Petitimbert *et al.*
*European Journal of Futures Research* (2022) 10:7
https://doi.org/10.1186/s40309-022-00195-6

European Journal
of Futures Research

RESEARCH ARTICLE

Open Access

# (Re)politicization of climate change mitigating projects: environmental forms and motives of the Seine Nord Europe canal

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**Abstract**

Climate change adaptation and mitigation strategies are gaining visibility and support. Decision-makers are defending the extension of large infrastructures that are low greenhouse gas (GHG) emitters, as a way to act quickly and massively without calling into question existing economic models. This situation depoliticizes these projects, masking their other ecological consequences such as their impacts on biodiversity. This article examines how promoters of these projects depoliticized its socio-technical futures while other actors re-politicized them. Using the example of the Seine Nord Europe Canal project, we show a politicization of the territorial future and a depoliticization of the environmental future. This depoliticization is based on the techno-optimist discourse promoting large-scale infrastructures as the only possible solution to the global ecological and climate crisis. It uses a selective framing of the environment that makes some elements visible and others invisible. We conducted semi-structured interviews with biodiversity stakeholders in the territories that would be impacted by the canal. Based on the concepts of environmental forms and motives, we reconstructed the environmental ontologies ignored by the dominant discourse and assembled them into three alternative scenarios. We present the method of investigation and identification of these motives and discuss the likelihood of the constructed scenarios participating in a re-politicization based on the reactions of various actors.

**Keywords:** Transport infrastructures, Biodiversity scenarios, Environmental forms environmental motives, Technological promises, Discourse analysis

## Background

Large spatial infrastructures, such as transport or energy provision, are spread across territories and at the same time build them politically, economically, and ecologically. The public or private promoters of these projects frequently benefit from an asymmetry of power in imagining the future of the territories concerned. They often have more means to design their project and study its environmental impacts than do the government's environmental assessment services and the local actors. They can sketch and promote their preferred technical solutions through largely publicized communication channels.

This situation of asymmetry is even greater when it comes to large technical systems that are depicted as solutions to reduce greenhouse gas emissions. National and European climate mitigation policies frame discussions on infrastructure, in which other issues pertaining to distribution [37] or ecology tend to be overlooked. This has the effect of depoliticizing renewable energy production and non-road transport infrastructure such as rail and waterways. It is consequently more difficult for stakeholders who express concerns about other issues not studied by the project owner to voice their concerns.

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In addition to the rhetorical framing of climate mitigation, project initiators also select the environmental elements they choose to represent in future scenarios. Environmental realities interact with each other through ecological processes. Human knowledge accounts for this complexity through a list of ontologies that describe these realities and their relationships. Selecting some of them in public representations while making others invisible produces another kind of framing, which can be called an ontological framing. By identifying other ontologies perceived by the actors but not promoted in the socio-technical future of the project, our work evidences this ontological framing.

This paper presents the results of the INFLUBIO research project which examined the consideration and governance of biodiversity in a major infrastructure project, the Seine Nord Europe Canal (see Fig. 1). The study we conducted confirmed the asymmetry of means between the contracting authority and the other actors, and the salience of the environmental forms designed by the former in the collective representation of the project. We were also able to collect diverging viewpoints, such as expressions of the fears about how specific forms of biodiversity would be governed in the future.

Our research work consisted in revealing these fears, in order to take a step back from the predominant imaginary. In this article, we do not present all of the environmental concerns that we identified, nor the scenarios that we constructed to render their political dimension, because their content is mainly of local interest. Instead, we focus on presenting the approach and the interest of the concepts of environmental forms and motives for challenging a quasi-hegemonic discourse on an environmental future.

We discuss the democratic interest of such scenarios of aggregated motives to make other voices heard. We then evaluate the potential of re-politicization that they convey. Although scenarios alone may not challenge the existing asymmetries of power, we assess the conditions under which they can contribute to the public debate about the environment of sociotechnical futures.

The article is structured as follows: the first part presents a literature review and sets out the theoretical framework for the politicization and depoliticization

