



Academic Advice Note issued by the National Academy of Technologies of France (NATF)

on

“Biodiversity and land-planning policies: local and global aspects, specifics and generalities”

(adopted by vote in the NATF at its Dec.9, 2015 Plenary session)

The relationship between biodiversity and land planning schemes is self-evident: all living creatures and matter occupy and use space to live and subsists in natural (or artificial) ecosystems. The ecosystems, with their associate biodiversity, change constantly through time, under the influence of spontaneous biological and ecological processes, or various environmental disturbances, or again due to anthropic (man-made) activities, among which the implementation of land-planning policies and decisions, leading to changes in the use of land or sea spaces. The effects are always local but the additional consequences can be felt at various scales. Those of anthropic origin can result from planning policy decisions, either local, regional or even global. For example, the Common Agricultural Policy in Europe has a direct impact on land utilization and hence on the biodiversity of those areas.

The consequences on living matter are only partly predictable and even then only in the short term, inasmuch as the interacting networks are so complex and undergoing constant change, and in most instances in an unpredictable manner. Except under exceptional conditions, the Academy advocates that abandoning simplistic causalities and stringent reductionism should be envisaged and replaced by new approaches that integrate this living matter complexity, its reactions and its capacity to adapt and evolve (sometimes rapidly), and where random events and circumstances play an important role. It is consequently advisable to be simultaneously ambitious, modest and rigorous. The choice of terms should be accurate and avoid wherever possible too hasty conclusions, falsely intuitive analogies and excessively ideology-driven convictions.

In a more global manner, we can recall that constant demographic growth in the world and the control Mankind now exerts over the Planet Earth do have important environmental consequences, leading as we saw to adoption of **the Convention on Biological Diversity (CBD)**, taken at the Rio de Janeiro Earth Summit in 1992. We can also note that the biodiversity theme comes to the fore when land planning and land management scheme are drafted. It is a demand that is seen as legitimate by land-planners and industrialists who today are not calling it into question at least in principle. Increasingly, they wish to play an active role in this area.

However, it has also been observed that the convention in favour of the preservation of biodiversity has been interpreted in an exclusive, absolute way. When this happens, projects that would otherwise be useful, are delayed or even cancelled. An over-strict application of the Convention could hamper economic development and job creation. Everyone wants to live in the most pleasant environment possible and to see it continuously improved, yet at the same time everyone wants to be able to have a job, travel, eat ... it is therefore inevitable that compromises have to be sought. The latter are all the more difficult to negotiate that biodiversity

is *per se* a complex subject, with which, as yet, we are largely unfamiliar. And we must admit that today the concept is coming under fire¹. However, the extent of erosion still debatable, except in some special cases. The difficulty comes in how one is to proceed with the assessment of the real state, especially in the case of natural or manmade processes that induce change and evolution.

For these reasons, the National Academy of Technologies of France (NATF), together with the National Academy of Agriculture of France (NAAF), commissioned a working party (WP) composed of scientists, legal experts and industrialists, to draft a status report on the relationships between biodiversity and land planning policies and decisions. The joint interdisciplinary work, over several years' studies and debates, has contributed to building up a truly collegiate expertise on the subject matter.

The present Academic Advice Note, which was submitted to extensive debates (with amendments) within NATF and adopted the main conclusions of the WP, while the supporting argumentation developed in various internal working documents, will be set out in an Academic Report currently being finalized.

1. Biodiversity has become concern of major scientific, social, economic, political and media importance.
2. However, the perception we have today of the biodiversity concept remains rather fuzzy and the term itself is often mistaken with Nature and/or the Environment. Biodiversity is most commonly perceived as an ensemble of individuals of different species, occupying the same geographic site, and in this connotation, the definition is exact. Status assessment is often limited to enumerating the number of species present and this is where we can observe frequent misunderstandings when comparing functional categories (individuals, populations, communities) and taxonomy (specimens, species, etc.). But the meaning should be extended to include the realities of a much wider biological, technological and economic connotation: from genes to biodiversity, from the emergence of life on Earth from the beginning to today.

