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Review

Integrating Ecology into Land Planning and Development: Between Disillusionment and Hope, Questioning the Relevance and Implementation of the Mitigation Hierarchy

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Abstract: Scientific research on the mitigation hierarchy has steadily increased over the past few years at the international level. While some seek to improve the application of this public action instrument, others point out its shortcomings and risks. This opinion paper—which focuses on the French context—does not provide an exhaustive overview of existing research but instead targets specific issues considered to be a "priority". We mainly investigate the relevance and implementation of the mitigation hierarchy, especially from an ecological point of view. Part of this paper thus questions the very principle of biodiversity offsetting (BO)—the last resort of the mitigation hierarchy that brings together numerous controversies—and the adequacy of the mitigation hierarchy with the objective of no net loss (NNL) of biodiversity. The general idea underlying this paper is to show how the mitigation hierarchy has been built and based on what values (mainly economic and legal, which leads us to conclude about the lack of ecology in the policy itself). In doing so, we provide a few perspectives as to what should be done to (better) integrate ecology into land use planning and development.

Keywords: biodiversity; mitigation hierarchy; nature; land use planning; ecology; no net loss; values; conservation

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Citation: Barbé, H.; Frascaria-Lacoste, N. Integrating Ecology into Land Planning and Development: Between Disillusionment and Hope, Questioning the Relevance and Implementation of the Mitigation Hierarchy. *Sustainability* **2021**, *13*, 12726. https://doi.org/10.3390/su132212726

Academic Editors: Patrizia Tassinari and Daniele Torreggiani

Received: 21 September 2021
Accepted: 12 November 2021
Published: 17 November 2021

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1. Introduction

Officially, the mitigation hierarchy—which aims to "avoid, minimize, compensate" for the environmental impacts of land use planning (i.e., projects, plans, and programs)—dates back to the 1970s. Since then, it has been introduced and regulated by law in many countries and applied through various environmental policies. This has led to a profusion of concepts (e.g., "no net loss", "eco-compensation mechanism," "biodiversity offset," "ecological compensation," "environmental reserve certificate," "compensation ratio," "direct/indirect impact," "losses and gains"), sometimes resulting in terminological confusion [1]. In a general context of global biodiversity decline [2], the mitigation hierarchy is associated with the desire to halt the erosion of biodiversity, to which land development contributes [3], while taking ecological issues into account. More specifically, the hierarchy aims to avoid as much as possible the environmental impacts of projects, plans, and programs (including those that affect biodiversity), to reduce any unavoidable adverse impacts, and eventually, after all efforts have been made to avoid and reduce, to use biodiversity offsetting (BO) to compensate for the significant residual impacts that cannot be avoided or reduced (Figure 1). In many countries, the mitigation hierarchy is applied in the environmental impact assessments (EIAs), which inventories, describes, and assesses all adverse impacts on the environment caused by projects, plans, and programs. This paper, which traces the origins of this internationally applied policy, will build on the French context, whose legal framework for the mitigation hierarchy dates back to 1976 (although many legal reinforcements took place from the 2000s onwards). However, our analysis quite possibly

reflects the findings and reflections from other countries. Moreover, the controversies highlighted here are specific to the very essence of this policy, regardless of the context.