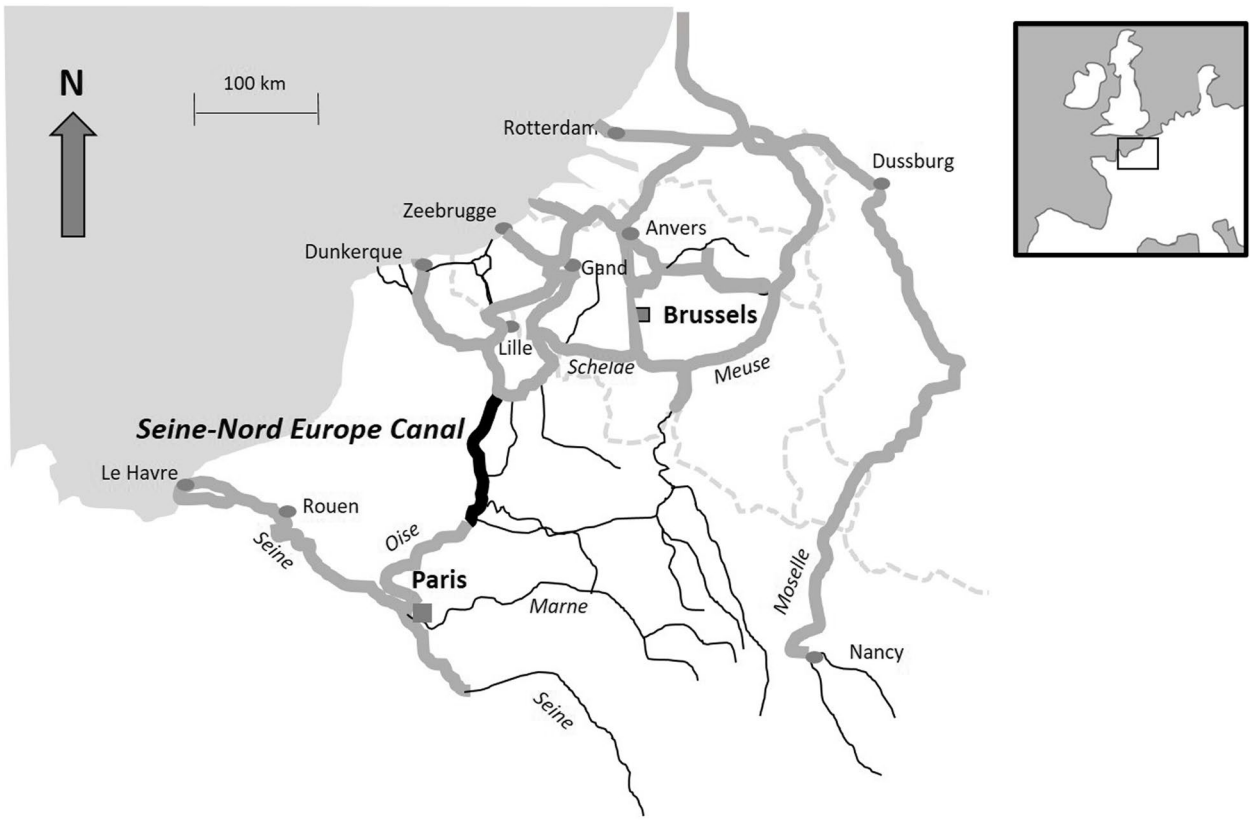


**Fig. 1** General map of the location of the Seine Nord Europe Canal project and among North-Atlantic waterways. Source: Authors, adapted from https://www.canal-seine-nord-europe.fr/Objectifs

of infrastructure projects in the Anthropocene. The second part presents the method used in our research project. The third part presents the results of our analysis of the politicization and depoliticization of the Seine Nord Europe Canal, and discusses the effects of re-politicization induced by the alternative scenarios we built in our research project. We conclude with some major points on the politicization of large spatial infrastructures and reflection on the ecological crisis.

## Literature review and theoretical considerations: politicization and depoliticization of infrastructure extension projects in the Anthropocene

STS scholars define infrastructures as technical systems of a scale or scope that exceeds a single site and which, once built, become embedded and transparent in society [36] because their existence is no longer questioned and their relative reliability for the user tends to make people forget all the work necessary to maintain them. An infrastructure "becomes visible upon breakdown" (ibid: 113); only during these episodes may users become aware of its social effects.

STS identify two stages in the existence of infrastructures. The first stage occurs when infrastructures are needed to introduce a new technology (electricity, water at home, cars, 4G, genome sequencing, etc.). Scholars focus then on the relation the infrastructure has to the sociotechnical emergence of the innovation, the promises associated with it [11] and the politicization of contested futures (see for example, [27]).

The second stage of infrastructures occurs when they have become so familiar in our daily lives that we no longer see them because they do not need to be reconsidered at the moment of each task they enable. Their political dimension no longer lies in the future they may make possible, but in the effects they have on certain publics ([34, 36]: 537). Some existing infrastructures are conceptualized as large technical systems (LTS) that may experience some decline due to a lack of maintenance but still act on the social due to their continued existence [35]. T.P. Hughes considered large infrastructures to be the material foundation of modern American civilization and to influence social change [21]. Van Der Vleuten [41] also claimed more recently that LTS reflect deep structures in society that can surpass natural geography or politics as key drivers of societal change.

We are interested here in a third stage: the extension, across a larger space, of large infrastructures that have already existed for a long time. This event must be conceptualized in a specific way because the uses allowed by the infrastructure are already known and embedded in society, but through the physical construction of the extension the infrastructure regains visibility. This calls for new justifications for the infrastructure that may be different from those that supported its initial implementation.

Our analysis focuses on the politicization of infrastructure extensions. We define politicization as an endeavor that is performed not only by political actors [42], for it encompasses all activities that bring controversies to topics from which they have been missing. It encompasses two interrelated meanings: "(1) making something publicly visible, and (2) making something debatable and open to conflict" ([29]:265). Before an issue becomes an institutionalized political conflict in which decisions are finally taken, politicization is already there as soon as somebody names something as political, voicing the existence of choice [19]. It therefore goes beyond the increase in polarization of opinions, interests or values [9]. Symmetrically, depoliticization, which consists in making something invisible or non-debatable, also has political consequences and must be studied together with politicization. We are therefore interested in how proponents and critics of infrastructure extension projects debate them in the public arena.

The extension of an existing infrastructure is political as soon as it requires public approval while alternatives are considered [35]. On this occasion, imaginaries and promises are mobilized again to promote the infrastructure [27]. The mobilization of these imaginaries is a form of politicization through values because "beliefs about technical futures are not value-free; quite the opposite, they pertain to 'sociotechnical imaginaries' containing explicit and implicit accounts of what society is and what it should be" [22].

Concern for the environment is an important part of this politics of imaginaries. Granjou et al. [18] have shown that foresight studies are "intricately connected to the emergence and development of environmental anticipation as discourse and practice" (ibid:5). The public debate on future infrastructures includes their relation to the local and global environment. Hence, since the 1970s, the developers of infrastructures have had to show through impact studies that they are not harmful to the environment. The public debate may revolve around global climate issues (mitigation and adaptation) and biodiversity issues (no net loss). At the local level, the politicization of ecological issues often consists in making certain material elements visible and hiding others. To conceptualize this selective public visibility of environmental objects, we draw on the concept of environmental motive [6]. This concept describes how materialities are identified, named, and shared socially through the categorization of forms that can be articulated to values or

motivations. Of course, infrastructure developers also try to defend their projects by finding forms of politicization and depoliticization unrelated to environmental issues.

In the following two sections, based on the literature and the example of waterways in Europe, we argue that the extension of an already existing transport infrastructure is most often subject to: (1) politicization by the territory concerned and (2) depoliticization by the construction of inevitability.

### The territorial politicization of spatial extension of large infrastructures

Authors who have studied large technical systems in the field of transportation [8, 15, 39] have insisted on the importance of the territorial dimension of politicization. Infrastructure contributes to the making of territory alongside identity or founding narrative [7]. The extension of the river transport network in France is particularly interesting from this point of view because canals historically contributed to establishing centralized political power over the national territory, before they lost their legitimacy and economic competitiveness to the benefit of rail. The project to extend this river network therefore revives different territorial conceptions.

