instruments of the EU member states, which until then had focused on individual emissions, and instead, created a framework focusing on water bodies within and across the states (Voulvoulis *et al.*, 2017). The WFD requires member states to prevent the deterioration of the status of their water bodies (inland surface waters, transitional waters, coastal waters, and groundwater), to protect them, and to make them reach good ecological status by 2027 at the latest (European Parliament, 2014). Billions of euros are invested annually into the restoration of water bodies (Bernhardt *et al.*, 2005), yet it is still not clear when the EU targets will be achieved.

Though it might be easier for planners to focus on the natural functions of water bodies when designing restoration projects, such projects can only be successful with the support of the wider population (Eden & Tunstall, 2006; Reichert *et al.*, 2007). While the acceptance of restoration projects seems relatively high, this can vary between projects (Eden & Tunstall, 2006; Buijs, 2009; Åberg & Tapsell, 2013; Marttila *et al.*, 2016). Nonetheless, a high level of acceptance is not necessarily sufficient, as even smaller groups can cause project failure or delays (Schively, 2007; Kondolf & Yang, 2008). A wide acceptance of restoration projects is thus critically important and should be considered during planning and implementation (Miller & Hobbs, 2007; Deffner & Haase, 2018).

To this end, several authors call for ecological measures to be complemented by social ones (Asakawa *et al.*, 2004; Palmer *et al.*, 2005). Social measures can be, for example, a playground or other infrastructural improvements, which are expected to increase the value of the project. The social component of river restoration is of particular interest in urban areas (Deason *et al.*, 2010; Kondolf & Pinto, 2017). This is partly because the ecological potential of urban water bodies is often rather low due to their severe degradation (Kondolf & Yang, 2008), but also because of the many different uses of water bodies for the urban population (Kondolf & Pinto, 2017). Accordingly, social measures can maximize the added value of restoration projects, especially within cities. However, it is obvious that complementary social measures are not welcomed by everybody and can, in fact, have a negative impact on the overall acceptance of projects. Therefore, for future restoration projects, it is important to understand how the different components of a project contribute to the acceptance of the overall project.

Wüstenhagen *et al.* (2007) define three dimensions of acceptance: socio-political, market, and community acceptance. Since river restoration projects are mostly small-scale projects where the acceptance of the local population is crucial, we focus on community acceptance. According to Becker *et al.* (2021), community acceptance is a function of (1) the perceived costs and benefits of a project, (2) perceived procedural and distributional justice and trust, (3) landscape change, place attachment, and identity, (4) ownership structure, and (5) other contextual factors. These five factors are also relevant for river restoration projects and the associated ecological and social measures. While the focus of river restoration projects is usually on the benefits of restored natural functions, ecological but more so social measures can lead to non-environmental benefits in the areas of recreation, aesthetics, education, and urban development (MEA, 2005; Eden & Tunstall, 2006; Findlay & Taylor, 2006; Åberg & Tapsell, 2013). These benefits often have a particularly high value for the population (Findlay & Taylor, 2006; Bae, 2011; Marttila *et al.*, 2016). On the other hand, river restoration projects may also be associated with costs or risks for the population. Several studies have highlighted the diversity of public concerns relating to restoration projects (Eden & Tunstall, 2006; Buijs, 2009; Seidl & Stauffacher, 2013; Weber & Ringold, 2015; Fox *et al.*, 2016; Deffner & Haase, 2018). Such concerns range from potential danger to small children and negative impacts on agriculture to concerns about flood protection impacts and costs (Eden & Tunstall, 2006; Deffner & Haase, 2018). Consequently, the design and implementation of a river restoration project and its associated costs and benefits can also determine whether the project is perceived as just by the population and whether people trust decision-makers. Moreover, research

suggests that public participation can increase the degree of project acceptance (Åberg & Tapsell, 2013; Deffner & Haase, 2018). In this sense, it is positive that the WFD already requires the public's active involvement in all measures affecting water bodies (European Parliament, 2014). However, it is evident that the different perceptions of planners, on the one hand, and the general public, on the other, still represent one of the greatest challenges to the implementation of such measures (Eden & Tunstall, 2006). One reason for this is that the level of public participation is still rather low (Szalkiewicz *et al.*, 2018). Furthermore, river restoration projects can transform the landscape and the identity of a place, especially within cities. Many rivers in urban areas currently flow underground and have thus become invisible to the public. The restoration of these areas would lead to a significant increase in the presence and importance of rivers in inner-city areas, thereby also challenging the attachment that people have with these areas. As Åberg & Tapsell (2013) have already shown, large changes resulting from river restoration are often perceived negatively by the population. Another factor influencing acceptance is the ownership of the land needed for restoration. Since many of the required areas are privately owned, the implementation of restoration measures can be difficult. Finally, the acceptance of river restoration also depends on the socio-economic, political, and geographical conditions of the site. Since the factor of ownership of the needed land relates primarily to the acceptance by individuals, the acceptance by the general population depends primarily on the other four factors. It is, therefore, plausible that in situations where ecological and social measures are combined, these acceptance factors for river restoration projects are particularly diverse. Understanding acceptance as a function of the relevant four factors highlights the urgent need for comprehension of their interrelations in order to develop accepted and efficient restoration projects and project components.