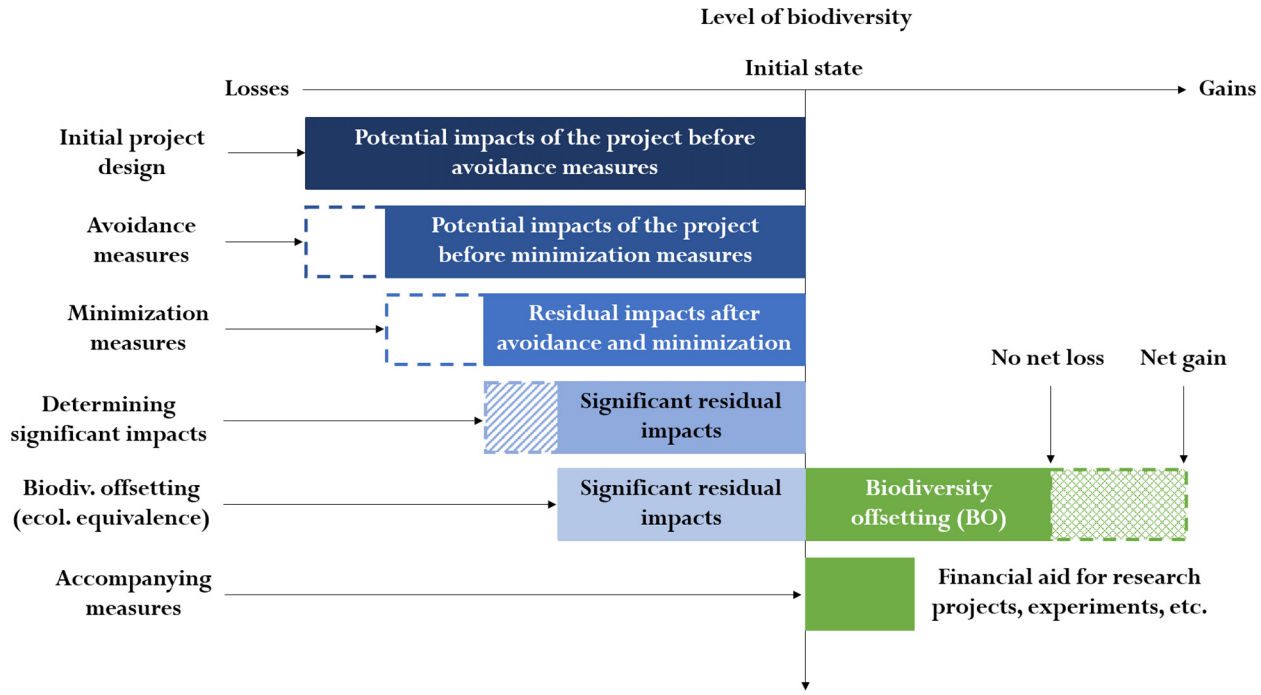

Figure 1. Illustration of the mitigation hierarchy applied to biodiversity in France (adapted and translated from Lucie Bezombes, 2017).

In recent years, a great deal of scientific research—in France and internationally—has focused on the mitigation hierarchy while seeking to improve this instrument of public action. More than just a step-wise planning and action process supported by policy directions, the mitigation hierarchy—and specifically its last step known as BO—has been the subject of many studies and publications (e.g., [4–13]). Simultaneously, the means (laws, institutions, tools, etc.) that enable the implementation of the mitigation hierarchy have a standardized and codified vision of the living/non-living world (which depends on national lists of protected species and habitats among others) and the value given to it. In this paper, we will show that this vision does not make sense in terms of scientific ecology and is rarely consistent with ecological dynamics, which—though much can be understood and explained—remain complex, fluctuating, and sometimes uncertain [14]. Indeed, the hierarchy itself is much more rooted in conservation biology [15], and this is particularly evident when looking at the journals with most of the relevant scientific works [16,17]. Therefore, the questions raised in this paper relate to why the mitigation hierarchy is insufficiently relevant or effective from an ecological perspective and to identify the ways in which nature can be better taken into account within or outside this legal framework.

Section 2 of this paper traces the origins of the mitigation hierarchy, which initially emerged from wetland management in the USA in relation to human health issues and shows how economic considerations have influenced this policy and particularly BO. In Section 3, we highlight the legal framework that reduces the complexity of ecological science (all the while drawing on it to justify the implementation of the mitigation hierarchy). In Section 4, we focus on the factors that guide political action in France in relation to the mitigation hierarchy. Finally, Section 5 aims to highlight the need for the better integration of ecology in land use planning (exploring temporalities and ethics), whether through the framework of the mitigation hierarchy or beyond.

2. The Economic Roots of BO and the Emergence of the Mitigation Hierarchy

First of all, let us recall that the basic principle of BO as a "compensation" process involves finding a form of "equivalence" between "losses" and "gains" (of biodiversity). As early as the 1940s, economists John R. Hicks and Nicholas Kaldor put forward the following principle: "If a project, an investment, or a development leads to a loss of utility for certain actors, it can nevertheless be considered socially desirable from the moment when the gains in utility generated for the beneficiaries of the project are greater than the losses suffered by a minority, as the former has the means to compensate the latter" [18]. This principle introduces a "financial" compensation for "utility losses" with human "beneficiaries." Therefore, it assumes that the "utility" (in a utilitarian framework) of a project can be evaluated in monetary terms. To go a step further, Géraldine Froger and Gaël Plumecocq explain that, when addressing environmental issues, standard economic models are based on what they call "intergenerational compensation schemes" [19] that postulate unlimited possibilities of substitution between natural and manufactured assets and an equivalence between consumer goods and environmental goods. These concepts of compensation and equivalence thus existed before the development of BO.