Various navigation projects have fuelled claims of sovereignty over the waterways of French territory for economic development, and the myth of a national territory structured by the waterway network. Philippe Buache conceptualized the notion of watershed in French geography as a way for the monarchy to naturalize the State ownership of navigable and floatable waters (for timber) [13]. This hydrographic reading of the territory survived the Revolution and the Republic institutionalized the distinction between State waters (floatable or navigable) and other waters (whose banks are private). Navigability was imposed as a legitimate form of public utility and State ownership in the national community. Most canals in the territory received significant government support, either through funding or through the public expertise of the engineers who designed them [40].

But this history of canals that served the construction of the central State ended in the nineteenth century.

The last great program to extend the river network in the nineteenth century was the Freycinet Plan for waterways which was approved too late, at a time when private companies were investing massively in railways. These companies boycotted the transfer of goods from rail to waterway or vice-versa by means of prohibitive tariffs and delays in the work. Finally, the economic crisis of 1882 drastically reduced the ambition of the Freycinet Plan [16, 26, 28]. Twentieth-century State and regional planners experienced several failures in the field of river infrastructures. One of these failures has a specific significance for our case. The Canal du Nord is a small-gauge canal that currently exists on a route parallel to that envisaged for the future large-gauge Seine Nord Europe Canal project. It was designed in the Freycinet Plan, but its construction in the Hauts de France Region was postponed twice due to the two World Wars. It was finally completed in 1962, but its capacity was deemed insufficient as soon as it was put into service. Another failure concerns the Rhine-Rhone canal project, which was presented by transport stakeholders as an essential link between the northern and southern networks of the country. It was strongly criticized by environmentalists and abandoned in 1997 by the *Gauche plurielle* coalition [3, 4, 31]. The completion of the project of standardization and centralization of the French territory in the 1960s [24] owes more to the railroad network and the highways (and many other political factors) than to the canals. The 107 km long Seine Nord Europe Canal aims to connect Paris to Benelux Countries. Its construction is still under discussion when we write this paper. In this context, this project of canal revives the myth of a national territory structured by the waterway network, despite the public policies conducted since the nineteenth century that have favored roads and railways.

### Depoliticization of the mitigation infrastructures in the Anthropocene

Depoliticization consists in presenting a public decision as a purely technical matter to be dealt with by experts and not debated in public. The Seine Nord Europe Canal project is an example of a specific form of depoliticization of mitigation projects. An explanatory statement in a strategic environmental planning law (*Grenelle 1*) and the declaration of public utility of the project both emphasize that shifting traffic from road to this waterway could reduce greenhouse gas emissions by 250,000 tons CO2 equivalent per year. Officials of the Regional Council focus on this argument to justify the project. In the Anthropocene, large technical systems that contribute to reducing CO2 emissions enjoy a favorable discourse [38]. The authors argue that evoking large global changes in the Anthropocene tends to hollow out public debates. They speak of post-politicization with regard to discourses that disqualify social struggles, as if any technical project to combat climate change should necessarily be encouraged, while this technophile bias invisibilizes divergences of interest, for example between capital and labor and between climate and biodiversity policy. One could also argue, in line with McLaren and Markusson [25], that the promise of technical solutions co-evolves with the IPCC models and delays action.

Beyond the global framing, the promoters of the canal also perform framing at the local level to impose a future

where the canal is already present. Garb [12] examined the discourses of transport infrastructure promoters using the case of the trans-Israeli highway. He argues that the depoliticization of the project was achieved through the construction of its inevitability. To do this, the promoters sought to get rid of all questions beginning with "if" and "when", which challenged the alternatives and the reality of the project. They focused on questions beginning with "how". We also see this depoliticization on the Seine Nord Europe Canal, where the contracting authority has built a technical argument to respond to all environmental fears. But as Adam and Groves [1] have pointed out, such a future begins by lacking both visibility and meaning. To give it consistency, the canal's promoters use photomontages and diagrams of certain features of the canal as showcases. These features become highly publicized environmental forms [6]: " the living canal", "the lagoon banks", "the canal bridge", and so forth. By highlighting these environmental forms, the project management operates an ontological and normative framing, as if the only things that existed and should exist in the environment were the canal and its technical solutions. All of these imagined forms create a more concrete future than that associated with the absence of the canal. To make the criticisms and fears audible, we identified other concrete environmental forms and motives that could also be shared and then investigated their re-politicizing potential.

## Methods

Our survey method did not aim to collect a representative sample of the population's opinions, but to identify ecologically sound views, which could be in the minority. We conducted 31 semi-structured interviews with 29 people involved as experts or spokespersons in the governance of biodiversity in the area under study and working in government departments [4], for the canal company or the Voies Navigables de France public agency [5], in chambers of commerce, industry or agriculture [2], at local authorities [9] and for non-profit associations [10]. The four sociologists of the project used the same interview guide. We used the Nvivo software to analyze and code contents. The first interviews served as a trial for a reflexive analysis to eliminate bias between interviewers.

We collected and analyzed public studies and documents related to the project (legal environmental assessment submitted to reviews, opinions of the authorities, public inquiry report), and to its environment (State map of issues, environmental planning documents). From the European newspaper database Europresse, we identified 91 published articles which mentioned concrete characteristics of the canal project that were under debate, and we kept the arguments related to ecological issues mentioned in 10 of them. These written documents allowed us to identify an initial list of environmental ontologies (forms and motives) that exist in the project's social environment. The list served as a reference to ensure that we did not forget any elements in the interviews.

We used the Nvivo software to identify and group together the environmental motives [6] cited in the interviews, i.e., environmental ontologies associated with motivations (fears, expectations, interests, values). These categories of analysis were constructed incrementally and iteratively, according to three main inputs: the biophysical functioning of these environmental objects, their politicization, and the policy instruments used to govern them [20]. During the interviews, some respondents used different terms to talk about environmental objects with similar biophysical behavior. When this made sense from a biophysical point of view (for which we consulted an ecologist participating in our research project), we grouped them together. If they fell under the same politicization or the same policy instrument (impact study, protected species), these categories of analysis could then be aggregated within the same environmental form and motive. We distinguished between stabilized motives established by law and those still under debate.

We then constructed alternative scenarios by combining the motives still under debate. We imagined they could evolve into hot issues, managed issues, or silent issues, depending on the actors' ability to mobilize for them or to negotiate their management. We also considered that some motives could lose their salience in local memories (see Table 1). We called upon the team's ecologist to ensure that the alternative scenarios were consistent in terms of biophysical processes.

