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Research

Experiencing the landscape: landscape agency in a multifunctional valley after dam removal on the Sélune River, France

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ABSTRACT. Here, we examine landscape as an actor of ecological restoration projects rather than as a resource. Based on relational thinking and the notion of agency, we aim to identify affordances recognized by local actors and to mobilize relational thinking to understand human-river relations. Although restoration projects have mainly been tackled from the point of view of contestation and landscape attachment, we question the capacity of these operations to produce multifunctional landscapes. We analyze the way in which the radical transformation of a landscape, resulting from the removal of two hydroelectric dams, led stakeholders to act. Our results not only reveal the limits of engineering approaches that struggle to overcome the nature–culture dualism, but also the value of integrating non-humans when we consider relationships rather than only objects. We analyze how the potential uses of a valley are revealed by the radical landscape transformations brought about by an ecological restoration project. We observe how the stakeholders project themselves into this new configuration, the resulting landscape visions it inspires in them, and how new functions emerge from the relationships woven between a new landscape and its stakeholders.

Key Words: *agency; affordance; dam removal; ecological restoration; landscape; place attachment; relational thinking; territory project*

INTRODUCTION

Whereas the appropriation of restoration projects was formerly approached primarily in terms of contestation and attachment to the landscape (Fox et al. 2016, Jørgensen 2017, Reilly et al. 2019), as an alternative, we examine how the radical transformation of a landscape caused by the removal of two hydroelectric dams compels actors to take action. We consider the period prior to conflicts over future uses, which is beyond the scope of this work, and observe how the actors see themselves in this new landscape configuration, the visions of the landscape they form as a result, and how new functions emerge from the relationships that are forged between a new landscape and its actors.

To this end, we analyzed the transition stage of the removal of Vezins and La Roche-qui-Boit hydroelectric dams, both located on the Sélune River approximately 12 km from the Bay of Mont Saint-Michel in northwestern France. Transition stages represent moments of recomposition during which various factors remain in flux (Latour 2005) and potentials remain untouched. In the case of the Sélune River valley, our analysis of the transition stage allows us to describe the role played by the landscape in how certain actors discover a place and take action. We document how actors formed relationships with this new landscape through its different motifs, i.e., cliffs, a flowing river, and submerged heritage sites, and its spontaneous dynamics, i.e., vegetation. We analyze how these landscape motifs and dynamics led actors to position themselves to assert their perception and their vision, in other words, their own course of action. By focusing on the users of this valley, we reveal the emergence of interest in rendering the river accessible and attractive, and we raise questions about how to include the demands of such actors, which have not yet been taken into account by decision makers, in the construction of a shared, multifunctional landscape. Taking these results into consideration in the future should help to design and implement projects that are less prone to conflict.

After presenting the theoretical foundations of this work and our methodological approach, we describe the transformation of the landscape and how it was appropriated by the actors. The description of the results leads to a discussion of the limits of engineering approaches. It underscores the advantages of considering landscape agency to account for multifunctionality and to investigate the possibilities for coexistence within the same landscape, which is experienced and perceived differently and for which people have different expectations. This discussion leads us to explore the potential for empirical experiences of the landscape to stimulate appropriation of ecological projects such as river restoration in a context in which inhabitants' relationship with the environment is not well anchored.

STATE OF THE ART

The landscape as a forgotten aspect of ecological restoration

Dams are removed in response to environmental concerns such as improving water quality, enabling the return of migratory fish, and reestablishing sediment transport. Dam removal was first practiced in the United States (Doyle et al. 2003) before being exported to Europe (Barraud 2011). The European Union's Water Framework Directive encourages the spread of such practices and, more tacitly, entails a return to a "natural" landscape (Barraud and Germaine 2013, Linton and Krueger 2020, Linton 2022). This desire to return to the original landscape is nevertheless the source of considerable debate because of the failure to define credible points of reference for profoundly hybrid ecosystems (e.g., Dufour and Piégay 2009, Lespez et al. 2015, Lespez and Dufour 2021). Strictly speaking, restoration seeks to rediscover the integrity of ecosystems; however, such projects usually follow a logic of rehabilitation that aims to recover environmental functions, but not necessarily the landscape per se (Downs and Thorne 2000, Wohl et al. 2005). Restoration is an experimental practice full of uncertainties about how various sites will adjust. This situation is especially true of passive restoration,

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which limits itself to reducing the sources of deterioration without taking action to influence the ensuing natural processes, for example, removing a dam or naturalizing a riverway. This state of uncertainty adds to the difficulties faced by decision makers, given the often conflictual nature of projects for restoration of environmental continuity that transform the lives of local populations and call their existing uses of the river into question (Eden et al. 2000, Jørgensen and Renöfält 2012, Fox et al. 2016, Barraud and Germaine 2017). Although the landscape is the visible result of ecosystems, ecological restoration contributes to its transformation without always foreseeing or considering this key aspect for politicians and local populations. One of the difficulties is due to the difference between the goals of the environmental project that seeks to reestablish natural processes and the goals for the area that are based on a landscape and its uses (Eden et al. 2000, Germaine and Barraud 2013). We previously looked at the role of landscape in the conflict arising from the removal of these dams (Germaine et al. 2019). Analysis of the local inhabitants' expectations revealed that they wavered between a desire for nature and a fear of wasteland, thus enabling us to understand the sticking points. Such resistance testifies to the multifunctional nature of the landscape as a place of multiple expectations, and to the need to foresee these significant changes to the landscape that contribute to the formation of local actors' expectations and initiatives. Because they are hard to evaluate, cultural services, of which an appreciation of the landscape forms part, are often overlooked (de Groot and van den Born 2003, Dou et al. 2022).

Landscape in relational thinking

The values held by actors operating at supra-levels, such as environmental nongovernmental organizations that have difficulty finding local relays in the Sélune valley, are the subject of ongoing analyses to account for the power games at work. Nevertheless, we here aim to go further than the analysis of power games between actors concerning landscape resources: we want to extend reflection to the relations between humans and non-humans to understand how the landscape and its components make other actors in the territory behave. It is important to explain exactly what we mean by landscape. The polysemic nature of landscape, so central to geography (Antrop 2000, Besse 2018), is often criticized (Castiglioni et al. 2022). Contrarywise, we feel that this characteristic is what allows us to consider the relationship of humans to their surroundings in a variety of ways (Sgard 2022). Landscape is actually the product of interactions between natural phenomena and human actions. It also has a material and an ideal dimension (Bertrand 1978, Besse 2018). As described by Berque (1994:15), interactions are permanent: "Societies shape their environment according to how they interpret it, and vice versa, they interpret their environment according to how they shape it."[1] Berque (2000) suggests analyzing the specific relationship between humans and their surroundings using the notion of *médiance* (mediation). Closely resembling the phenomenology approach, the *mésologie* (mesology) proposed by Berque (2000) goes beyond the modern dualism between nature and culture criticized by Latour (1991) and Descola (2005). Berque considers that the object depends on the subject: it is the relationship with the subject that gives the milieu a concrete form. The notion of *trajectivité* (trajectivity; Berque 1987) invites us to consider the relationships, rather than the landscape, independently of the subjects who observe and evolve in it. Thus, landscape is envisioned as the dialectic between the initiatives of the various actors that perceive, inhabit, and shape the environment according to their own needs, and the surroundings that elicit these initiatives and respond to them. The dynamics are hybrid.