Although compensation was originally conceived in terms of "utility," it adopted an "ecological orientation" in the 1970s. Indeed, the idea of compensating nature for no other purpose than its own intrinsic value [18] first appeared in 1971 at the international Ramsar Convention, whose article 4.2 called for "compensating as much as possible for any loss of wetland resources." In 1972, the USA introduced its first policy dedicated to mitigating impacts on wetlands and streams, giving rise to the first "mitigation hierarchy." The introduction into law of the need to mitigate impacts to wetlands came with the enactment of amendments to the Federal Water Pollution Control Act (last renamed the Clean Water Act (1977)) [20]. It is worth noting the major influence of the USA, and particularly certain public institutions and NGOs, in the development of the mitigation hierarchy, and more specifically, BO. The interesting aspect of BO is that, though inspired by economic mechanisms, it does not share the features of other classic market-based instruments [17]. According to Calvet et al., conservationists have incorporated economic vocabulary and concepts into their lexicon, thus promoting an economic approach to address conservation issues [17]. In reviewing the authors' analysis, we understand that the political context and agenda have influenced the development of BO by promoting the use of economic and market approaches, although this phenomenon reflects a shift in the conservation community rather than scientific advances in ecology or economics.

If one attempts to summarize the stages in the development of BO, the following emerges: (i) the principle of compensation was initially a matter of equivalence between losses and gains; (ii) stakeholders then adopted this principle and applied it to wetlands and biodiversity, leading to the emergence of BO; (iii) finally, despite the fact that ecological and environmental concepts—notably through the fields of ecological restoration and engineering—initially prevailed in the literature, we recently witnessed an increase in the use of economic terms such as (ecosystem) services, incentives, economic, cost, payment, trade, bank, market, and so on [17].

That being said, we better understand the origins of BO controversies. Although it has been assigned a no net loss (NNL) objective and a "performance obligation," BO "require[s] certainty, and if this cannot be achieved, then the relevance of the process as a conservation tool must be called into question" [21]. Yet, we obviously know that there is no 100% probability of success when undertaking restoration actions [22]. While calculating "financial equivalence" is not complicated, calculating "ecological equivalence" is a different matter [23–27]. It is not surprising, then, that BO faces many challenges: conceptual challenges such as choice of metric, spatial delivery of offsets, equivalence, additionality, timing, longevity, ratios, and reversibility and practical challenges such as compliance, monitoring, transparency, and timing of credits release [4,28]. For several years, many studies have questioned BO [5,21,29–34], including some jurists who take a critical stance [8,35–39]. To them, BO is more like a "check box" that fails to guarantee

an NNL of biodiversity [6,12,28,40–45]. In France, BO was the subject of a French Senate committee of inquiry that have made several recommendations (e.g., developing a more detailed approach to the functioning of ecosystems, generalizing the consideration of damage to ordinary biodiversity in the authorization process, relying on local authorities for real planning of BO) [46]. The methods are also the subject of an ongoing debate [16]. In other words, despite ongoing efforts to improve this process [47], we can argue that BO is not a sustainable and consensual solution [6,48–50]. That said, we do not discredit BO: For now, and despite the existence of other tools to protect natural areas in France [51], it remains a means to stop environmental degradation caused by land use planning, and some view BO as a tool for managing and transforming territories [52]. However, it is clear that it fails to effectively address ecological and biodiversity issues.

In summary, the mitigation hierarchy was first implemented to achieve specific water quality objectives, while biodiversity issues only came later (we can assume that the assessment for water was easier than it is for biodiversity today). Then, even if BO has gradually moved away from a monetary vision of compensation, its use calls for some cautiousness. While some agree that offsetting nature "for its own sake" (intrinsic value) instead of "for its benefits" (use value) constitutes an important paradigm shift, others believe that the high expectations of ecological restoration and engineering may favor a "managerial and 'techno-garden'" vision of biodiversity conservation [17]. We agree with the latter and argue that it would be illusory to consider that BO successfully meets expectations in terms of biodiversity conservation. This can be explained, as we have seen, by the absence of ecological considerations and the predominance of economics and conservation biology in the development of this concept [17]. Furthermore, before considering compensation for a loss, should we not ask ourselves whether this loss is legitimate and justified? We could argue that the avoidance step of the mitigation hierarchy seeks to answer this question. We should nevertheless clarify this argument, because the avoidance step does not always receive sufficient attention and leeway and does not always—as it should—raise the necessary questions about the choices (political, economic, etc.) that lead to new project development.