We also drew on the socio-history of infrastructures of the same type to imagine how environmental forms and motives could evolve. We brought input from existing techniques for reducing construction site nuisances and for current biodiversity management of existing canals.

Last, we chose to force contrasts between scenarios by organizing them according to three political visions identified in the scientific literature Sergent [33]: green growth, ecological modernization, and commons-based management. We then submitted the resulting scenarios to local and national experts of the Ministry of Ecological Transition, to test their plausibility. These experts completed and amended these narratives by suggesting modifications that reinforced credibility through their knowledge of the legal procedures and the history of the zones impacted by the canal.

**Table 1** In the 3 imagined scenarios, 10 motives were taken into account as hot, managed, or silent issues. Their graphical representations are used in the following figures in black, grey or pale grey according to their salience in the scenario

| | | A truly green channel | Railway modernization program | The bioeconomy canal |
|---|---|---|---|---|
| Project timeline |  | | | |
| Living channel |  | | | |
| Waterway platforms and commodity types |  | | | |
| Water flows and volumes |  | | | |
| Habitats and ecological continuity |  | | | |
| Landscape of construction site |  | | | |
| Future of offset measures |  | | | |
| Road traffic |  | | | |
| Incidents in the life of the canal |  | | | |
| Mudflows |  | | | |

Hot issues
Managed issues
Silent issues

## Results: the different politicizations, depoliticizations, and re-politicizations of the Seine Nord Europe Canal

### Politicization and depoliticization of the Seine Nord Europe Canal

While in the early 2000s, the Seine Nord Europe Canal (SNEC) project was politicized as a solution to mitigate climate change, local elected officials' fears of mobilization by opponents to the project contributed to the development of another argument around the territory's economic development. Gradually, through the intermediary of the project initiator, the political argument of the canal's necessity was replaced by technical discourse on the construction and management of the river infrastructure. The narrative of inevitability highlighted by Garb [12] took shape.

The designers and financiers of the project first politicized the SNEC project through its alignment with environmental issues. In 2007, the Grenelle de l'environnement (French environmental summit) called for the canal to be in place by 2020 as part of the fight against climate change and the reduction of greenhouse gas emissions. At the time, Voies Navigables de France estimated that 4.5 billion kilometer-tonnes would be saved annually, equivalent to 250,000 tonnes of $CO_2$, as a result of the modal shift from road transportation to waterways [5], since water transport is deemed to be nominally four times more carbon efficient than road transport. The environmentalist NGO France Nature Environnement, which had long prioritized waterways over road and had actively mobilized against the building of the A24 Amiens-Belgium freeway, supported the inclusion of the canal in the Grenelle law. The modal shift was also the main ecological argument justifying the construction of the canal, according to the project initiator and the financiers (including the European Union and the Regional Council). Yet, this argument was contradicted by these same actors who acknowledged that, on the whole, freight transport might also increase, which could lead to an overall increase in greenhouse gas emissions (Regional Council interview, March 2017). Moreover, the increase of droughts—which raised questions about the canal's water supply—was not anticipated in the reports by the project initiator and in the declaration of public utility. In the final analysis, the socio-technical imaginary of the canal was concerned with mitigation more than with adaptation. It was underpinned by a relatively optimistic representation of the effects of the ecological crisis on territorial ecosystems.

This project was largely supported by regional actors, but was given low priority by successive national governments. Generally, the waterway network has little support from national elites, who have traditionally favored the development of rail since the 19th century. Additionally, the SNEC put the port area of Le Havre (northwestern France) and the Hauts de France region (northern France) in economic competition with each other. Governmental elites on both the left and the right, bound by previous mandates in northwestern France, were mostly reluctant to implement the project. This was notably the case of Édouard Philippe, prime minister between 2017 and 2020 and former mayor of Le Havre. However, the local promoters of the project found support among European actors. In 2004, the European Parliament and Council declared it a "priority trans-European transport project". The French government then entrusted the public agency Voies Navigables de France with the task of launching design and impact studies. An institutionalized public debate was organized. However, the costs quoted by the bidders in 2011 exceeded the estimated budget of 4.5 billion euros. The promoters of the project again found support from Europe in 2013 through: (i) the European Parliament and the Council Regulation 1316/2013 establishing the mechanism for interconnection in Europe, which finances 50% of the studies and 40% of the work of priority projects; and (ii) Regulation 1315/2013 identifying the Seine Europe link in the priority guidelines for the development of the trans-European transport network. This European funding proved decisive in convincing the French authorities. Lanneaux [23] has argued that this canal would contribute to building the European territory at least as much as it would to building the French territory.

The SNEC promoters later changed the politicization of the canal due to a political event outside the region. The construction of an airport on the territory of Notre-Dame-des-Landes near Nantes (France) spurred fierce activist mobilization. The "zone to defend" (ZTD) environmentalist occupation of the area in which the Nantes airport was to be built was made possible by the support of local actors who challenged the purported economic benefits of such a project and feared its effects on the territory. Rémi Pauvros, MP for the Nord (also a director of the contracting authority), who was in charge of a parliamentary report on the political and ecological advantages of the Seine Nord Europe Canal, feared the organization of an anti-Canal mobilization similar to that of Notre-Dame-des-Landes (interview with an associate, March 2017). To weaken any local support for such protest, he emphasized the territorialization of the project by binding the future of the canal to that of the Region. He also claimed that the canal project would contribute to the economic and social revival of one of the poorest regions in France, marked by industrial decline. The local political actors, i.e., local representative of the State and the Regional Council, ensured that the *"Grand chantier"*

(major project) was designed to benefit the local actors of the territory (local construction companies, job seekers, etc.): facilitating local employment, adapting the training needs of the worksite trades, promoting the professional integration of young people, supporting local companies so that they could respond to calls for tenders, and meeting the ancillary needs of the worksite locally (catering, accommodation, transport). In short, the project was reframed around the economic revival of the territory, so that the ecological argument fell into the background.