Few studies that analyze this relationship quantitatively exist. While many studies identify preferences for different components of restoration projects (Brouwer *et al.*, 2016; Chen *et al.*, 2017; Logar *et al.*, 2019), very few compare the acceptability of the single project components. de Groot & de Groot (2009) assessed the acceptance of various flood control measures in the Netherlands and attempted to explain it in terms of attachment, contextual factors, and other variables. However, there are a few examples of studies that examine the effects on individual river restoration projects. Buijs (2009) explored, among other things, how perceived costs and attachment to a place are related to project rejection, and Åberg & Tapsell (2013) investigated the positive and negative effects of aesthetic aspects on the level of satisfaction with a project. Although these studies provide information about the importance of individual acceptance factors, their relevance in relation to various and diverse components of a restoration project is rather low.

In this study, we address this knowledge gap by analyzing the acceptance of different ecological and social components of a river restoration project in the city of Bad Bergzabern (Germany). We employ the framework by Becker *et al.* (2021) by focusing on the four acceptance factors that were identified to be relevant for the general population. The two objectives of the study are the following: (1) to investigate the acceptability of a project and its components and (2) to explore interrelations between factors that explain the acceptance of project components.

The analysis is based on a face-to-face household survey of a final plan of a river restoration project in Bad Bergzabern that includes both ecological and social measures. Regression analysis is used to examine the influence of the surveyed factors on the acceptance of the individual project components. The results of the analysis can be used to derive recommendations for urban planners and decision-makers aiming to reduce acceptance problems in river restoration projects in the future and, thus, support more efficient implementation of the urgent objectives of the WFD.

2. MATERIALS AND METHODS

Based on the factors of acceptance identified by Becker *et al.* (2021), we derived a simple conceptual framework of the causal relationship of project acceptance (Figure 1). We expected that the overall project acceptance would

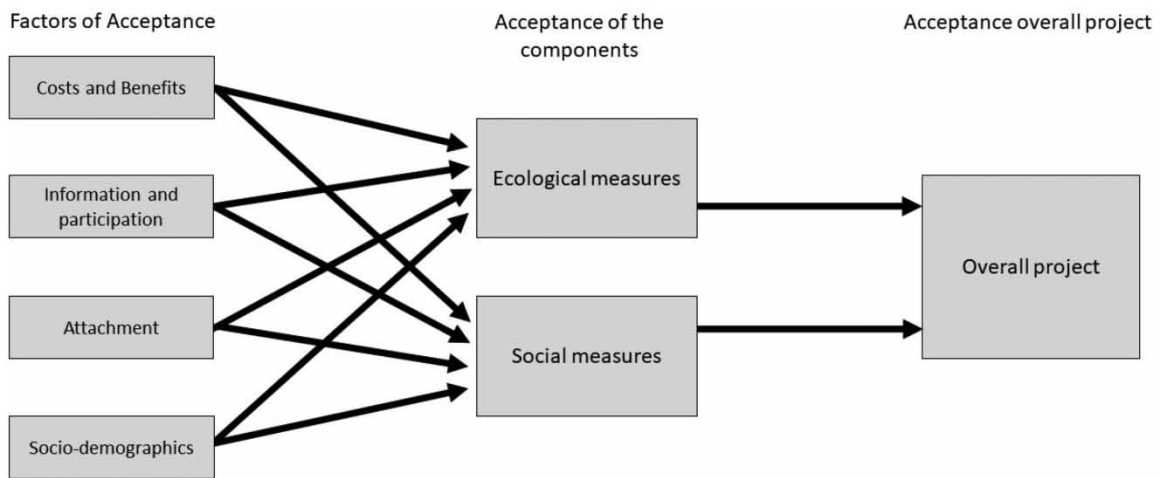


Fig. 1 | The causal model of the research, building on [Becker et al. \(2021\)](#).

result from the acceptance of its components (i.e. the ecological and social measures), and, in turn, that the acceptance of those components would result from the factors identified by [Becker et al. \(2021\)](#). The four factors considered were perceived *costs and benefits* (concerns) of the components, *information and participation* that took place, *attachment* of the population to the site that is affected, and *socio-demographic* factors. In this study, the *costs and benefits* factor represents the *concerns* that exist about the project, as these are of particular relevance for the implementation of projects. We hypothesized that the overall project acceptance would be increased by complementary social measures and that the factors explaining the acceptance of the project components would differ between the components of the project.