3. The Prevalence of Law: Building on the French Legal Framework

Since the 19th century, and mainly during the 20th century, the concepts of ecology and the environment have gradually gained momentum on an international scale, raising questions of compatibility between land use planning (driven by techno-economic orientations) and the preservation of ecological dynamics [3]. In France, project owners who undertake development projects or local authorities preparing planning documents are subject to several regulations. In the environmental field, the oldest is the 1976 law on the protection of nature (law n° 76-629, 10 July), which introduces the mitigation hierarchy in article 2. Its first and foremost purpose is to conciliate economic development and biodiversity preservation [23] according to the "polluter-pays" principle (art. L. 110-1, French environmental code). Its application—partial or even non-existent for many years—was reinforced in 2016 by the law for the recovery of biodiversity, nature, and landscapes (law n° 2016-1087, 8 August). We recall that BO is the final step in the mitigation hierarchy, which itself is based on principles described in the national policy [53] and guidelines [54]. Some of these principles occur at the international scale [55]. We would like to emphasize the philosophy behind the process: BO is first and foremost a "last resort" step that only applies after efforts to implement the previous steps have been exhausted. It is also a step of "least preference," which means that most efforts should target the avoidance step. We should also keep in mind that the way in which we assess an "adverse impact" and its "significance" will greatly influence the implementation of avoidance, minimization, and offsetting.

Although the mitigation hierarchy seems to be a beneficial process for minimizing environmental damage, its scope of application is however relatively limited—and mostly uneven—in France. First, the thresholds defined in the law lead to an initial filtering of files,

which particularly affects the consideration of ordinary biodiversity—living organisms that are not considered rare or threatened—as well as potential biodiversity—"biodiversity that cannot be detected in the field but may be present" [15]. As a result, ecological issues are not always well integrated. Second, although a standard national policy exists as mentioned before [53,54], the implementation of the mitigation hierarchy varies among project, plan, and program files [56] and regulations. Moreover, some exemptions can be exploited by project owners and local authorities. Here, we mainly refer to exemptions relating to the prohibition to impact protected species. They can be problematic as they are motivated by "imperative reasons of overriding public interest" (mostly based on social or economic reasons), whose definition can be questioned [3], especially since there is no prior consultation with the concerned "public." Finally, despite the legal framework, the implementation of BO can sometimes deviate from the regulatory injunctions [18]. At the same time, the sanctions for non-compliance with the mitigation hierarchy do not seem to be sufficiently dissuasive [18]. Let us also recall that the French environmental code assigns an objective of NNL of biodiversity to offset measures (art. L. 110-1, II, paragraph 2), thus ignoring many other ecological dimensions such as "the spaces, resources, and natural, terrestrial, and marine environments, the sounds and smells that characterize them, the sites, the daytime and nighttime landscapes, the quality of the air, and the living beings" (art. L. 110-1, I).

Without being exhaustive, we want to place more emphasis on two key issues regarding the legal framework of the mitigation hierarchy. First, we observe that the texts tend to simplify the reality by using the concept of "ecological equivalence," for example, or by promoting the use of protected species lists. This means that the law sets "achievable" goals, but these are frequently based on "conservation values" that are historically driven by a strong interest in charismatic species and/or wilderness, intertwined with aesthetic and spiritual notions [57], rather than scientific ecological considerations. Thus, actors (such as project owners) are not encouraged to make greater efforts or change their practices in a radical way, since their activity is considered by default to be "compatible" with conservation objectives [17]. Here, "efforts" can refer to the time invested in understanding ecological knowledge and to the money invested in "avoid, minimize, compensate" measures but also to the engagement in dialogue—and compromise—with stakeholders and the lay public (which is generally time-consuming). Although ecological concepts such as species, ecosystem, or ecological functions have been gradually integrated into the law, there is still a gap between the law and the reality on the ground: For example, legislators often use ecological concepts without defining them [58], which leaves substantial flexibility in the application of the law. Second, the way in which legislators, decision makers, or practitioners use ecological knowledge [59] and the values attributed to it [60] remain a poorly addressed issue. This partly relates to ethics [61]: for example, the values that we attribute to nature, our (moral) representations and emotions [62], as well as the "relationship between knowledge and actors in ecological research" [63]. This "relationship" between science and policy has already been analyzed, among others, by Chassé et al., in the context of creating protected areas [63,64] but also by Theobald et al., in relation to rural land-use planning in the USA [59]. As mentioned above, a simple illustration of this issue is found in the French environmental code, which gives more weight to biodiversity than to other ecological dimensions.

In short, we observe that the legal framework—which strongly influences the implementation and effectiveness of this policy—has been structured according to a logic that is far removed from ecology. The weaknesses that emerge around this policy are also apparent in the EIA process, as Laura Rodriguez points out [65]. In her opinion, the EIA has faced much criticism since the 1990s. One reason is the rationalistic and technocratic model on which the EIA is based (which recalls the managerial and "techno-garden" model of BO). The author identifies two weaknesses in this model: "it does not account for the complexity of ecological relationships nor does it consider the related human and social dimensions" [65]. From our experience, we come to the same conclusions.