Biodiversity includes the renewable resources necessary to maintain life conditions and enhance development of human Societies, not forgetting that, on one hand, there are so-called non-renewable resources and, on the other, certain resource that can be qualified as "amplifiable": this, for example, is the case for agricultural resources and for those that have been created through varietal selection processes (stock size, rate of renewal, amplification limits). The term 'biodiversity' also refers to various cultural, aesthetic and ethical and even religious considerations. It can also be a source of inspiration for technological innovations, for unique and original management modes for ecosystems; it can also prove to be a factor of resilience for ecosystems, or for new medicinal drugs, playing an essential role for the conservation of the environment of our planet and the living condition for its inhabitants.

3. It is difficult to quantify and assess biodiversity all the more so that it constantly undergoes evolutionary change, and this makes it somewhat delicate to assess what is supposed to be a "satisfactory biodiversity status". Moreover, our attention is often focused more on what

¹ Cf. for example: Billé, R. *et al.*: « Biodiversité : vers une sixième extinction de masse », 2014, Ed. La ville brûle. ["Biodiversity : heading for a 6th mass extinction"]

has disappeared, neglecting what has come to be, or has changed. This is a sort of fixed vision perception, i.e., one in which we have a world and its ecosystems that, without human intervention or natural disturbances, simply would not evolve at all. Indeed it is this fixed vision that is embodied in most legal texts, the latter tending to approach the issues in terms of protection and conservation. Lastly, the effects of human activities can even contribute positively to biodiversity, such as via varietal creations or through creation of new habitats, and these are not always taken into consideration.

4. Assessments of biodiversity, especially when it comes to measuring its dynamics, must be undertaken with utmost care and precaution and must correctly use robust methodology, taking into account what needs to be seen as subjective and not objective, and avoiding to extend conclusions from a local or specific case to make a generality. Invoking for example the mathematical 'law' known as *Habitat & species*² to evaluate extinction of species, based only on the changes in habitat is characteristic of a calculation that generally tends to overestimate the extinction rates, except in the case of large-scale endemism.

The rate of appearance of new species or varieties, when underestimated, gives yet another example of announcing a risk of loss of biodiversity whereas we now have excellent reference studies in this area.

We can also observe an occasional confusion among the various notions used to characterize different categories (individuals, populations, species) or which derive from rapid extrapolation (life expectancy of a given individual or for a population has a biological meaning on a local, regional or global scale whereas the extinction of a species, or of an entire taxonomic group requires a recognition of the fact by world-level experts).

We must underline that the spontaneous dynamism of biodiversity is, as yet, a rather unknown quantity because phenomena which specialists see as random, play an important role, their effects and origins being just as unknown and, paradoxically, not much investigated to date. Lastly the values associated with biodiversity are often in fact positive, whilst the negative aspects in this case are neglected. Thus, the wet lands are most definitely reservoirs that favour biodiversity but, at the same time, they are also sources for release of methane and other pathogenic factors. A certain balance therefore must be struck.

5. The interest expressed in conservation of biodiversity, which, fundamentally, is justified, does bring with it certain social and economic consequences. Thus, the effective presence (even the possibility of such presence), of individuals of a protected species can lead to certain land planning schemes to be contested (or even cancelled)³. In contradistinction,

² This empiric 'law' expresses the relationship between a sample area and the number of species having chosen this area as their habitat. By extrapolation of the findings, we can estimate the number of species present in a surface area than the sample areas. A frequent logical error is to use this relationship to evaluate the number of species eradicated when the area in question has been disturbed. This error was only exposed recently, whereas the 'law' itself dates back to the 1920s and was improved on in the 1960s – exposure came in a paper published in *Nature*, 473, pp368-371; He, F., Hubbel, S.P. with the title "Species-area relationships always overestimate extinction rates from habitat loss". The paper clearly demonstrated that of the 'law' is efficient when it comes to estimating the number of species present, it is not so for the number of species eradicated and therefore leads to a gross overestimation of the latter, i.e., the rate of eradications.