2.1. The restoration project

This study was based on the reopening and restoration of the river Erlenbach in Bad Bergzabern. Bad Bergzabern is located at the western edge of the Upper Rhine Plain in Rhineland-Palatinate, Germany, and has about 8,000 inhabitants; the municipality of Bad Bergzabern has a total of 24,000 inhabitants. The river Erlenbach originates in the Palatinate Forest and runs through Bad Bergzabern in an easterly direction and mostly in an underground tunnel. In the western part of the city, it was planned to improve the ecological condition of the stream by reopening it over a stretch of about 800 m and restoring the area. The area can be divided into four sections ([Figure 2](#)). From east to west, the reopening is to take place in the town's spa park (a), in an adjacent parking lot (b), on the site of a hotel (c), and in a currently derelict area (d). The reopening in the spa park is the central part of the restoration project where a new playground will be built (e). The hotel area was not considered further in this research project, as it is not a public area. For the analysis of acceptance, we considered four components, two ecological ones and two social ones. The two ecological components are (a) reopening and restoration of the Erlenbach in the spa park (*reopening in the spa park*) and (d) reopening and restoration of the Erlenbach on a brownfield site (*natural stream section*). The two social components were the following: (b) reopening of the Erlenbach in the parking lot and the associated redesign (*reopening with a redesign of the parking lot*) and (e) construction of a playground in the spa park (*playground*). The parking lot measure was classified as a social measure since it needed to respect the current use, and therefore, the ecological potential of the measure was moderate.

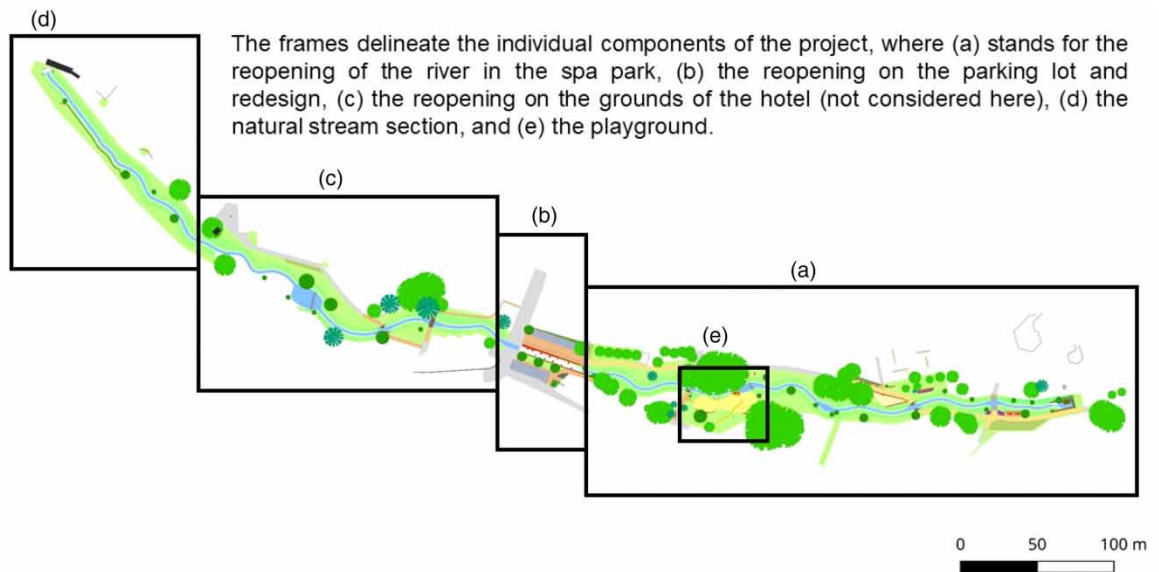


Fig. 2 | Restoration project.

2.2. Sample and data collection

For this study, 321 people in the municipality of Bad Bergzabern were interviewed in person in June 2018 using a standardized questionnaire. In addition to the city of Bad Bergzabern, all villages of the municipality close to the city (Dörrenbach, Gleiszellen-Gleishorbach, Kapellen-Drusweiler, Oberhausen, Oberotterbach, Pleisweiler-Oberhofen) were surveyed. On average, 2.4% of the population of each village were interviewed. The survey was part of a comprehensive study of the restoration project in Bad Bergzabern.

The sample was selected in three steps. First, the planned number of interviews was distributed proportionally among the villages. These interviews were then assigned to the individual streets of the localities in proportion to the number of inhabitants of each street. Finally, individual households were selected using the ‘random walk’ method (Häder, 2019). Interviews were conducted by trained students and lasted an average of 28 min. The participation rate was approximately 36%. Of the 321 people interviewed, only 275 provided complete information on the acceptance of all four components. In the following, we consider this subsample of 275 as the full sample.

2.2.1. Data analysis

Statistical analysis of the data was performed using the IBM SPSS Statistics software (version 25.0.0.1) and comprises three parts. In order to keep the dataset as large as possible, different sub-samples were used for different analyses. The specific subsample size was determined by the number of questionnaires with complete data for the variables used.