4. Reflecting on the Factors That Guide Political Action

As explained in the previous sections, the mitigation hierarchy seems incapable of complying with the NNL objective and thus effectively preserving biodiversity. Although major issues have been highlighted, we feel that it is important to discuss the ethical/moral dimensions associated with this policy in greater detail. First, we have to keep in mind that this policy is based on a trajectory of biodiversity decline [15,40]. Indeed, in practice, the effects of the mitigation hierarchy only target a tiny portion of biodiversity (i.e., that which is known, which is measurable, which is considered "to be protected" or "remarkable" [65], which meets the thresholds of environmental assessments and which is compensable) to the detriment of other ecological dimensions such as soil, air, landscape, functions, ecological networks [66], etc. For this reason, some researchers call for "a pluralistic perspective on biodiversity" [57], which means that we have to focus our efforts on acknowledging the complexity of ecology—given that complexity is not only the prerogative of ecology and can be expressed through other concepts such as "wicked problems" [67,68] or "controversial universes" [69,70] that refer to the complexity of the systems in which our societies are embedded—and remain open to other fields [61]. This is for good reason: People, indigenous or not, land workers or not, artists, ecologists, environmental social scientists and humanists (including philosophical approaches, environmental anthropology, environmental ethics, and so on), historians, population geneticists, plant scientists, community ecologists, conservationists, biogeographers, biogeochemists, macro-ecologists, climatologists, hydrologists, geologists, economists, environmental lawyers, and so on, all have different views of nature, and none of them should be excluded when dealing with ecological issues.

Ultimately, we believe that one of the main problems is the implicit desire to give priority to the socioeconomic development of territories, without questioning the implications for the environment and populations (human and non-human) in the long term. Although we may hope that the mitigation hierarchy addresses this issue, it does not seem to do so. As Lombard-Latune argues, the polluter-pays principle aims to make the developers pay for the environmental costs of their projects due to negative externalities and restore the environment to an "acceptable state" [71], rather than decreasing the number of projects. This statement points to a hierarchy of interests—restore, rather than prevent—with the desire to "restore" the environment adversely impacted by human activities to an "acceptable" state, with the term "acceptable" raising diverse questions: acceptable for whom, for what, and according to which criteria? Cécile Blatrix's analysis supports this observation, stating that the government wants to ensure the protection of the environment "while facilitating the realization of projects of economic and social interest" [72]. The emphasis is heavily placed on "facilitating" the realization of projects. In other words, despite the IUCN's appeal for "the rejection of projects that significantly impact biodiversity and lead to the destruction of endemic species or rare environments" [73], it is highly unusual to observe the cancellation of a project for strictly ecological reasons [7].

In France, some researchers argue that the environmental law has failed to address ecological issues [74]. Our first assumption is that the answers are not to be found solely in the Western legal framework. For example, in March 2017, New Zealand gave the Whanganui River the legal status of a living entity through the *Te Awa Tupua* law. One of its articles states, "I am the River and the River is me," (*Ko au te Awa, ko te Awa ko*) which embodies the genealogical linkage (*whakapapa*) that Whanganui people (*iwi*) have to the river, reflecting an interdependence between people and the environment. As such, Whanganui descendants (*uri*) have an obligation to protect the health of the river. In this case, there is a legal recognition of the inseparability between humans and their environment. This law calls into question the limits of our own environmental law and highlights the incapacity of our legal system and political model to conceive ecosystems and their inhabitants as a whole, although theoretical alternatives are beginning to slowly emerge such as the principle of "ecological solidarity" [75–77].

The last question we ask is whether it makes sense to assign an objective of NNL of biodiversity to a policy that does not intend to "save biodiversity" but only reduce the impacts of economic development (and mainly those induced by new projects). Indeed, this entire public policy has been built around the consideration of biodiversity as an operational, financial, legal, and reputational risk [78]. It is thus a matter of juggling the compliance with regulatory requirements, the technical quality of the methods used to meet them, and the interests of project developers [78]. The procedure essentially aims for the evaluation, ruling, and sanction (or reward) [79], leaving aside the initial ambition of safeguarding the environment as such. Moreover, while the precautionary principle (art. L. 110-1, II, paragraph 1) raises questions about whether development projects should be carried out, the mitigation hierarchy does not (at least in practice) [80]. Nonetheless, even if the NNL remains idealistic, it seems (or at least tries) to bring stakeholders together around a common goal.

The next section allows us to highlight the need for the better integration of ecology into this policy (whether through temporalities or ethics), which can lead to better "avoid, minimize, and compensate" actions. Nonetheless, it may also be an opportunity to think outside the box and see whether the mitigation hierarchy should stand on its own or whether other avenues are possible.

5. Discussion: Going beyond the Mitigation Hierarchy?

We propose to address two challenges that tend to go beyond the mitigation hierarchy framework: The first challenge requires looking at temporal issues, including the consideration of ecological temporalities; the second challenge involves questioning the ethical values that shape our relationship with nature.