This ontology echoes relational thinking that invites us to focus on relationships rather than on independent entities to improve our understanding of social-ecological systems (Latour 2005, Haraway 2016, Eyster et al. 2022). Whereas nature conservation is based on recognition of the intrinsic value of natural elements, Chan et al. (2016) promote relational values that "are not present in things but derivative of relationships and responsibilities to them." In this perspective, ecological restoration must be considered not only as an operation aimed at restoring biophysical process or even natural landscape, but as a way of repairing the relations between people and their environment (Egan et al. 2011). Holistic restoration focuses on improving the quality of this relationship (Tadaki and Sinner 2014, Dicks 2022) considering social-ecological systems as the result of the complex relationships between humans and other organisms (Latour 2017). This approach forms part of an attempt to transcend the modern duality between subject and object (Latour 1999) by seeking to demonstrate how landscape arises and unfolds at the hands of both human and non-human agents who adjust to one another.

The agency of landscape in the transformation of social-ecological systems

In this relationship, the landscape and its key components possess an agency, the capacity to make other actors act (Latour 2005). Different scholars have proposed approaches to take into consideration the role of non-humans inspired by the actor network theory developed by Latour (e.g., Dwiartama and Rosin 2014, Herman 2016). In this case, the role played by landscape in the transition phase is considered an incitement to action. Consequently, the landscape is not considered in visual terms, as something to be contemplated, but rather as a dynamic experience that is open to all our senses, as a power that makes us act (Berque 2000, Besse 2018). Our attention is not focused on potential conflicts, given that actors' expectations are not inevitably in competition with one another, but instead on the landscape's agency. We analyze how it helps to set actors into motion, in particular, how it gives rise to initiatives involving the future of the area (Davodeau 2021, Plant 2022). The goal is to identify the role played by the landscape (and its transformation) in creating new collectives around the river. This dialectical approach also calls on hydrosocial research that considers rivers to be continuously recomposed assemblages of relationships between humans and non-humans (Boelens et al. 2016, Hommes et al. 2016).

The landscape abounds with invitations. Each actor sees its own interests in it. And each actor has a different interpretation of each motif in the landscape, whether natural or human-made, that contributes to the valley's spatial configuration, each one a kind of snapshot. According to the perceptual psychologist Gibson (1979), these features constitute affordances, and each organism benefits differently from the features' useful properties according to the principle of co-option proposed by Ingold (2021). Different actors may appropriate the same object within a landscape, but each one does so differently. The period in which a landscape is fundamentally changed thus provides fertile ground

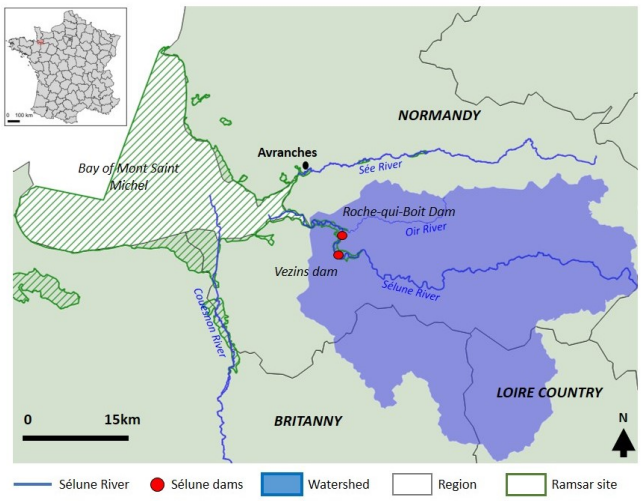
for direct observation of the emergence of relationships between actors and the new landscape they help construct, and which, in return, the landscape sets in motion. The crucial issues are in identifying the role that affordances play in the production of plans for an area and how private actors (individuals or associations) work alongside, on the sidelines of, or against institutional actors in producing the new territory. The process starts with the revelation of a new object, a new motif in the landscape: the properties of this landscape reality are perceived by actors in relation to their own capacity for action and their intentions. Materiality feeds the imagination, which in turn, triggers action and leads to the reconfiguration of hydrosocial assemblages (Hommes et al. 2022). Individual actors then position themselves in relation to the landscape affordance they have perceived and in relation to what other actors have apprehended. The emergence of coherence in relation to the development of a project occurs after a period of trial and error and of sparse action. The agency of the landscape is at the heart our work. Whereas the landscape is usually considered an external object, we use a relational approach to contribute to the literature on territory projects. We analyze the mechanisms and processes by which the landscape and its components drive other actors of the territory to act.

METHODS

Field study

The Sélune River is a coastal river whose watershed covers an area of 1014 km² and that flows for 68 km before emptying into the Bay of Mont Saint-Michel (Fig. 1). With a population density of < 60 inhabitants/km², this watershed is dominated by agricultural landscapes consisting primarily of temporary grasslands, corn grown for fodder, and other cereal crops. The hydroelectric dams at Roche-qui-Boit (16 m high) and Vezins (36 m high) were built in the lower part of the river in the first half of the 20th century and flooded the valley floor for almost 20 km. The dams are insurmountable obstacles for Atlantic salmon, who enter the Bay and are unable to access spawning grounds located farther upstream (Forget et al. 2018). These structures also disrupt the flow of sediment, and finally, do not comply with French legislation (Germaine and Lespez 2017). For these reasons, in late 2009, the government announced the removal of the dams as part of a national plan for the restoration of environmental continuity along waterways. Despite opposition from local politicians as well as a large proportion of the local population (Germaine and Lespez 2014, 2017), in 2018, works began with the management of 2 million m³ of sediment that had accumulated in the Vezins reservoir, followed by destruction of the dam itself in late 2019. This first project, which is not yet complete, was managed by the State, which was the project owner. The Roche-qui-Boit worksite is managed by Electricité de France (State-owned electricity company), owner of the works and operator of the two hydroelectric dams. This project began in 2021 with a new sediment management program, and demolition of the structure began in spring 2022. The Sélune watershed has a population of 57,000, the vast majority of whom live in small rural communities with little demographic dynamism. The population is older than

Fig. 1. Map of the location of the Sélune River valley in France.



the national average, with 25% > 65 years old. The Sélune watershed is home to a high proportion of low-income households, of whom 61% do not pay income tax, and a high proportion of whom have no professional qualifications (Margetic et al. 2014). Even though the agricultural sector currently only employs a few people, it is very dynamic, and the agrifood industry, especially dairies, is an important source of employment. Politically, the municipalities are conservative (right-wing Catholic). Associated with an image of tradition, the inhabitants are not known for protesting (Guillemin et al. 2018).