The first analysis examined the acceptance of the four components (Table 1). For this purpose, we identified groups of equal preference present in the surveyed population on the basis of the acceptance of the components. This analysis was based on the full sample of 275 interviews; these contained complete responses for all four components.

The second analysis explored the identified groups with respect to the level of acceptance of the overall project (Table 1). This comparison was based on a subsample of 188 interviews out of the 275; these respondents were

Table 1 | Acceptance of the components and the overall project.

Cluster	Components ¹					Overall project ²		
	Sample (N / %)	Reopening in the spa park	Natural stream section	Reopening with redesign of parking lot	Playground	Number of respondents who also evaluated the overall project (N)	Acceptance overall project per cluster (%)	Proportion of rejections of the cluster to rejections of the overall project (%)
1	159 / 57.8	Acceptance	Acceptance	Acceptance	Acceptance	93	94.6	10.6
2	29 / 10.5	Rejection	Acceptance	Rejection	Acceptance	23	95.7	2.1
3	21 / 7.6	Acceptance	Acceptance	Acceptance	Rejection	16	87.5	4.3
4	14 / 5.1	Rejection	Acceptance	Acceptance	Acceptance	11	78.6	17.0
5	12 / 4.4	Acceptance	Acceptance	Rejection	Rejection	10	80.0	4.3
6	9 / 3.3	Rejection	Rejection	Acceptance	Rejection	7	0.0	14.9
7	8 / 2.9	Rejection	Acceptance	Acceptance	Rejection	8	0.0	17.0
8	6 / 2.2	Rejection	Rejection	Rejection	Acceptance	6	16.7	10.6
9	4 / 1.5	Rejection	Acceptance	Rejection	Rejection	4	15.0	6.4
10	4 / 1.5	Acceptance	Rejection	Acceptance	Acceptance	3	66.7	2.1
11	4 / 1.5	Rejection	Rejection	Rejection	Acceptance	4	25.0	6.4
12	2 / 0.7	Rejection	Rejection	Acceptance	Acceptance	1	0.0	2.1
13	2 / 0.7	Acceptance	Rejection	Rejection	Acceptance	1	0.0	2.1
14	1 / 0.4	Acceptance	Rejection	Acceptance	Rejection	1	100	0.0
Total (%)		83	92	76	80		75.0	100
N	275					188		

Acceptance
Rejection

¹Grouping of acceptance for the individual components (full sample).

²Acceptance for the overall project and proportion of rejections of the clusters in relation to the rejections of the overall project (subsample 1).

aware of the project from the beginning of the interview and were asked the question about the overall acceptance (subsample 1).

The third analysis examined how the acceptance of the different measures can be explained (Table 2). This analysis was based on a subsample of 209 interviews from the full dataset of 275 interviews, as the analysis required complete answers for all explanatory variables. In the first step, a backward stepwise binary logistic regression was run for all four components to identify the variables that were best suited to explain the acceptance of the respective components (dependent variable in the corresponding model). In the second step, a binary logistic regression model was run for each component, including the previously identified influential variables (subsample 2). The binary logistic regression was chosen due to the nominal/ordinal scale of the variables.

2.2.2. The variables

The first two analyses were based on four variables on the acceptance of the single components of the project and one variable on the acceptance of the overall project. The third analysis was based on the four variables for the acceptance of the project components and, additionally, explanatory variables on the acceptance factors presented earlier.

Table 2 | Results of the four final binary logistic regression models for the four components examined^a.

Category	Explanatory variables	Reopening in the spa park		Natural stream section		Reopening with redesign of parking lot		Playground	
		Sig	OR	Sig	OR	Sig	OR	Sig	OR
Concerns (costs and benefits)	Construction noise								
	Restriction due to construction								
	Noise of playground					0.009	2.34	0.000	16.33
	Littering							0.001	4.85
	Flood risk	0.020	3.33	0.000	13.43				
	Conflicts of use								
	Running costs								
	Insufficient water								
	Restriction of use								
Information and participation	High cost	0.020	6.58	0.997	/			0.052	3.93
	Project known	0.014	8.45						
	Citizen participation			0.074	/				
Attachment	Communication	0.006	3.83	0.065	/				
	Status quo								
Socio-demographics	'Partially true'	0.932	/	0.244	/	0.224	/	0.078	/
	'Fully true'	0.000	10.00	0.216	/	0.059	2.13	0.418	/
Nagelkerke's R ²	Age	0.054	1.029					0.001	1.06
	Gender	0.091	/						
		0.445		0.413		0.105		0.511	

^aFor each model, only those explanatory variables are considered that were previously identified as most suitable to explain the acceptance of the respective component. For the explanatory variables, both the significance (Sig) and the odds ratio (OR) are given. Nagelkerke's R^2 indicates the effect size for each model (Nagelkerke, 1991). According to Backhaus (2003), a value of >0.2 is considered a small effect, >0.4 as a medium effect, and >0.5 as a large effect.