5.1. Temporalities: Integrating the Many Facets of Time

Time is a constant and very complex issue for science, and more globally, for humans. This is why it should raise concerns, because the more complex the issue is, the more effort it requires. In this "axis," we outline several temporal concerns, some of which relate to the mitigation hierarchy and others that do not.

Regarding the implementation of the mitigation hierarchy, some concerns arise. First, it is essentially based on a static view of nature. The actors who wish to implement this policy tend to leave aside (or disregard) the dynamics of living organisms by focusing on a few fixed "components" (i.e., protected or remarkable species) [81]. Second, monitoring is rarely well supervised, which jeopardizes the sustainability (and efficiency) of the "avoid, minimize, and (mainly) compensate" measures [15]. This is linked to the issue of evaluating this public policy, an evaluation that seems partial or even non-existent in France [45]. For instance, the administrative authorizations, in which offsetting measures are summarized, do not sufficiently describe the needs and objectives of BO. To overcome these shortcomings, Baptiste Regnery proposes the creation of regional observatories for "avoid, minimize, and compensate" measures [15]. They could enhance knowledge, access to information, environmental dialogue, and global evaluation of public policies. Third, the mitigation hierarchy also comes up against a "governmental" temporality. Indeed, the objectives set by programs and laws (in terms of energy, transport, housing, etc.) set the pace for how territories are developed. For example, the French multi-annual energy program sets specific targets for the development of renewable energy [82] (targets which, according to former Environmental Minister Nicolas Hulot, will not be met due to an insufficient budget [83]). These will influence the development of wind and photovoltaic farms in particular, thus leaving less room to maneuver for companies—although they can decide on the location of the farms, the number of installations is rarely negotiated. Fourth, the governance system underlying the elaboration of planning documents could be questioned. In France, most planning documents—regional, departmental, inter-municipal, and municipal—are approved by political representatives elected for a period of 6 years. As

a result, there is a gap between the term of office of elected representatives and the duration of planning documents, which provide for long-term land-use planning and guidelines.

On a broader scale, the time for decision making becomes a strategic issue when addressing "environmental problems." Understanding and changing the way in which ecological, political, and socio-economic temporalities are intertwined is therefore essential [84,85]. However, the intangibility of these overlapping temporalities and their discrepancy seem to hinder the implementation of actions to transform society [86]. While we are witnessing an "extrication of social time from ecological time" [84], some researchers advocate rethinking the temporalities of public action—characterized by short-termism and anthropocentrism—by integrating ecological temporalities and irreversibilities (though without creating concrete avenues for it) [84]. In terms of temporality, one may also argue that the stage at which the different actors are involved has a significant influence on the outcome of decision-making processes. For example, the French environmental authorities responsible for controlling the quality of environmental assessments have some ecological knowledge, but they—mostly—intervene after the design of projects, plans, and programs and the assessment of their "impacts." Thus, deciding which actors should participate is not enough: One should also be explicit about how and when they must be involved.

There are so many factors that can hinder the proper consideration of ecological temporalities. For example, humans can easily fall into an attitude of presentism and denial (i.e., tendency to prioritize issues that affect them personally in the present) [85]. They may also be subject to environmental generational amnesia: Indeed, we all have different references—which vary in time and space, and gradually become standards—on which we base our judgements and opinions about the environment [87]. Some researchers also speak of the "shifting baseline syndrome" [88], which can explain why something out of the ordinary can later become ordinary, such as the declining abundance of birds. In practice, this means that when considering actions to be taken in the present, we need to draw on our past history in order to see the framework in which we are situated and understand its contours and then decide whether the future should fit within that framework or not. This retrospection could allow us to consider new political options or justify new choices [7]. In the same vein, Coline Ruwet speaks of the invisibility of ecological problems: invisibility in space—disconnection from what is far away—and invisibility in time—time lag between the roots of the problem and its effects [85]. Barbara Adam speaks of the invisibility of human impacts [89], whereas Guillaume Simonet uses the concept of "silent transformations" [86]. Therefore, making ecological problems more visible remains a key issue for land development.