SNEC project initiators continued however to fear the emergence of local mobilization against the ecological impacts of the canal on local ecosystems. The feasibility of creating and maintaining aquatic biodiversity in a canal built without there being a pre-existing watercourse was still an open question. Additionally, as the canal would pass through ecologically valuable wetlands, it was likely to disrupt local biodiversity. To counter this other front of opposition, the project initiator set up an Environmental Observatory composed of local experts and collected their ideas for making the canal "a living canal". These local experts included representatives of environmental non-profits, the regional hunting federation, the regional fishing federation, and experts who were partners of the local authorities. The greening of the project was based on a set of technical solutions designed to avoid protected areas (with, for example, the installation of a canal bridge in the Somme), to develop the banks (gentle slope, lagoon banks), and to try to limit water losses by sealing the canal. Mitigation measures planned according to the legal precept "first avoid—then reduce—last mitigate" also aimed to support local biodiversity, in particular by restoring local wetlands that were poor in biodiversity, such as the poplar groves on the Oise. Such proposals included in the impact study were aligned with a socio-technical imaginary, which contributed to an engineering depoliticization of the canal project. It showed Nature mastered by means of technical innovations carried out by the contracting authority.

In the end, these different politicization and depoliticization operations understated the primary objective of transportation. The discourse on the "living canal" became prominent in public debates. As one of the members of the project management company pointed out, "The infrastructure, we hide it." (April 2018). In short, infrastructure disappeared behind an artificial nature maintained by ecological engineering. Climate change was no longer central to political and technical discourse.

The gradual predominance of technical discourse—with the *"Grand chantier"* approach and the advisory Environmental Observatory—confined discussions about the canal to expert arenas [14] and obscured other political and more contentious arguments about the political, economic, and ecological merits of the canal.

#### Re-politicizing the future through alternative narratives

The environmental motives approach allows us to examine the dominant sociotechnical narrative, its promoters, and their influence on the territory. The words collected during the qualitative investigation highlighted contrasting perceptions and representations, and revealed how and by whom dominant representations of nature were constructed and what they left out. The motives not taken up by the project management opened possibilities for elaborating alternative narratives that would restore ignored and delegitimized voices and then promote a potential political re-appropriation of the future [37].

The concerns associated with the environmental forms that we identified in interviews related to their future dynamics in the presence of the canal. Would wetlands and endangered species disappear? Would noise and dust invade the living environment? Would landscapes be transformed? We made these questions debatable by embedding them in potential futures for 2040. Our intention was to explore the re-politicizing potential of such environmental forms and motives by elaborating narratives that differed from the socio-technical imaginary of the canal promoters.

The aggregation work produced 11 environmental forms and motives corresponding to stabilized entities, instituted in law and governed by specific policy instruments: the public river domain, drinking water catchments, waterways, protected species, wooded areas, hedges and paths, classified facilities, water pollution, built heritage, agricultural land, and wetlands. It also resulted in 10 non-stabilized environmental motives, whose spatio-temporal contours and political meanings were still being debated: the canal project itself, incidents that may occur, the living or non-living nature of the canal, mudflows, ecological compensation sites, breaks in ecological continuity, road traffic, water flows,

(See figure on next page.)

**Fig. 2** A truly green canal. The canal project is carried out well with carbon accounting and compensatory measures. Incentive policies secure the transportation shift from road to water. Yet, climate change challenges the infrastructure. In summer the canal water heats up, the lagoon banks silt up, and joints in the canal expand too much, causing leaks. Some winter rains cause mudflows and pests attack the tree lines. A lot of manpower must be mobilized for maintenance. Interbasin water transfers are undertaken. All these unforeseen events lead to additional costs, but they are taken care of by the public authorities to ensure a truly green canal