The survey differentiated between participants who had already been aware of the project and those who encountered the project during the survey for the first time. Only those respondents who stated they were aware of the project were asked about their acceptance of it as a whole. The single components were then presented in detail to all respondents to survey their acceptance of these components. This sequence was intended to ensure an evaluation of the overall project that was as unbiased as possible. This meant that respondents who were not familiar with the project were not asked about their acceptance of the project as a whole, which reduced the sample suitable for the second analysis.

In order to determine the acceptance of the overall project, respondents were asked about their position toward the project. The response categories were very good, quite okay, do not care, and reject. A project was defined as acceptable if the respondents found it very good, quite okay, or did not care, and not acceptable if the respondents rejected the project.

The acceptance of the four components – *reopening in the spa park*, *natural stream section*, *reopening with a redesign of the parking lot*, and *the playground* – was assessed by asking respondents how useful they considered each component. They could rate the component as useful, somewhat useful, somewhat useless, or useless. Subsequently, a component was understood to be accepted if it was considered useful or somewhat useful, and not accepted if it was classified as somewhat useless or useless.

A total of 16 explanatory variables, related to four acceptance factors, were collected: perceived concerns (perceived *costs and benefits*), *information and participation* (perceived procedural and distributional justice),

attachment (landscape change, place attachment, and identity), and *socio-demographics* (contextual factors). An overview of the questions can be found in the Supplementary data, Annex 1.

Since restoration measures are associated with many concerns (Eden & Tunstall, 2006; Buijs, 2009; Seidl & Stauffacher, 2013; Weber & Ringold, 2015; Fox *et al.*, 2016; Deffner & Haase, 2018), we evaluated the relevance of 10 concerns that were raised in the lead-up to the survey at informational meetings held by the city about the proposed project. The corresponding question was ‘Some citizens have expressed the following concerns. Do you personally think they are justified?’ With regard to information and participation of the population, three variables were considered: awareness of the project, participation, and communication about the project. The influence of people’s attachment to the area was considered in terms of the question of whether the spa park should remain as it is (the response categories were fully true, partially true, and does not apply). Additionally, two socio-demographic variables, age and gender, were surveyed.

3. RESULTS

The sample was largely representative regarding gender of respondents (sample = 48.4% men; municipality = 47.6% men), while older persons were slightly overrepresented. The average age of the sample was 57.2 years, which was just above the average age of 52 years in the municipality of Bad Bergzabern.

For the full sample, the survey showed a high level of acceptance of the components examined. The *natural stream section* received the highest acceptance with 92%, followed by the *reopening in the spa park* with 83%, the *playground* with 76%, and the *reopening with the redesign of the parking lot* with 72% (Supplementary data, Annex 2). The acceptance of the project components in subsample 2 differed only slightly. The overall project was accepted by 75% of the respondents (subsample 1). Furthermore, almost all of the concerns raised during the city’s informational meetings were considered justified by the majority of the respondents. Concerns due to running costs were most widespread (83%), whereas concerns due to the restriction of use (29%) and flood risk (17%) were less prevalent. Approximately 80% of the respondents were aware of the project (*project known*), 30% would have liked to see public participation (*citizen participation*), 52% were somewhat or very dissatisfied with the communication that took place (*communication*), and 23% fully agreed with the statement that the spa park should remain as it is (status quo).

3.1. Acceptance of the restoration project and its components

The combination of four individual components and two possible positions (acceptance and rejection) resulted in 16 feasible combinations (clusters) that participants fell into on the basis of their assessments. Fourteen clusters were observed in the surveyed population (Table 1). Approximately 58% of the respondents accepted all components (cluster 1), 25% rejected one component (clusters 2–4 and 10), and only 3% rejected all components (cluster 6).

A comparison of the acceptance of the preference clusters with the acceptance of the overall project showed that participants of only four clusters (6, 7, 12, and 13) unanimously rejected the overall project initially (i.e. the acceptance of the overall project is 0.0%); apart from cluster 14, participants of all other clusters rejected the project at least partially. Furthermore, most respondents who rejected the project (74% – the respective percentage points can be found in the last column of Table 1) rejected the reopening in the spa park (clusters 4, 6–9, 11, and 12), while the majority accepted the other measures. Thus, of the people who originally rejected the project, the *reopening with the redesign of the parking lot* was accepted by 53% (clusters 1, 3, 4, 7, 10, and 12), the *playground* by 53% (clusters 1, 2, 4, 8, and 10–13), and the *natural stream section* by 72% (clusters 1–5 and 7–9).