Methodological approach

We monitored the entire operation from start to finish. Our primary interest was the role granted to local actors in the process, which led us to examine the inhabitants' attachment to the lakes formed along the flooded valley floor (Germaine et al. 2016), and the engineers' representations and aims concerning the landscape of Sélune River valley and nature in general (Germaine et al. 2019). We do not discuss the design of a new project for the landscape and for uses of the valley, which remain to be defined by the local elected representatives and the State; here, we focus on the period of work that consisted of restoring the valley following demolition of the two dams. We observed how different categories of actors reacted to the profound reconfiguration of the river landscape during the transition stage. We monitored how their view of the landscape changed over time and how they envisioned new functions for the future of this space.

A photographic observatory of the landscape was established to monitor closely all ongoing transformations of the landscape. The observatory comprised 16 points of view of the flooded areas, which were photographed every month while the works were underway. Combined with field visits, monitoring enabled us to identify changes such as variations in water levels, changes in the river's flow path, reshaping of the valley floor due to sediment deposits, and the spread of vegetation.

A participatory observation process was established to monitor the ongoing construction of a new valley. We began by using the two studies conducted before the works started to put forward ideas for redevelopment of the valley's landscape and economic situation, one of which was conducted by local communities and which culminated in ambitious proposals for the valley's reconfiguration (Germaine et al. 2019). As observers, we attended the thematic working group meetings held at the request of the local Prefect to produce a plan for the area's socioeconomic recovery. These meetings were attended by the appropriate politicians of the urban community *communauté d'agglomération*[2] and, especially, by technicians and specialists from various domains ranging from fishing and kayaking to agriculture and beyond. We were unable to attend all the project review meetings that were held every three to six months by the central government to keep local politicians and associations apprised of the progress of the works, but we did obtain access to the minutes for these meetings, which provided a glimpse of the rare interactions between actors concerning the area's potential reconfiguration.

Finally, we conducted semistructured interviews with actors in the area, particularly those with a relationship with the valley (Table 1). We met the politicians in charge of various aspects of the project, as well as actual and potential users of the future valley, including fishers, hunters, kayakers, farmers, hikers, trail organizers, and leisure park managers, nearly all of whom have lived in the valley for many years. Only the people in charge of the kayak club and the fishing federation were not local inhabitants of the valley. Some of the interviews were repeated. Following an initial meeting at the interviewee's home or in another private space, we conducted field interviews in the valley along a route selected by the interviewee. The aim was to understand clearly the opportunities offered by the valley's new configuration and constraints to its achievement identified by each interviewee and to be able to address, together and directly, the materiality of the places in question.

Table 1. Types of interviewees and numbers of interviews conducted between January 2020 and April 2022.

Interviewee group	Type of interviewee	Number of interviews
Local politicians (16 interviews)	Isigny (former mayor)	3
	Isigny (current mayor)	1
	Vezins	2
	Les Biards	4
	Ducey	1
	St Brice de Landelles	1
	Urban community: President	1
	Urban community: Vice-President of the Environment	1
	Urban community: Vice-President of Tourism	1
	Urban community: Vice-President of Development	1
Managers (23 interviews)	Watershed association	6
	Urban community technicians	2
	State services	8
	Agriculture service	4
	Electricité de France (State-owned electricity company)	3
Associations and users (24 interviews)	Farmer A	2
	Farmer B	1
	Farmer C	2
	Farmer D	1
	Farmer E	1
	Farmer F	1
	Farmer G	1
	Local fishing associations	2
	Departmental fishing federation	1
	Salmon fishers	1
	Kayakers	4
	Nature association	2
	Salmon fishers	1
	Trail users	1
	Hunters	3
	"La Mazure" leisure base	1

RESULTS

Emergence of a new landscape following ecological restoration

Removing the dams on the Sélune River was a big project that took several months (Fig. 2). The biggest tasks were carried out before dam removal began, which involved removal of the sediment that had accumulated due to erosion of the agricultural slopes since the last dredging in 1993. The Vezins reservoir alone was estimated to contain 2 million m³ of sediment. The reservoirs were emptied by gradually drawing down the water level. The sediment was removed by dredging along pipes running along the valley floor and by dredging land. The sediment was then stored in bins in the meanders of the formerly flooded area of the valley bottom before being spread on the slopes. A total of 700,000 m³ was moved in this way. The same precautions were taken at the La Roche-qui-Boit site to avoid the sediment flowing downstream and especially into the Bay of Mont Saint-Michel.

After the sediment was removed, the dams were demolished. The multiple-arch dam of Vezins was removed between July 2019 and January 2020. The La Roche-qui-Boit dam was demolished in the spring and summer of 2022.

In addition to the disappearance of the lakes that were replaced by a flowing river (Fig. 3), the landscape was transformed by terracing the sediment, which changed the cross-section of the valley along a stretch of almost 20 km. The river course was not redrawn, but its profile was subject to extensive works; the stream bed was dug anew in the Vezins reservoir. The banks were reshaped with the creation of a calibrated sediment bank to secure the flow of the biennial floodwaters, which was topped by one or two terraces 1–2 m in height. The project thus involved active restoration.[3]

The central government termed the second stage of the works "renaturing," which it defined as the restoration of the site before it was handed over to the local communities, even though the communities had not yet agreed to take back ownership of the drained land. In the absence of a management plan, vegetation developed spontaneously in the drained area (Fig. 4); willows began to grow, along with knotweed and other grasses that are rapidly overrunning the landscape (Ravot et al. 2020). This aspect can be characterized as passive restoration. By default, the landscape is being transformed randomly, but ultimately, the landscape is transforming itself in response to the renaturing techniques gradually adopted by the project owners as the transition stage has unearthed new problems.