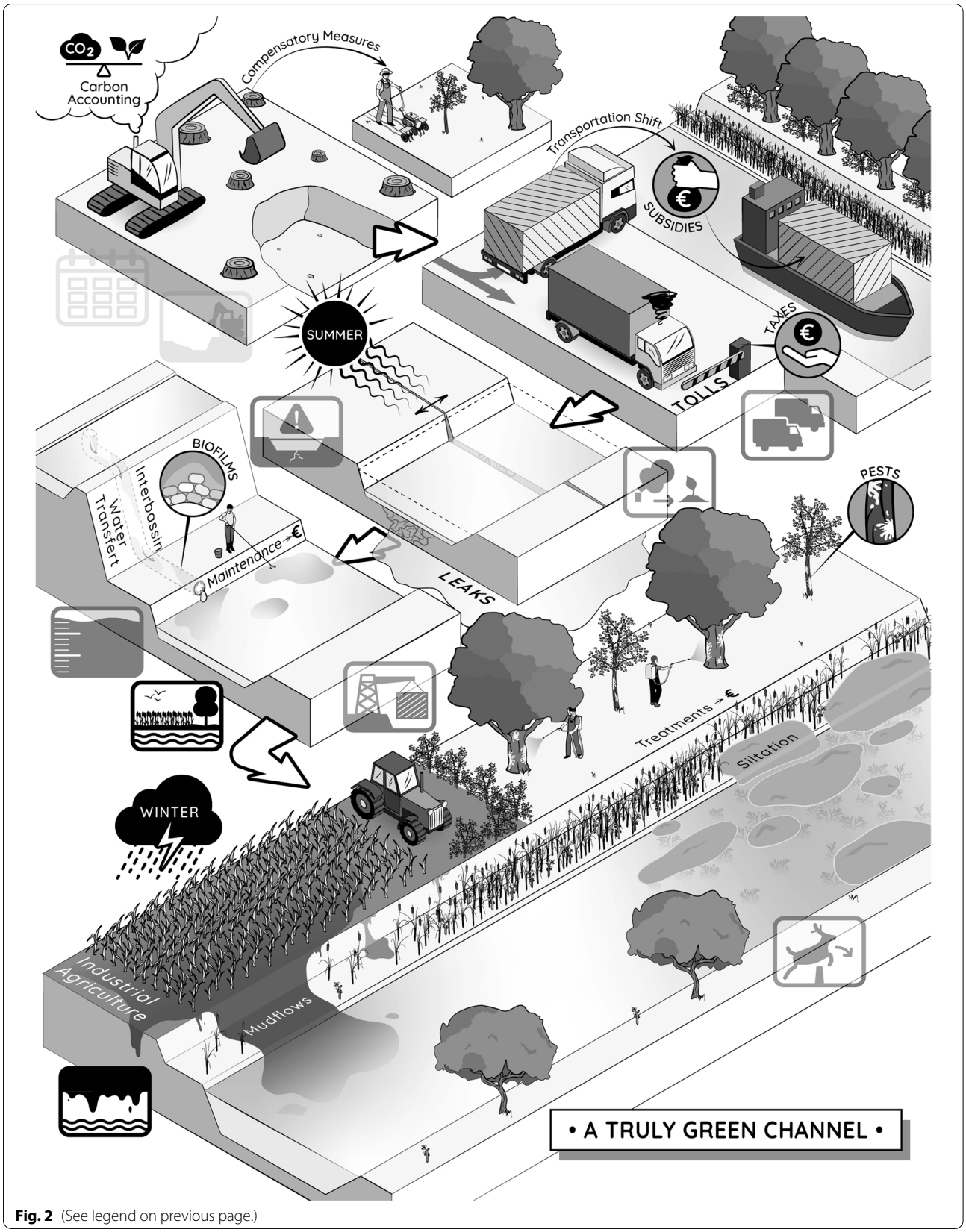


**Fig. 2** (See legend on previous page.)

the multi-modal platforms, and the construction site landscape.

As explained in the "Methods" section, we built on these motives under debate to shape three alternative scenarios to the dominant discourse (see Figs. 2, 3, and 4), which imagine that motives can have more or less salience in public debates as shown in Table 1.

We presented the three scenarios to the project sponsors (the SNEC contracting authority itself and the Regional Council). They were invited to express their views during a dedicated meeting. Their reception of these scenarios revealed an initial performative effect. They clearly perceived the scenarios as a political and argumentative threat to the technical project, and they asked to negotiate the status of these scenarios with us.

First, they wanted to qualify the scenarios as science fiction. Yet, as we argued, these scenarios reflected the real concerns of the actors, not the researchers' imagination, even if the narratives were more coherent and convincing than a series of testimonies from actors who did not necessarily have any authority. The SNEC initiators agreed that these stories were not a piece of literature disconnected from real life conditions.

Second, they challenged the scientificity of the method and the ethical positioning of the researchers. They required the research team to distance itself from a critical standpoint and to explicitly label the constructed scenarios as undesirable. We proposed to call these scenarios alerts that could give rise to a right of response from the project initiators in the form of a desirable scenario. It was agreed that this response could be included in the research report. This compromise offered the project initiators the guarantee that the alert scenarios would be disseminated at the same time as the technical and managerial arguments intended to reassure. The addition of a desirable scenario co-authored by the research team and the project sponsors mitigated the critical impact of the research report. However, the construction of this scenario also created legitimate expectations about how to prevent undesirable scenarios. By agreeing to build a so-called "desirable" scenario, the project sponsors agreed to acknowledge some uncertainty regarding the project future. The motives and the scenarios revealed issues that were absent from the debate, yet they also revealed the predominance of the project initiators' desired futures over other possible but dissonant futures. The project initiators disqualified these other possible futures but they absorbed part of the criticism in their own projections of the future. Through this phenomenon of construction and selection of the future, the dominant imaginary was further imposed as the only possible and desirable future in and for the territory.

This reaction of the project initiators nevertheless demonstrated the capacity of the imaginary worlds assembled by our research team to reopen the space of debate that had been framed in a restricted way to secure local consent for the project. The alternative scenarios challenged the vision of a climate-mitigation canal by reporting uncertainties on future road traffic. They also called into question the "living canal" as they reintroduced biodiversity issues and particularly the uncertainties linked to biodiversity preservation (e.g., mitigation measures, lagoon banks). They introduced new coherent narratives—detached from the people who had contributed to their elaboration—which could be seized upon by actors who would like to break free of the contracting authority's scenario. Today, the scenarios constitute a means of political reappropriation of the future that has remained in abeyance for lack of actors and of a window of opportunity to bring them into the public space.

The political process is not, however, limited to the public space and the placing of issues on the agenda. The implementation of decisions [30] and the formulation of policy solutions [43] are also a matter of struggle. Our warning scenarios have not been discussed in public arenas, but they have been taken up within the State's environmental assessment review departments. The recent neo-managerial reforms of the French State have given more decision-making power to prefects, who tend to distrust technical services since they have no control on their level of expertise. In this context, these services have experienced forms of modernization that devalue their technical skills, which also prevents the State from developing a common knowledge of local issues [2]. The prefectural services have lost their ability to anticipate the future of local territories, since the only information they receive is from the socio-technical promises of the project initiators and from opposition, when it arises. This is how we understand the positive reaction of one of our respondents working in a State environmental assessment service, who commented: "it [the

(See figure on next page.)

**Fig. 3** The railway modernization program. During a very dry summer, a collective of inhabitants mobilized against the hydrological impact of the project and claimed that the water traffic forecasts were not credible in a context of economic crisis. Following a ministerial reshuffle, the new government abandons the canal project in favor of a railway modernization project and ecological restoration of the Sensée and the Somme. The existing old canal is landscaped for river tourism. A network of paths and hedges offset the impacts of railway developments. The train offers fewer export outlets, but agriculture is turning to agro-ecology and local markets. New farming practices limit mudflows. It also improves water quality. Authorities occasionally authorize pumping in the existing canal is for irrigation and tourism development