3.2. Factors explaining acceptance for project components

The descriptive results of the explanatory variables of subsample 2 ($n = 209$) showed that most concerns identified in the city's meetings prior to the survey were considered justified by the majority of respondents (Supplementary data, Annex 2). Among these, concerns due to *running costs* received the highest support, while *restrictions of use* and *flood risk* concerns were shared by only a minority. In terms of socio-demographic variables, the subsample contained a slightly higher proportion of males and a slightly higher average age than the full sample ($n = 275$). Results for the other variables can be found in the Supplementary data, Annex 2. A logistic regression model was constructed and estimated to explain the acceptability of each of the four components. The results of the four regression models can be found in Table 2. The dependent variable in each of these models was the dummy-coded acceptance of the corresponding component.

The stepwise variable selection revealed that seven of the 16 variables investigated best explain the acceptance of the planned *reopening in the spa park*. The final model (Table 2) was statistically significant ($\chi^2(5) = 66.571$, $p < 0.001$), resulting in a medium degree of explained variance (Backhaus, 2003), as shown by Nagelkerke's $R^2 = 0.445$. Of the seven variables entered into the regression model, six contributed significantly to predicting acceptance: *flood risk* ($p = 0.02$), *high cost* ($p = 0.02$), *project known* ($p = 0.014$), *communication* ($p = 0.006$), the second level of *status quo* ($p < 0.000$), and *age* ($p = 0.054$). In addition to the agreement with the two concerns, knowledge about the project, dissatisfaction with communication, the desire for no change, and higher age also led to rejecting the component. Variables from all four acceptance factors, thus, had a significant effect on acceptance.

The acceptance of the *natural stream section* was best explained by five of the 16 variables investigated. The final binary logistic regression model was statistically significant ($\chi^2(5) = 42.292$, $p < 0.001$), resulting in a medium degree of explained variance (Backhaus, 2003), as shown by Nagelkerke's $R^2 = 0.413$. Of the five variables entered into the regression model, one contributed significantly to predicting acceptance: 'flood risk' ($p < 0.000$). The expectation of increased *flood risk* led to rejecting the component. This showed that only the acceptance factor *cost and benefits* had a significant influence on acceptance.

The acceptance of the *reopening with a redesign of the parking lot* was best explained by two of the 16 variables investigated. The final binary logistic regression model was statistically significant ($\chi^2(5) = 15.785$, $p < 0.01$), resulting in a small amount of explained variance (Backhaus, 2003), as shown by Nagelkerke's $R^2 = 0.105$. Of the two variables entered into the regression model, only the *noise of the playground* ($p = 0.009$) and the second level of *status quo* ($p < 0.059$) contributed significantly to predicting acceptance. Both the expectation of increased noise and the desire for no change led to rejecting the component. Thus, only variables from the two acceptance factors *cost and benefits* and *attachment* showed a significant influence on acceptance.

The acceptance of the planned *playground* was best explained by five of the 16 variables investigated. The final binary logistic regression model was statistically significant ($\chi^2(5) = 82.559$, $p < 0.001$), resulting in a large amount of explained variance (Backhaus, 2003), as shown by Nagelkerke's $R^2 = 0.511$. Of the five variables entered into the regression model, four contributed significantly to predicting acceptance: *noise of the playground* ($p < 0.000$), *littering* ($p = 0.001$), *age* ($p = 0.001$), and *high cost* ($p = 0.052$). The expectation of increased noise and littering, higher cost, and an older age made respondents more likely to reject the component. Consequently, only variables from the acceptance factors – *cost and benefits* and *socio-demographics* – had a significant influence on acceptance.

4. DISCUSSION

4.1. Acceptance of the overall project and its components

The results of the household survey show that all four components examined received a high level of acceptance, but that there were clear differences between individual components. For example, the *natural stream section*

experienced by far the highest acceptance, while acceptance levels for the other three components were very similar at a lower level. Comparing the results with other studies (Eden & Tunstall, 2006; Buijs, 2009; Marttila *et al.*, 2016), the degree of acceptance in our study was high for all the components examined. However, the share of people who accepted every single project component (58%) was noticeably lower than the share who accepted the overall project (75%) (Table 1). This might be because preferences in the surveyed population were very heterogeneous, which was reflected by the representation of almost all conceivable preference patterns. Looking at the project components individually showed that, actually, more people had issues with at least one part of the project. Without the two complementary social components (reopening with a redesign of the parking lot and the playground), for example, the percentage of people who accepted all components would be significantly higher (80%). These findings highlight the potential risks of adding such components. However, the inclusion of the complementary social components may not have led to a rejection of the overall project.