Vegetation dynamics driving (in)action

The landscape produced by the restoration project gave birth to a desire to intervene in the valley. Vegetation dynamics are a good illustration of how landscape dynamics give rise to representations but also trigger action (Fig. 5). The vegetation is perceived as a threat to usage because letting the valley become overgrown means sacrificing the possibility of access and activities. As one farmer noted, "The landscape is changing quickly; we can't let it turn into a

Fig. 2. Timeline of the successive stages of the Sélune River valley restoration.

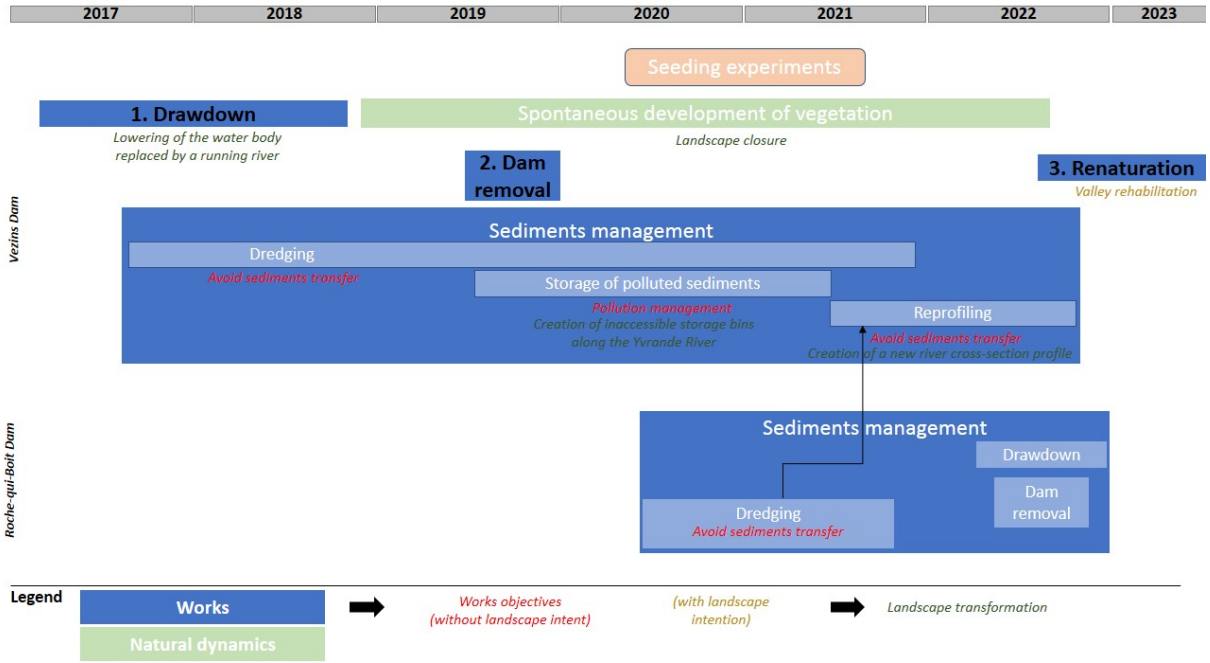


Fig. 3. Photographs of the Sélune River valley transformation. (a) Upstream part of the Vezins Dam reservoir (view upstream from the République bridge). (b) Sediment storage along Yvrande River (view upstream from the Biards bridge).



jungle." Thus, a natural process of revegetation can be a powerful driver of action. According to an actor in the tourism sector, "Nature is reclaiming the place, the willows are growing, and that might get us to act more swiftly," and a politician commented, "What is going to push things forward is nature; the black willow is kind of getting everyone to act."

Farmers are the primary observers of these changes. They see thistles and nettles appearing on the drained parcels they farm and are concerned about their spread. They also describe damage caused by wild boars to their corn fields on the plateau. The wild boar population has increased across France, but the disappearance of the flooded areas, which formed a barrier to animals originating from Fougères Forest, is considered to be a locally aggravating circumstance. Hunters have been contacted, and several hunts have been organized. At the same time, politicians and users have argued for open landscapes as a condition for keeping the valley accessible and, therefore, alive. All these factors led to an experimental agricultural project in July 2020, with the aim of keeping the landscape that had resulted from draining the valley floor (Fig. 6a). In addition to the opportunities offered by the reclaimed land, the farmers view an investment in the grasslands as an initial, indispensable step for reappropriating the valley: "Originally we said yes mainly out of respect for our environment, because it hurt to see the valley like that." The topographic constraints of the drained area have limited the number of available parcels to just a few flat, accessible spaces (11 ha of the 150 ha revealed when the water in the flooded areas was removed), but the first tests have been successful and produced excellent hay yields.

Fig. 4. Transformation of the landscape before and after removal of Vezins Dam.