As can be seen, time is a constant challenge. Luc Semal and Bruno Villalba speak of both climatic delay (global warming) and ecosystemic delay (mass species extinction) and wonder about the role played by politics, which is built on the idea of a "time that lasts" and finds itself confronted with the "time that remains" (before the next crisis, the next disruption, the next environmental disaster, etc.) [90]. In addition, as Bruno Villalba reminds us, postponing decisions increases the risk of falling into crisis management [91]. This is reminiscent of the fact that conservation biology—which is used in the mitigation hierarchy—is described as a "crisis discipline": Depending on the urgency, pragmatic factors may prevail over theoretical considerations [15]. Perhaps our priorities should focus on our capacity to imagine "policies of time" (especially long-term policies) to better refocus on the conditions that allow for the existence of an "authentically human life on earth" [92] in all its diversity. The reorientation of financial and human resources in favor of the application of such policies still remains a vast undertaking, although our skills do not allow us to provide informed expertise in this area. Yet there may still be hope, as suggested by the June 22 announcement by the Labor-led Welsh government, which intends to freeze new road building projects to tackle the climate emergency and to have all proposed schemes reviewed by an external panel [93]. It remains to be seen whether this announcement will actually take effect and endure. Nevertheless, this does not prevent us from stating that the implementation of the mitigation hierarchy concerns the short term

more than the long term, and that it remains part of a (Western) European development model heavily influenced by planning, infrastructure development, and urbanization.

5.2. About Values and Ethics: A Human Weakness and Strength

As Lionel Charles and Bernard Kalaora explain, the environment is more a matter of relationship to the world than of knowledge, a relationship whose primary support is action [94]. In addition, we must not forget that "land planning" is only one way to represent human action in a given space and at a given time [95–97] and that taking care of territories (including their inhabitants and ecological dynamics) does not necessarily mean giving priority to economic growth. Integrating ecology into the management of territories means defining different objectives from those adhered to today such as the NNL of biodiversity. According to us, this objective implies a form of total control/domination over nature and implicitly suggests and acknowledges that the conservation of biodiversity is "good"—which we could question. For instance, Ruth E. Brennan asks: Does asking how people understand and relate to other-than-human nature open the door to alternative approaches instead of relying on the assumption that biodiversity conservation is "good" and must be achieved? Would a deeper understanding of the values and worldviews in a context of conflict (and socio-environmental injustice [98]) give a better idea of the proper governance process to adopt [99]?

There may be many different ways to answer these questions. For example, we could suggest moving toward "ecological and social planning", as described by Laure Després [100], in order to decompartmentalize the elaboration of land use documents (which is not unique to France [101]). Such an undertaking would involve managing the resources to stabilize the climate, accompanying the restoration of ecosystem functionality when possible, and satisfying the population's essential needs [100]. It could integrate prospective—using scenario planning [102,103]—and environmental complexity, which reflects a convergence of epistemologies, rationalities, and imaginaries [104]. For Enrique Leff, environmental complexity implies deconstructing "what has already been thought in order to think about what remains to be thought" [104], thus throwing into question our knowledge and science itself. In addition, reflecting on social and ecological planning requires the integration of diverse nature values [105], including "relational values." According to some authors [106], these "relational values" represent an opportunity to understand how and why people care about "other-than-human" nature lying at the interface of intrinsic and instrumental values. Consequently, it is open to discussion whether project owners and other potential stakeholders (citizens, organizations for the protection of the environment and other NGOs, state services, researchers, and so on) should be involved in the elaboration of planning guidelines and documents. Efforts should also be made to understand, acknowledge, and integrate social representations of nature [107]. Géraldine Froger and Gaël Plumecocq—who study the environment from an economic perspective—suggest making greater use of multi-criteria analyses and deliberative processes [19,108]. Although neither approach is perfect, both methods make it possible to articulate different expressions of social values and build "a shared vision of a given environmental problem" [19]. Others emphasize the value of collaborative dialogues. For example, Judith Innes and David Booher, inspired by Habermas' ideas on communicative rationality, propose a "collaborative rationality" approach [109] that is based on a set of conditions (seven are cited in the article) allowing the actors to reach a mutual understanding of the problem at stake and of each other's interests. However, regardless of the process, ecology may sometimes take a back seat. The temptation is to adopt a technical solution or maintain the status quo, because the situation seems too complex.

To evade the pitfalls of our current policy, we could reimagine human–nature relationships [99,110,111] by drawing on Éric Sabourin's work on human–nature "reciprocity." He describes the relationship between farmers and nature in terms of three reciprocal structures: two binary relationships—the first of which involves the interdependence between the farmer and the land environment and the second the sharing of parcels and