The acceptance of the overall project was significantly higher than the proportion of people who accepted all components (Table 1). Due to the design of the survey, it was not possible to draw conclusions about the importance of individual components for the acceptance of the overall project. The assessment of the overall project may have been based on potentially incomplete or even incorrect assumptions held by participants. For example, those who stated to be familiar with the project may have only been familiar with the key component (reopening in the spa park), but not with the additional components. Nevertheless, the comparison of the acceptance of different project components with the acceptance of the project reveals interesting correlations. For example, most of the respondents who knew about the project and rejected it expressed negative opinions about the *reopening in the spa park* (74%); interestingly, the majority were in favor of the other three components. Even if it is not clear which components the respondents were aware of, these results showed that additional components may have a positive effect and that this could be used by planners and local governments to sway people's perceptions of the overall project.

4.2. The importance of acceptance factors

The results of the regression analysis showed that the factors examined can effectively explain the acceptance of the components such as *reopening in the spa park*, *natural stream section*, and *playground*, but not the component *reopening with a redesign of the parking lot*. Therefore, in the following discussion, the variables examined will only be discussed for the first set of components.

The acceptance factor *costs and benefits* played an important role with regard to the acceptance of the components. The concerns expressed in the preparation phase of the survey at information events held by the city about the planned project were not a niche phenomenon but were shared by the majority of the population surveyed. This is of particular relevance because information and participation events are often criticized for only being attended by a minority and, therefore, not reflecting a representative opinion of the population (Vortkamp, 2013). The results of this study suggest that these concerns are unfounded as almost all of the concerns queried were considered justified by the majority of the respondents. However, as this study only included concerns raised during the participation process, further concerns cannot be ruled out.

Only some of the concerns (four out of 10) had an impact on the acceptance of the components. The most significant concerns, *high cost*, *littering*, *flood risk*, and *noise of the playground*, were in line with other studies (Asakawa *et al.*, 2004; Buijs, 2009; de Groot & de Groot, 2009; Seidl & Stauffacher, 2013; Deffner & Haase, 2018). We did not find problems identified in other studies, such as use conflicts or temporary low water levels that could result in a rejection of such a project (Fox *et al.*, 2016). This would require further study. Possible reasons might be that the consequences associated with insufficient water levels were not really present in the population. It might also be the case that the conflicts of use between the previously rather old and the potentially

younger population in the future were acknowledged but were not seen as a real problem, especially by younger respondents. Another reason could be that this study asked about the individual concerns in a closed-ended way. These concerns could not have been mentioned actively (open-ended way) and were not equally relevant for all respondents.

One key finding of this study was that concerns were largely component-specific. For example, concerns about excessive costs affected the acceptability of the *reopening in the spa park* and the *playground*, a feared increased risk of flooding affected the *reopening in the spa park* and the *natural stream section*, and an increase in noise and littering affected the acceptability of the *playground*. It is interesting to note that not all concerns were relevant for the acceptance of the components responsible for the respective concerns. Costs were mainly caused by the restoration measure. However, on the basis of costs, only the *reopening in the spa park* and the *playground* were rejected but not the *natural stream section*. One explanation for this could be that the costs were incorrectly estimated because the respondents were not aware of them for the individual measures, or that the *natural stream section* was seen as more valuable because it made a more important contribution to nature than the other components. Other studies (de Groot & de Groot, 2009; Seidl & Stauffacher, 2013; Fox *et al.*, 2016) have shown that projects that have a positive impact on nature are preferred. Thus, which concerns are relevant seem to be measure-specific – the wider applicability needs to be tested in further studies.

In addition to the acceptance factor *costs and benefits*, the other three factors, *information and participation*, *attachment*, and *socio-demographics*, also affected the acceptance of the components. While the high level of acceptance for the *natural stream section* may be explained exclusively by the concern of a higher flood risk, other factors may also play a role in explaining the acceptance of the *reopening in the spa park* and the *playground*. For example, the acceptance of the *reopening in the spa park* depended not only on the concerns raised, but also on communication that had taken place, the desire to maintain the current state of the spa park, and the age of the respondents. Age, in turn, also had an influence on the acceptance of the *playground*.

Several other studies have already shown the importance of communication for acceptance (Åberg & Tapsell, 2013; Marttila *et al.*, 2016; Deffner & Haase, 2018). The finding that people who were dissatisfied with how the project was communicated by the city tended to reject the *reopening of the spa park* was, therefore, not surprising. The fact that respondents who were not previously aware of the project were more likely to accept the *reopening in the spa park* draws attention to the issue of dissemination of information in the run-up to the project. Indeed, planning of the restoration project dragged on for several years and even the planning office had to be changed once due to escalating costs. This knowledge gap was also evident in concerns around flood risks and costs that are unfounded. Calculations have shown that the flood risk would be reduced by the measures and costs would have been incurred regardless of the overall project, as the outdated piping of the Erlenbach urgently needed to be replaced. In fact, reopening the river made this necessary measure eligible for funding; the state of Rhineland-Palatinate covered up to 90% of costs. Neither of these benefits appears to have been sufficiently communicated to the local participants – though information events had been offered. This draws attention to the crucial role of citizen participation in the acceptance of river restoration projects. However, our regression results showed that while the desire for citizen participation was relatively high, this factor may not explain the acceptance of the components. Dissatisfaction with communication, on the other hand, may have a (negative) influence on acceptance. In our study, satisfactory information and communication seemed to be much more important for acceptance than public participation in planning.