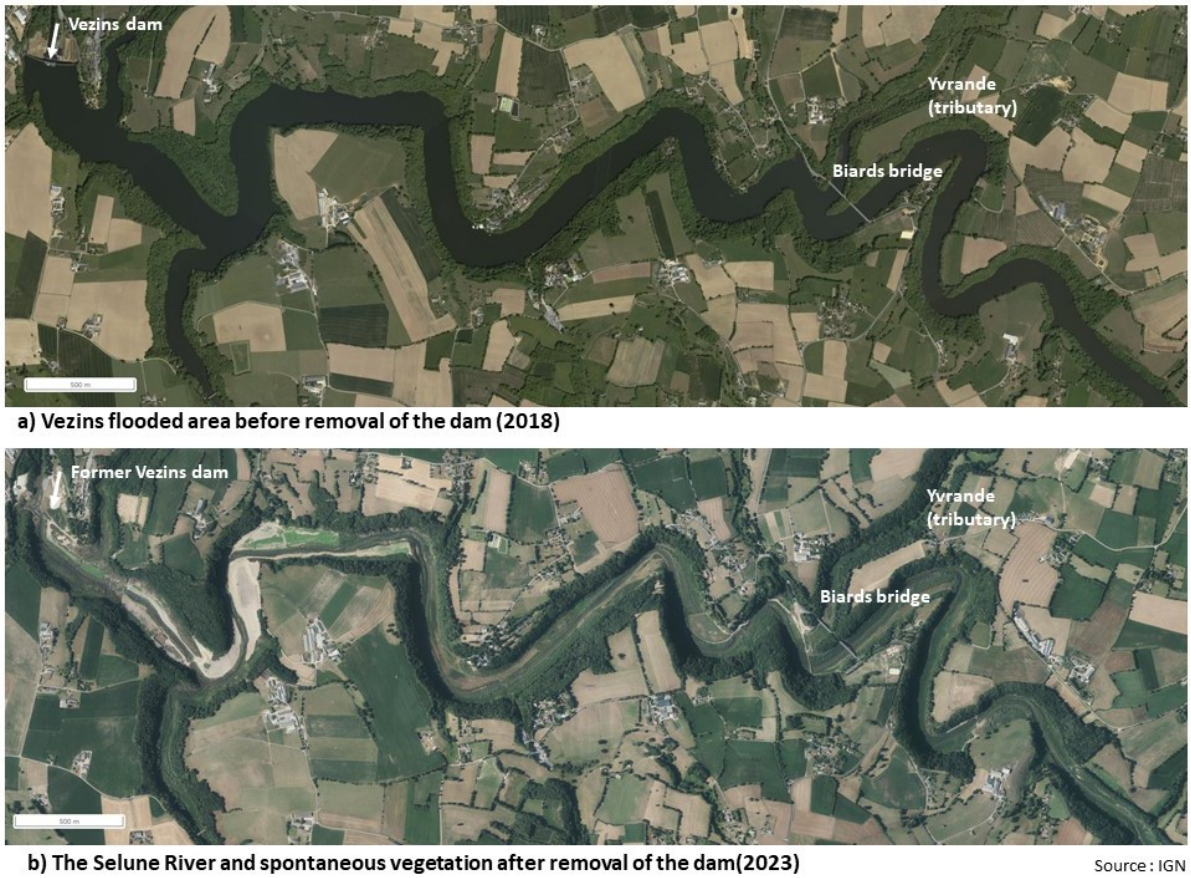
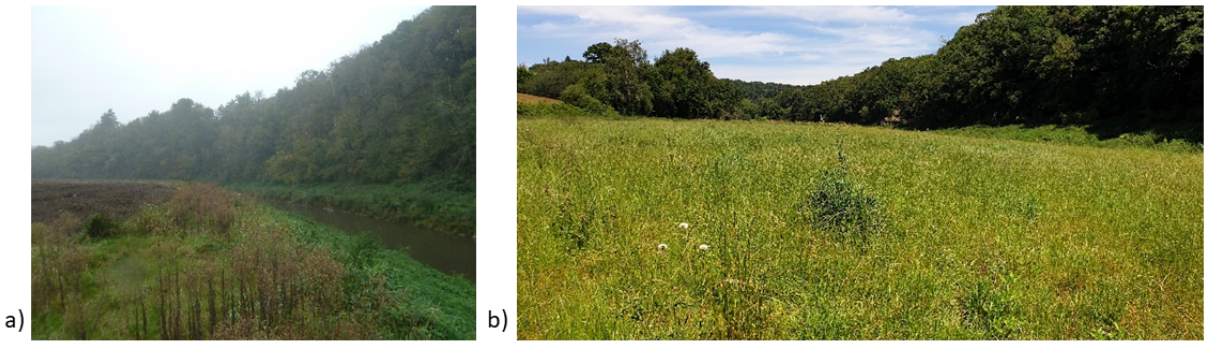


Fig. 5. Photographs of the naturally growing vegetation. (a) Immediately upstream from the former Vezins Dam. (b) Willow groves growing in the former Vezins flooded area and along the worksite road.



In the meantime, from an ecological standpoint, the principle of non-management is upheld by the Agency for the Preservation of Natural Spaces in Normandy (French acronym CEN), which is looking for experimental sites for its regional program for naturally evolving spaces. However, one of the CEN project managers recognizes that the Sélune valley cannot meet its strict criteria because that would prohibit any use (hunting, walking, fishing) and even any human passage through the valley, which the CEN does not wish to impose, given the configuration of the site. Accordingly, CEN proposed to oversee the parts of the valley where the maintenance of open landscapes would be difficult financially and technically without imposing a narrow vision of natural development. In terms of politics, the president of the Urban Community Association has expressed interest in this scenario: "Ultimately, why not let the valley be natural? Shouldn't we let the valley evolve freely? We are looking at a minimalist approach. It's in the spirit of the times." The return of vegetation is thus a biophysical process with a political dimension. It was unexpected and acted as an affordance for the institutional actors overseeing the project at a point when it was the subject of a certain hesitation. Until then, the Urban Community Association had refused to take over the land that had been freed up and to design a socioeconomic development project for the valley. This affordance provides a way out of the sluggishness of the project's governance at a time when it has lacked a clear vision of renaturing. Vegetation has agency. It is the vegetation that sets

Fig. 6. Photographs of the landscapes at the end of the agricultural sowing trials. (a) The first experimental grass plot before mowing (July 2020). (b) A new plot at the edge of the unusable sediment bank was plowed before harvesting in October 2020.



the players in motion in very different ways, with laissez-faire on the one hand and a return to control on the other. Despite the farmers' attempts to control the vegetation, they continue to suffer from damage caused by wild boars, while local residents denounce the overgrowth.

New affordances that give rise to new plans for using the valley

The ecological restoration works have thus produced an entirely new landscape and thoroughly reshaped the valley. Even though this portion of the valley remained inaccessible for the entire duration of the works,[4] the landscape was still visible from the bridges that cross the valley and from the paths along its crest, which was how local actors gradually discovered the profoundly changed environment of the drained landscape. Certain residents did have access to the worksites: farmers who worked land at the edge of the flooded areas, people who obtained temporary passes, or those who ignored the "no trespassing" signs and explored the new terrain anyway. Although many people miss the lakes, the emergence of this new landscape has fostered new wishes and even the beginnings of new practices, which are also encouraged by the current landscape dynamics resulting from this profound change.

Kayakers were quick to express their interest in the rediscovered river. The Avranches Canoe and Kayak Club, which mostly uses the neighboring River Sée, organized several scouting trips on foot and by kayak to assess the river's potential. Aside from their interest in a new river course, the landscape is what has caught their attention. They emphasized the atmosphere created by the gorges that is free of noise from the highway and the city and can even be considered as "intimate" because it is both isolated and well hidden. They especially appreciate the broad view of the river at each bend, a nice change from the forested banks of the River Sée: "We should preserve this sense of openness, of grassland without trees; if stuff grows everywhere, the charm of it will disappear. We have to maintain that aspect, keeping woods while preserving an unimpeded view, not letting things grow uncontrollably." This interest has led to plans for official boat trips along a fixed course with a guide to discover the richness of the environment, where many species frequent the river's edge, from herons to nutria and more, as well as the valley's heritage, in the form of vestiges of old mills and fisheries. From a technical standpoint, they envisage different degrees of difficulty in the course that will vary with the season, meaning that experienced athletes would use the river in winter, with a whitewater slalom course at the level of the former Vezins dam with its steep slope, and more family-based outings in summer. The weirs belonging to the old mills and fisheries that emerged during drainage are particularly appreciated for the diversity they provide to the course, with eddies and obstacles to cross.