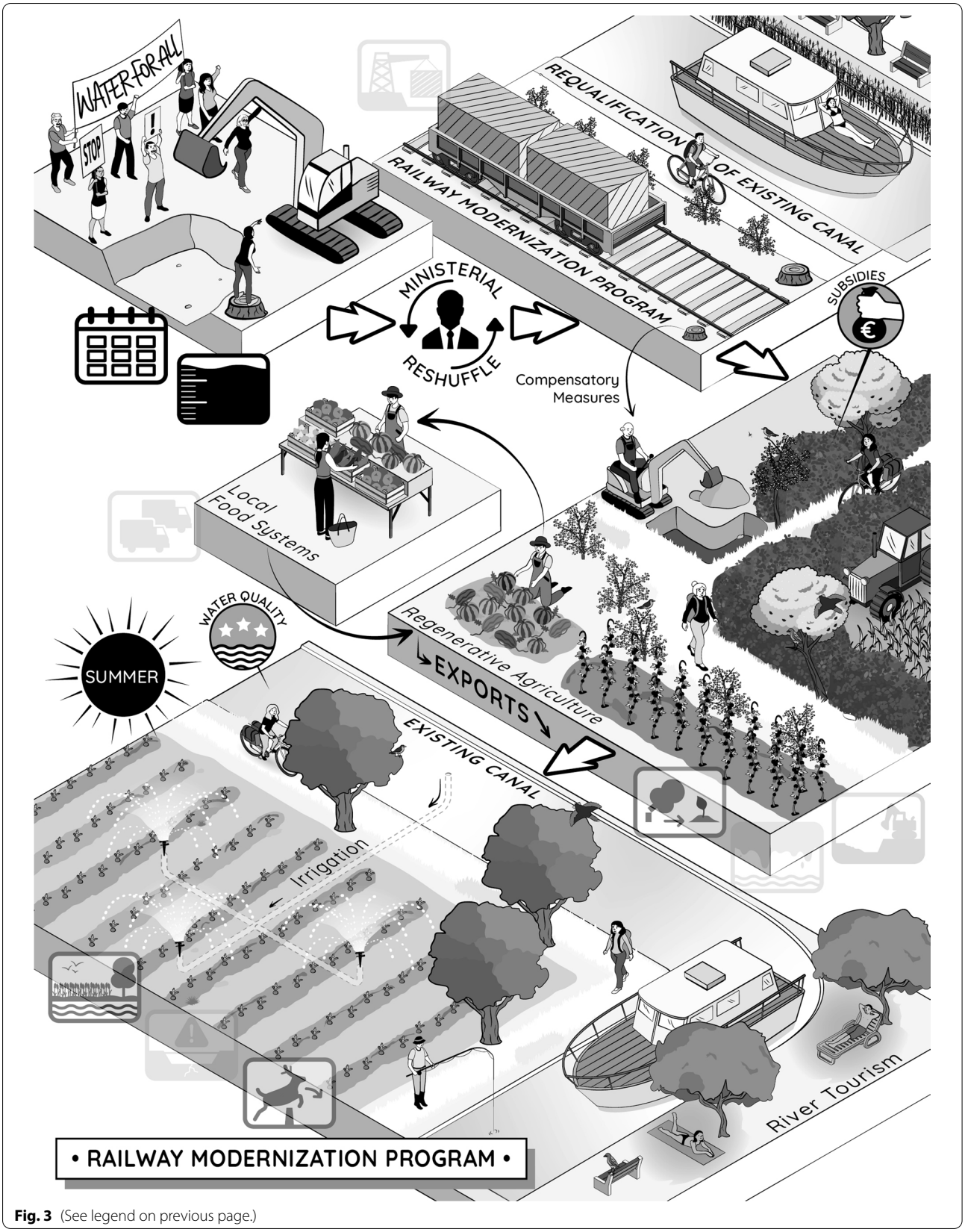


**Fig. 3** (See legend on previous page.)

INFLUBIO research project] gives meaning to our work". A State engineer who occupied a transversal function at the regional level, to establish dialogue between the prefect and the technical services, also took up our warning scenarios. One of these scenarios envisaged local opposition to the construction site, which took the form of a ZTD—a form of protest that often costs prefects their jobs. The status of the engineer and the seal of science on the INFLUBIO research report made the ZTD risk credible in the range of possibilities discussed at the prefecture. This created favorable conditions for building a common position of the State services, distinct from that of the contracting authority, on water resources and construction site excavations related to the canal. The warning scenarios thus reinforced the critical arguments of the State environmental assessment services.

## Conclusion

As illustrated in other papers in this special issue, the construction of sociotechnical futures is a political enterprise that aims to enlist allies and produce consent. In this paper we have looked specifically at the politicization of the sociotechnical futures of spatially unfolding infrastructures, such as transportation infrastructures. In conclusion, we would like to consider four major points.

First, not only are these infrastructures politicized when they are first implemented and when they eventually fail, but each of their extensions is an opportunity for territorial re-politicization, because of the new places involved. For this reason, in addition to a sociotechnical future, the promoters of the infrastructure construct a territorial imaginary, to convince sponsors and obtain local residents' consent. Like other transport infrastructures, the SNEC has thus been politicized territorially. It has been presented as a factor in the development of the Hauts de France region and a means of building a European territory for the free movement of goods.

Second, the climate crisis imposes a framing on all major socio-technical infrastructures. This tends to depoliticize those that are presented as mitigators of greenhouse gas emissions. However, this framing does not exhaust the debate, as shown by the case of the SNEC and other work on renewable energy [10]. The time frame of the transition and the insertion of the project into the local context are all subjects of re-politicization. We have noted that the promoters of these projects respond to criticism by producing an "ontological framing", in other words, by describing what can and should exist in the environment of the socio-technical future they propose. For the SNEC, these are technical and aesthetic elements that show the canal before its construction through photomontages. We conceptualize these ontologies as environmental forms and motives [6] that are compatible with the project and that the project initiator tries to impose on the collective imaginary. The desirable environmental motives of the canal thus perform the greening of the sociotechnical future.

Third, fears about the canal's impacts on various forms of biodiversity can also be translated into environmental motives. Assembling them into a narrative produces another politicization. In the case of the SNEC, the project's promoters perceived these narratives as a politicization that they sought to disqualify. They negotiated the integration of these critical elements into a new socio-technical future.

Our final point is reflection on the ecological crisis. The promoters of the SNEC are building an imaginary that reconciles the appeal of modernity and ecology. They are doing so by proposing a "living canal" whose banks will be designed to meet the needs of protected species, and which will make it possible to transport just as much if not more freight while reducing carbon emissions. But are these two imaginaries compatible? Ian Scoones and Andy Stirling [32] consider that the promise of control is at the root of all aspects of modernity. Rationalism is appealing because it offers a way to control emotions. Bureaucracy has developed because it organizes a control of collective activity through procedures. Democracy promises the citizen a control over politics. The nation represents the ideal community in control of its destiny. Capitalism offers a means of controlling work that industrialization completes by supervising production through machines and standardization. But all these promises of control come up against the ecological reality. The Anthropocene is the age of the loss of control of the Earth system. At the local level, crops are suffering from frost never seen before, exceptional rainfall events are producing unprecedented landslides, and droughts are forcing

(See figure on next page.)