It is also not surprising that people who thought that the spa park should remain as it is rejected the *reopening in the spa park*. The spa park in Bad Bergzabern is emblematic of a past time of success as a spa town. Many citizens are likely still familiar with this, even if only from stories. This historical significance may have created a special bond and, thus, a critical position toward reopening the Erlenbach. Several studies (Buijs, 2009; Fox

et al., 2016) have shown that the attachment people have to a place has an important effect on the acceptance of actions planned there. It is interesting to note that the condition of the spa park worthy of preservation was not equally diminished by the *playground*. Up to now, the park was especially designed for older people and even playing on the meadows was forbidden. Accordingly, a *playground* would bring a big change. It is conceivable that the respondents were aware of the currently poor facilities for children in Bad Bergzabern and, therefore, attached greater importance to this component.

With regard to socio-demographic variables, the acceptance of the components studied did not depend on gender but did depend on age. It is not particularly surprising that older people tended to reject the *reopening in the spa park* and the *playground*.

4.3. Differences between components

Comparing the acceptance of the different components and the reasons that explain them showed that high acceptance and few costs for the component go hand in hand. While concerns about the *natural stream section* were only raised due to a feared higher flood risk, the acceptance of the *reopening in the spa park* and the *playground* simultaneously depended on several factors. One reason for these differences may lie in the current use of the areas: while the *natural stream section* is to be created on a brownfield site, the other measures are to be implemented on a partly intensively used site. The number of relevant factors, thus, seems to be directly related to the location. Whether complementary components to a project lead to higher costs, such as noise and littering, or are seen as an enrichment depends on the location and whether they are in competition with the former use of the site.

Another difference between the components studied is the degree of naturalness desired. Only the *natural stream section* explicitly pursues the WFD objective of good ecological status, while the reopening in the spa park is oriented more toward the needs of people. While the importance of closeness to nature was not investigated in detail, other studies suggest that it helps to explain the differences in acceptance due to a high value for the population (de Groot & de Groot, 2009; Seidl & Stauffacher, 2013; Fox *et al.*, 2016).

5. CONCLUSION

The results of the study showed that while acceptance for the components of the river restoration project was high, some of the components were viewed critically. As a result, the combination of several components led to a significant increase in the proportion of people who were critical toward the project as a whole. At the same time, this did not necessarily lead to the overall project being rejected, as the proportion of people who rejected all the components was very low, and the results indicate that it is precisely the supplementary components that tend to have a positive effect on the acceptance of people who view the overall project critically.

Furthermore, the results of the study showed that all four factors investigated have an influence on acceptance, though the influence differs substantially with regard to the components. While the acceptance problems for the *natural stream section* can be explained exclusively by the factor *costs and benefits*, namely by a feared higher risk of flooding, the acceptance of the *reopening in the spa park* depended on all four factors. The acceptance of the *reopening of the spa park* depends on the feared higher risk of flooding, the perception of high costs, dissatisfaction with communication, the desire to maintain the current state of the spa park, and also on the age of the respondents. The acceptance of the *playground* depends again on the factors *costs and benefits* and *socio-demographics*, though it can be explained by high costs, a feared increase in noise and littering, and a higher age of the respondents. The factor *costs and benefits*, therefore, appeared to be important for all the measures studied, while the factors of *information and participation* as well as *attachment* were very specific to the measures. Furthermore, it is remarkable that with regard to the factor *costs and benefits*, almost all concerns raised in advance

at information events were considered relevant by large part of the interviewees, yet only a few had an influence on acceptance.

With regard to the objectives of the WFD (European Parliament, 2014), the results of the study show that acceptance and, thus, also the speed of implementation of river restoration projects could be improved, if decision-makers take the identified interrelationships into account. Further recommendations can be derived from the results of the study. For example, the concerns raised at information or participation events reflected the opinion of the general population and should, therefore, be taken seriously. However, since not all concerns are equally relevant for acceptance, it is important to differentiate between the concerns that arise and actively address the most relevant ones with suitable measures. The cost of the project and the issue of flood protection, but also the attachment of the population to a place, seem to play an important role in this respect and should, therefore, be carefully communicated and addressed in future projects.

Whether and to what extent the results of this study can be applied to other regions of the world cannot be easily assessed due to potential cultural differences. Further studies should investigate whether cultural differences are relevant and how they affect the acceptance of river restoration projects and the factors we investigated. It is also promising to investigate whether complementary measures actually increase the acceptance of the overarching project and what type of components and associated factors specifically contribute to the overall acceptance. With regard to the acceptance factor *costs and benefits*, future studies should also take into account the benefits of a project in addition to the costs.

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DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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