Paradoxically, appropriation by the fishing community is much more tentative. Some members of this community opposed the plan, which resulted in the disappearance of predator fishing (Thomas and Germaine 2018). The salmon fishers still cannot access the new stretches of the river; downstream, the only stretch that is still fishable, the effects of the works are still felt despite all the precautions taken. They thus find themselves in a holding pattern, waiting for demolition of La Roche-qui-Boit dam, which stops the migratory fish from swimming upstream. Aside from having to wait, the fishers are concerned about maintenance of the riverbanks; they complain about the lack of maintenance of the riparian forest, which prevents them from accessing the river banks and creates obstructions in the river bed. They are also concerned about the capacity of the future owner or operator of the restored section to keep the riverbanks free of obstacles, which is a condition for access and also for flyfishing, which requires space for casting.

Conversely, actors with no clear links to the river have expressed great enthusiasm for the valley's new configuration. One of the first actors to appropriate this new landscape was the Isigny Running Association, who organized a trail through the Sélune Valley that has been in operation since 2017. Members of the association consider that the variety of slopes offered by the valley, thanks to changes in altitude, enable multilevel courses and are a real asset. The disappearance of the flood water revealed a topography of gorges that is unique in northwestern France, which is generally not very hilly. The term "cliffs" has been used to describe the rocky walls that emerged. The association also included the river bed in their course, with several fording sites along the trail. The trail hikers are the first and still the only people

to have organized an event in the valley, once the central government lifted the ban on access: the 2021 trail event drew almost 500 participants.

The rediscovery is thus mainly expressed in terms of nature sports, whether in the form of associations interested in the expansion and diversification of their terrain or individuals interested in exploring the valley by mountain bike, on horseback, or even on quad bikes, but also through direct intervention in the landscape. The experience of the valley is disseminated by the narrative created by those who already succeeded in entering: "People can see the valley with their own eyes, and they appreciate it," or "The problem is that we can't go in, but everyone who has gone in says it's amazing." The managers of the leisure base at the edge of the former flooded area share their enthusiasm: "We can only think of one thing: rediscovering this area and seeing how it can be used." For those who are convinced of its worth, it is just a matter of demonstrating the interest of a valley to those who are not yet familiar with it. A farmer remarked, "Many people refuse to come back; they need to be shown it's really nice." The same landscape is subject to multiple interpretations that lead to different actions.

Tension or convergence between local initiatives and restoration goals?

Despite their diversity, all the actors agree on the need to share the valley. Whereas the lakes had been monopolized by fishers (Germaine et al. 2016), the actors we met are eager for everyone to be able to benefit from this new landscape. According to a salmon fisher, "We have to share; the river belongs to everyone," and in the opinion of a trail organizer, "It [the valley] can't become private again." Thus, the precondition appears to be guaranteeing access to the valley by creating a path that runs alongside the river and by keeping the landscape open. The vision of the future valley is forming in interaction with the environment and with other users. The variety of uses that are emerging appear to be able to coexist. Hunters wonder what the best route for the path would be and are concerned by the risk of hunters positioned at the edge of forested areas being too close to people walking along the river. Hunters are also concerned about the valley being too open because an increase in visitors could disturb the hunt. Kayakers talk about drawing up explicit rules in collaboration with fishers to avoid the most favorable times of day and spots for fishers, and sharing the task of cleaning the riverbanks that they both use. Some fishers see the issue of cohabitation with kayaks as resolved by the fact that in summer, water levels are too low to allow the passage of boats, which would otherwise damage the spawning grounds.

The emergence of initiatives and expectations from the ground up thus seems to refocus the project on the inhabitants, or, as a politician in charge of tourism put it, "For me, the Sélune is, above all, a project for the inhabitants; the valley is being redrawn, and I think we are going to have a beautiful valley. The natural setting may already be enough." The inhabitants of the valley and the users who experience it have distanced themselves from the ambitious projects proposed by the consulting firm hired by the local communities in 2013–2014, which was more focused on tourism. The firm proposed projects that are now seen by politicians as too ambitious and too expensive, and too far removed from a vision that is respectful of nature: "The *Maitres du Rêve* project was a bit out there; this is a little more down to earth." The survey revealed a possible convergence between local expectations and environmental goals. In the meantime, immersion in the valley while it is being reforested is appreciated by the users who are rediscovering the same intimate and preserved atmosphere in the new landscape that previously characterized the lakes. The vegetation is thus helping to maintain a sense of place by preserving the intimate atmosphere of the valley.

Nevertheless, difficulties encountered by agricultural valorization testify to the lack of convergence between the ecological project and local expectations. Central government departments have imposed a considerable number of restrictions: no soil amendments, priority mowing, and removable fencing. The government refers to the operation's initial ecological goal and lays down strict conditions for agriculture. The director of the scientific program is amazed by "this obsession with the unused land." In these discourses, agricultural development seems in discordance with the initial goals of ecological restoration. This restriction contradicts the expectations of politicians who are searching for a way to maintain physical as well as visual access to the river because this space is currently not being maintained, giving rise to the fear that a vegetation barrier will form all along the valley. This point of view is shared by the fishers, who complain of a lack of will among politicians, who "are helping ensure that the project is only ecological."

DISCUSSION

The removal of dams creates landscapes that open up new realms of possibility. The uncertainties surrounding the ecological restoration project undertaken by central government actors reveal the limitations of using an engineering approach to try to understand social-ecological system functioning. First, the example of the removal of Sélune dam encourages recognition of the co-agency of the human collective and the landscape in addressing contemporary problems. Next, it shows that the involvement of local people can be supported by recognizing the chain of relationships and interdependencies (Eyster et al. 2022) revealed by landscape experience. Finally, while the expectations of residents and users can be atomized, it is crucial to imagine new forms of dialogue to promote a common project.

Co-agency at work

The ecological restoration of the Sélune site is being undertaken in two stages based on an engineering scheme. First, public authorities are working on the site with the primary aim of removing the dams, in parallel with active restoration to control the sediments that accumulated in the previously flooded areas. The second stage is a passive restoration process in which vegetation grows spontaneously. This situation could lead one to believe that the first stage was dominated by engineers, followed by a second stage dominated by nature. The reality is more complex and shows that the landscapes produced during the two stages are the product of co-agency involving human communities and communities of non-human life forms.