limited resources with other living beings such as plants, animals, and other human producers, users, or consumers of the land—as well as one ternary relationship involving the transmission of the natural heritage to future generations and its norms of preservation or valorization [112]. From this perspective, Sabourin lays the foundations of an ethical question: What do humans give back to nature, or how do they take care of it? In the context of planning, he invites us to perceive the territory (whose definition is not so obvious [113,114]) as a shared space with different "inhabitants"—living and non-living—and reciprocal relationships (project owners share the territory with trees, watercourses, fauna and flora, as well as with human collectives such as local authorities, "residents," NGOs, companies, public institutions, etc.). We could only encourage the actors—first and foremost, project owners, public administration, elected officials, and technical staff—to view territories as places full of experiences and emotions by making them experience the territory themselves. Reflecting on ethics and values also means questioning the ways of living and occupying places. Thus, the example of the French "zones à défendre" (ZADs), which Jean-Paul Deléage describes as "a great laboratory of the commons" and a place where other ways of cohabitation are emerging [83], illustrates a different relationship to the world and the territory [83,115]. These alternative models—which bypass the law but nonetheless attempt to integrate environmental considerations—can be a source of inspiration for questioning our relationship with the territory. Regardless of the path taken, it is no longer possible to develop a political project without considering territories as part of a global dynamic of change and subject to the influence of unpredictable elements (such as those involved in climate trajectories). Given that we may be forced to immediately withdraw from certain areas due to sea level rise and extreme weather events (heavy precipitation, droughts, fires and so on) [116], we need to reconsider our relationship with territories. To our mind, this ethical transformation is a sine qua non condition for a political transformation.

However, ethics is not enough as long as the framework (i.e., the law) remains unchanged. In fact, dealing with earth dynamics necessarily implies flexibility and humility. This is why we advocate another policy or process that is truly based on ecological knowledge. Project owners are already well aware of the uncertainties surrounding the "management" of nature [117], and some stakeholders are explicit about the limitations of the regulations that should respect nature but fail to take into account its rhythms [118]. To begin with, one may encourage a clear and transparent definition of environmental "adverse significant impacts" (especially in the EIA procedure), as this step often determines the extent of the actions to be taken. We are certainly aware that several obstacles need to be overcome such as project owners' relationship with the law and the actors who enforce it. Indeed, some project owners seek to anticipate the expectations and requirements of the administration because this "reassures" them. Therefore, the standardization of practices carried out by the Ministry of the Environment [47,119] partially responds to this "fear" of uncertainty, risk, lack of control, and, in fine, failure and possible sanction. The general idea of this whole process is to make something complex (i.e., ecological dynamics) appear simple in order to give oneself a feeling of control over the elements of nature, of compatibility between economic development and ecology (a feeling that still seems very strong in the context of public action and its evaluation). Fortunately, this standardization offers "safeguards." Unfortunately, it prevents actors from thinking outside the current political framework and tends to lock them into the same practices—thus leading to an inefficient integration of ecological issues.

6. Concluding Remarks

In this article, we highlighted the nuanced role of ecology in the mitigation hierarchy. We agree that this policy can help increase the awareness and responsibility of development actors, even though its use is still viewed as a constraint rather than an opportunity by some project owners [120]. Nevertheless, by reviewing its foundations and revealing the weight of the economic and legal considerations, we have shown that this policy is unable

to reverse the declining trend in biodiversity, and as a result, we believe that there is a significant risk of greenwashing when communicating about the NNL objective. It should also be recalled that "avoid, reduce, and compensate" measures depend on many factors, including the definition and assessment of what we call "adverse impacts" (especially "significant" ones), notably in the framework of the environmental assessment process. Consequently, we maintain that the global and upstream integration of ecological issues into land development should involve a reflection about temporalities, accompanied by a profound transformation of planning strategies and new ways of defining the objectives of a "project." This transformation needs to fully integrate reflections about our relationships with nature (which includes human beings) and those that we want to build in the future (something that environmental ethics incite us to do [61]). Many pathways remain possible: for example, raising the awareness of decision-makers and elected representatives [121] who have significant power and influence; meeting the individual and collective expectations of local populations [122,123]; integrating the finiteness of the territory and changing the relationship with the land [124,125]; and questioning the governance [126] and means of environmental "control" [127], as well as the division of labor within companies and institutions [81]. Behind these issues lies the need to embrace interdisciplinarity [59,128,129], especially because science and its application are inherently "imperfect" [130].

Author Contributions: H.B. wrote the first draft of this paper. N.F.-L. was a major contributor to the revisions. All authors have read and agreed to the published version of the manuscript.

Funding: The authors would like to thank the financial support by the lab recherche environnement VINCI ParisTech.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were used.

Acknowledgments: H.B. is extremely grateful to N.F.-L. for her insightful comments and suggestions and for her support in writing this paper. H.B. is also very grateful to Caroline Vincent for the enriching discussions she had with her, which brought interesting elements to her reflection. Finally, H.B. thanks all the people (researchers or not) who may have influenced her thinking in a more or less important way. The authors thank Victoria Grace for reviewing the English language. They also thank the editors and all anonymous reviewers for their helpful revision of the manuscript.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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