**Fig. 4** The bioeconomy canal. During the construction, several problems arise. Illegal wastes are mixed with the excavated material. The villages near the construction site suffer from clouds of dust. Agricultural wells dry up. The villagers enclaved by the construction site without benefits of platforms are mobilizing. The canal becomes an issue between agriculture, navigation, and waterfowl hunting, which compete for water rights in summer. To reach a compromise, the project owner agreed to finance two additional platforms and an irrigation network from the Louette reservoir, whose capacity was increased. The agricultural cooperatives become key players in the management of irrigation, erosion, spoilage, and agricultural pollution. River traffic increases mainly due to the export of foodstuffs. Road traffic is also increasing. The offsetting of the ecological impacts of the digging of the canal is carried out in sites, without any gain in biodiversity

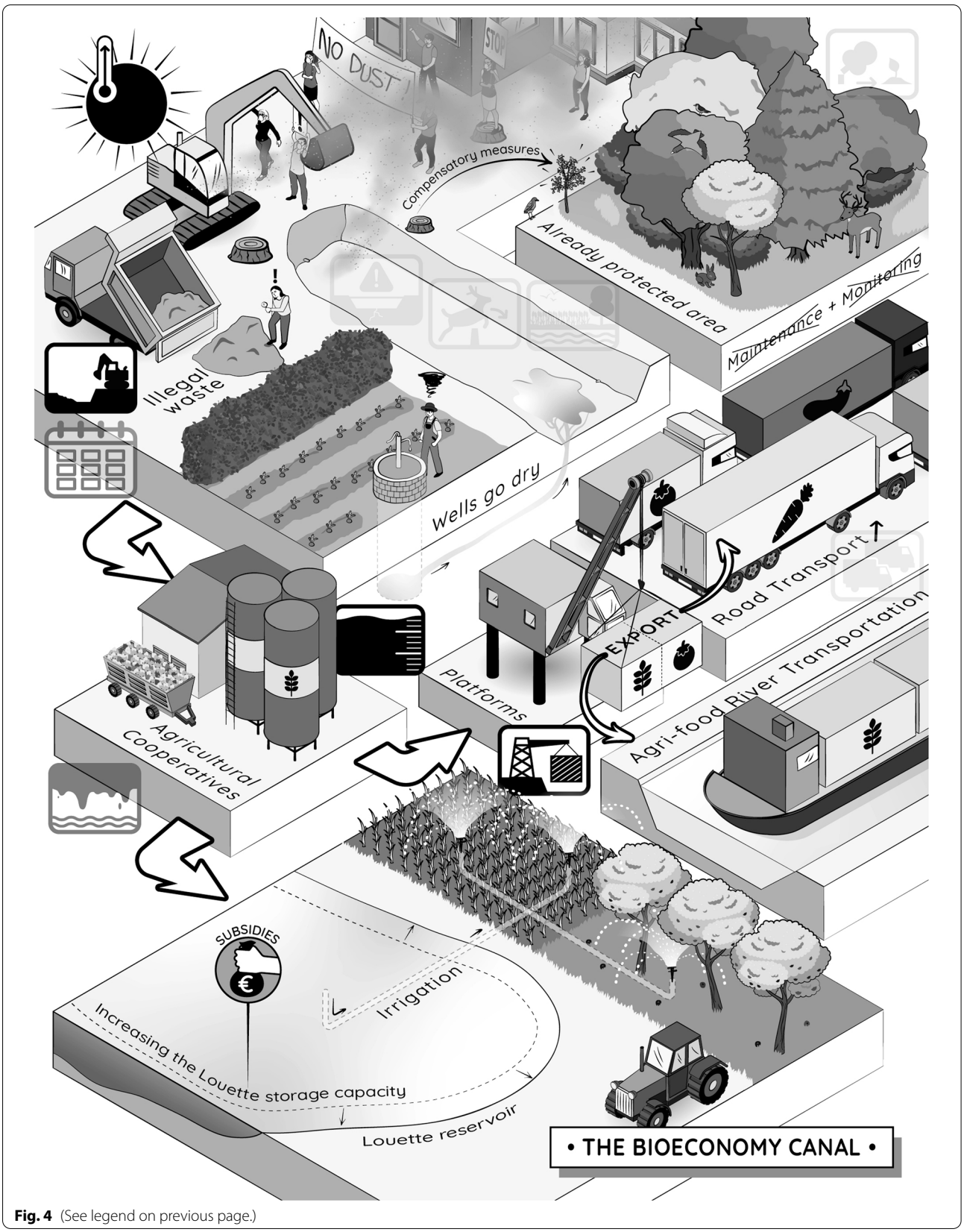


**Fig. 4** (See legend on previous page.)

the managers of a canal to close the waterway. These are all environmental motives that profoundly question the modern promise of control. Instead, failures reveal vulnerable infrastructures. Not only does the world depend on humans and non-humans, but these non-humans also have capacities to bring about a future not anticipated by humans [17]. It is a considerable political challenge to reimagine futures that take on board these major uncontrollable forces. The example of the Seine Nord Europe Canal shows that the political conditions of debate on infrastructures are not yet all conducive to this politicization.

**Acknowledgements**
The authors would like to thank Caroline Lejeune who conducted interviews for the INFLUBIO project and Philippe Boët who reviewed the ecological consistency of scenarios.

**Authors' contributions**
All three authors of this article developed the research question, planned the research process, and contributed to the literature review. Rémy Petitimbert and Gabrielle Bouleau analysed and interpreted the data, and wrote the scenarios. Rémy Petitimbert analysed the scenario reception. All three authors were major contributors in writing the manuscript. They all read and approved the final manuscript.

**Funding**
The project is sponsored by the ITTECOP programme (2017-2020) co-funded by the French Ministry of Ecological Transition, the national Agency for Ecological Transition, and the French Foundation for Biodiversity Research (FRB).

## Declarations

**Competing interests**
The authors declare that they have no competing interests.

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Received: 23 August 2021 Accepted: 22 March 2022
Published online: 20 April 2022

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## Publisher's Note