Active restoration, characterized by the storage of sediments and the subsequent regrading of the valley floor, can be interpreted as a modern engineering act of human control over nature. We

propose to reverse this perspective: the restoration process is driven by the agency of the sediments. The government fears that a downstream flow of sediments would indicate a lack of control and contradict the operation underway to remove sand from the Bay of Mont Saint-Michel (Lefeuvre and Bouchard 2002). The agency of the sediments is fueled by the memory of the last dredging operation in 1993, which resulted in peak turbidity of 160 mg/L after a rainy period, and the poor management of the operation by Electricité de France (Germaine and Lespez 2017). The authorities are therefore making sure that the design offices and companies working on site on behalf of the government and Electricité de France limit these discharges as far as possible.

The engineering logic is also influenced by the landscape in the second stage of the project. Ongoing changes affect their plans. Although in other restoration projects, the role of vegetation is an integral part of the ecosystem's recovery of soil fertility or accelerates decontamination of polluted ground (Lei et al. 2016), this role was not taken into consideration along the Sélune before the transition stage began. Vegetation was not a priori perceived by project developers as playing a significant role, unlike in other dam removal projects such as on the Elwah (e.g., Brown et al. 2018, Prach et al. 2019) or the Klamath rivers (Klamath River Renewal Corporation 2020), where vegetation management was part of a planned strategy. However, even if it was never made clear by the promoters, vegetation participates extensively in the construction of a new landscape, both because of the role it plays for non-human agents (especially fish) by controlling the temperature of the water, and because of unwanted plants the actors fear will proliferate. Although these interactions were disregarded and in fact were not foreseen, they are now revealing themselves to be major drivers in the trajectory taken by the restoration project. Finally, in an opportunistic attitude, the vegetation dynamics could provide a possible content for poorly defined renaturation, leading to a laissez-faire attitude. However, in the Sélune Valley, this option is not the result of a reasoned choice, as is the case in other European regions or where associations explicitly call for rewilding projects (Barraud et al. 2019, Locquet and Héritier 2020, Morizot 2020), but has entered the realm of the possible and is increasingly present in the discourse. Unconsidered and unforseen by the authorities, vegetation dynamics are imposed by default, and the resulting landscapes are not accepted.

Engineering approaches driven by technical objectives have difficulty in dealing with the uncertainties of ecological restoration. In this context, landscape is never an issue because the action is guided by regulatory and safety concerns. Ultimately, the actions follow a schematic logic that is quite dramatic for the milieus and the actors, both human and non-human, because such actions appear to be insensitive to the affordances. We believe that if the landscape is not reduced to the material form of the environment, it can inspire territorial transition policies (Folléa 2020). The consideration of chains of trajectories (*chaînes trajectives*; Berque 2000) is fundamental to understanding the process by which actors, through meaning, action, and thought, come to grips with a reality in order to adapt it, if necessary. Landscape must be seen as a living entity: it is not just what the stakeholders decide to make of it, but has its own autonomy, which means that it must be considered as such in the implementation of a territorial project. It is important to recognize the agency of the landscape and the dynamics of trajectory chains because the landscapes delivered as part of projects will inevitably subsequently evolve, be transformed, or be altered (Delbaere 2021) as a result of the many interactions that take place between living elements, but also as a result of their capture by the site users.

Recognizing interdependencies for holistic restoration

Although the engineering approach tends to focus on the original objectives, the public authorities are not aware of many chains of interaction. They are mainly concerned with compliance and safety, i.e., not letting too much sediment escape while the works are underway, and preventing floods from releasing trapped sediment afterward. These objectives act like blinkers, preventing them from seeing the other issues at stake in the operation. We believe, quite the opposite, that it is useful to identify the other chains of interdependence at work around the river. It is a way of identifying and preventing potential conflicts, and it is a way to identify local expectations beyond the scope of ecological restoration, as well as other stakeholders likely to support the project (who are interested in the hydraulic heritage, for instance). Following Latour (2015; but see also Maniglier 2021), our aim is to identify the chain of dependencies to understand better the world we live in and what we value (Hache 2011, Gosselin and gé Bartoli 2022). Awareness of interdependencies and relationships is built up in the field and in the material experience of places. For example, it is not the vegetation alone that causes farmers or riverbank dwellers to act, but what its proliferation involves: the arrival of wild boar, or the fact that shading of the river by trees growing on the banks is detrimental to the living conditions of migratory fish. In other words, vegetation does not act alone, but helps to render visible the chain of relationships, collaborations, and dependencies.

The transitional phase also revealed issues that had not been foreseen. Those who support fishing are divided about the future of the residual weirs associated with old fisheries or mills (Lespez et al. 2023). The fishing federation does not believe they will prevent the target fish species (salmon, lamprey, and eel) from passing through them, but the water bodies they create upstream likely alter the quality of their habitats. Conversely, the presence of these structures in a heritage site is of interest to politicians and tourism operators. The weirs are also a source of diversification for kayakers, who are particularly keen to preserve them. Similarly, biodiversity protection has led to the preservation of part of the foundations of the factory buildings to preserve the populations of bats that nest there, but could also lead to the removal of this water-based heritage. To have the "technical" choices dialogue with the local social expectations, it would have been necessary to build a project together, but the project remained segmented from the beginning. In fact, the landscape produced is a production landscape: State services made choices that will affect potential uses of the valley. Considering the multifunctional character as a criterion for the success of the project can therefore be a way to motivate a truly holistic restoration that contributes to the renewal of people's relationship with the river and its surroundings (Wantzen et al. 2016).

Seeing these relationships and interdependencies requires a change of scale: looking not just at the river, but at the valley or catchment (upstream–downstream interactions, river–valley-bottom–slope) and integrating dimensions other than sediments and fish, as illustrated by the lack of interest in vegetation. Space

seems to be a practical medium for expressing these relationships. Being aware of the chains of interdependence encourages us to adopt a holistic approach to restoration, as opposed to an engineering approach that segments the chains and separates the environment into zones.

A sensitive landscape at the heart of restoration

Finally, undertaking a holistic restoration means not only restoring the river, but also the relationship between the inhabitants and the environment (Higgs 2003, Chan et al. 2016, Dicks 2022) while paying attention to all stakeholders (Hikuroa et al. 2021). Landscape is also one of the rare common themes that favor decompartmentalization and invite democratic dialogue (Sgard 2022). It is important to recognize the existence and diversity of ways of knowing and acting according to one's relationship with the world. These methods are both rational, i.e., crucial for responding to global change and to the erosion of biodiversity, and emotional, i.e., essential for building meaningful places and encouraging people to (re)connect with living things.

The new valley described here is being appropriated through the views of the inhabitants and users who directly experience the different landscapes independent of the frameworks conceived by experts or decision makers. If we accept that the aim of restoration is not to "fix" an environment in a given state, but rather to maintain its resilience so it can continue to provide a variety of services, then every user or inhabitant needs to be recognized as a potential manager or steward of this biodiversity, someone who will contribute to its maintenance at their own level. We believe that direct, empirical experience of the landscape plays a key role in this type of engagement. Actors take positions by immersing themselves in the valley and studying its new configuration. To date, the Sélune Valley has been characterized by the lack of local collective support for dam removal, unlike most such operations that, for example, had the support of Indigenous peoples in North America (Brewitt 2019, Diver et al. 2022) and New Zealand (Brierley et al. 2022) or, elsewhere, from environmental nongovernmental organizations (Gosnell and Kelly 2010, Sneddon et al. 2017). The only grassroots collective to speak out about dam removal has been the "Friends of the Dam" association that fought the project, whereas the actors who called for removal of the Sélune Dam ("Friends of the Sélune") are outsiders who failed to find a local ally in the valley (Germaine and Lespez 2017). In this case, appropriation is not based on memory or on the desire to rediscover forgotten practices, as was the case in the of the Elwah Dam in Washington State (Busch 2008, Winter and Crain 2008, Mauer 2020) or the Penobscot Dam in Maine, USA (Day 2006, Opperman et al. 2011), or on ecological principles that a priori favor such operations. Furthermore, the sensitive relationship between the river and the variety of visions and actions engendered by the new landscape were not taken into account in the engineering approach to restoration. In fact, many of the actors do not even know the place well, and memories of the river as a running waterway have completely disappeared among the local population, given the age of the dams (Drapier et al. 2023). The return of salmon is not a sufficiently strong lever, considering that only a few fishermen still fish this species downstream of the dams (Thomas and Germaine 2018). Although the relationship with the Sélune River is less obvious than elsewhere, it is important not to deny or neglect it, but instead to try to (re)build it (Germaine and Lespez 2023).

If in Europe, river restoration projects cannot count on Indigenous people's claims to restore the river environment or fish populations (Fox et al. 2022), such projects may find support in relationships with the landscape, as promoted by Linton and Pahl-Wostl (2023). The results of our analysis of the relationship with the environment during the transition stage concerning the capacity of social (hydro)connectivity (Kondolf and Pinto 2017) call for the creation of a new ontology based on respect and reciprocity. Although the relationship with restored landscapes is based on a utilitarian vision, affects and emotions are also involved in the construction of the relationship with this new environment through the identification of a new "playground" or new resources (e.g., land). In fact, new views lead to new expectations that can be called landscape innovations (Plant 2022). Some actors (farmers, kayakers, etc.) have played the role of landscape entrepreneurs.

Thus, restoration needs not only concrete works but also a vision, and the vision cannot be realized only on the basis of plans and diagrams independent of a direct relationship with the landscape (Gonin et al. 2024). A plan for the area is beginning to emerge through an empirical understanding of the valley's potential. It is worth noting that support may come from categories of actors that have been overlooked by the agencies overseeing the project because they are not directly affected or concerned by dam removal. This situation underlines the importance of broadening the category of stakeholders who may be interested in the new valley, to manage the restoration more holistically and thereby build a shared vision (Germaine et al. 2021). Although the politicians referred to those who had already experienced the valley when they asked for access to the valley floor, these "allies" must also be given a role to play in the building of a new vision of the valley. This is the condition for the emergence of new relationships with the landscape that will lead to collective attention and care (Haraway 2016).

CONCLUSION

The experiences of the new landscapes emerging in the Sélune Valley following the removal of the two hydroelectric dams testify to the role of the landscape in setting actors in motion. Although the first stages of the works were conducted solely from a technical standpoint to achieve ecological and safety objectives, the "renaturing" stage has revealed other aspects of the landscape that affect the choices made as a result. This situation illustrates the difficulty involved in predicting all the transformations brought about by an ecological restoration project of this type, and the need to account for sensibilities to the affordances throughout the duration of the project, as well as the trajectories they suggest to different actors. The relational experience actors develop with the area leads them to take initiatives related to the landscape. The example of the Sélune River restoration project also shows that decision makers themselves are sensitive to the affordances, and that a project cannot be fully defined and constructed in advance based on a plan in the absence of any interaction with the reality of the place. What is more, our results invite us to rethink the notion of the collective and to open it up to non-humans. To accompany an ecological restoration project, more attention needs to be paid to the relationship between humans and non-humans, and even to focus on this relationship, because it is the source of the environment that ultimately emerges

(Latour 2005). Even though in the Sélune Valley, such initiatives are still mainly spurred by individuals and associations, the problem is seeing how these wishes are or are not taken into account by the decision makers, i.e., central and local government authorities. This is the moment when power relationships between actors will come into play and different trajectories will be presented that will favor keeping the riverway a shared experience to varying extents. From an operational and political standpoint, the results will depend on the capacity of the project owners and of the decision makers to expand the ecological project to include sensory and landscape dimensions.

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[1] Original quotation (in French): "Les sociétés aménagent leur environnement en fonction de l'interprétation qu'elles en font, and réciproquement elles l'interprètent en fonction de l'aménagement qu'elles en font."

[2] This is a public establishment for intermunicipal cooperation (French acronym EPCI). It is an administrative and political entity that brings together several municipal bodies and has existed since 2015.

[3] The Yvrande flows into the Sélune on the right bank a few hundred meters above the Vezins dam. The sediment stored in the Yvrande was contaminated with heavy metal waste dumped by a metal processing facility and consequently could not be exported. After being dried, this sediment was encased in dams made of gabions (wire containers filled with rocks) and then covered with 3 m of healthy sediment. The entire area will not be able to be used for several years.

[4] The lifting of the prohibition on access to the valley depends on completion of the sediment management works. No partial reception is planned that would allow progressive lifting of the prohibition, starting upstream and heading downstream. Moreover, the central government is currently involved in litigation with the contracting company. Thus, as the sediment from La Roche-qui-Boit is stored in the Vezins reservoir, the worksite has been extended, thereby also prolonging the time until the ban ends.

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No data or code were generated.

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