³ Numerous examples illustrate this - such as when the training centre planned on the town of Plougastel, Brittany (for the Brest football stadium) was abandoned. It was at the time evident that there would have been an advantage for young trainee players, but also would have helped the Brest club to stay in the French First Division football league. The argument that shelved the project was the reported presence on the site of a protected species, the Quimper snail [*elona quimperiana*]. Naturally, there are other specimens of this particular snail on

the use made of a biodiversity argument, whatever its format, can lie at the origin of progress and sizeable direct (or indirect) revenues, such as can be found as material, food or new medicinal drug sources, not forgetting that observation and scientific investigations on living systems can be a source of technological inspiration (bio-mimic or bi-inspired) .

We can conclude that any land planning project must include, as of the legally required, prior impact study, all the dimensions of biodiversity, the negative and also the possibly positive effects as well as a cost/benefit analysis, the advantages and disadvantages, that relate to the project in question., to conservation and valorisation of specific ecosystems, even including possible increases to biodiversity.

6. Since French Parliament adopted the July 10, 1967 law on “protection of Nature”, France has applied a so-called ERC doctrine standing, in French, for ‘avoid, reduce, mitigate’. It enforces on project initiatives to implement measures that will effectively avoid negative effects, or reduce them or, failing that, at least mitigate the impacts of the projects on neighbouring milieus. Project initiators are required by law to implement appropriate ERC measures, and these must be set out in the impact study phase. Any alternative solution seen as an improvement (in ERC terms) must be studied and mitigation where necessary must be implemented on other sites, for example, to create or restore the partly destroyed (or negatively impacted) ecosystems.

Sometimes, these measures prove difficult to implement: property right issues, ecological engineering, time horizons involved or lasting repairs. The draft law “Re-conquest of biodiversity, Nature and landscapes”, adopted in its first Parliamentary presentation March 24, 2015 by the Members of the Assemblée Nationale (French Lower House), and currently under discussion at the Senate, introduces three very important measures:

- (i) Any person under an enforcement order to provide mitigation can do so directly, or indirectly while retaining full responsibility by contracting the measures required out to a ‘mitigation operator’; or by purchasing mitigation unit coupons, in a reserve of natural assets. This should enable the creation in France –as was done in the United States in the 1970s – whereby natural zones can be restored in advance, for example the so-called wet-lands, and the offer of the coupons to prime contractors under the obligation to mitigate a given construction project. In France, the *CDC Biodiversité* agency, a subsidiary of the national bank *Caisse des Dépôts et Consignations*, set up such a “bank” on an experimental basis in the Plaine de la Crau (in South France, inland from Toulon).
- (ii) There are plans to extend - in a global legal framework - the scope of application of mitigation measures, to replace regulatory enforcement, depending on type of planning (for example, the law on Water, or for Urban planning schemes such as the PLU and/or SCOT).

other sites nearby. Sometimes, even the simple hypothesis of the presence of a protected species can bring planning to a halt, even when it runs against the safety of some of the inhabitants. An example here is the case of the hermit beetle, aka the Russian leather beetle [*osmoderma eremita*] evoked when the trees lining an alley of a château in the Yonne department were to be trimmed. The media at large got their teeth into this, managing to make the situation ridiculous, countering any serious consideration of biodiversity. In reverse, now we see – and it is worthwhile underlining this – that some airports are doing their best to preserve biodiversity without endangering flight traffic. Two French airline companies, Hop! and Air France, as well as the French Civil aviation authority (DGAC) are supportive of these initiatives. Cf. in the French newspapers *Le Parisien* : <http://www.leparisien.fr/environnement/les-escargots-taillent-le-stade-brestois-13-12-2012-2404461.php> and in *Libération* dated 20/09/2010 (Alexandre Stobinsky) : <http://www.liberation.fr/societe/01012291095-le-pique-prune-heros-de-ces-bois> http://www.hop.com/sites/default/files/press/180615_hop_biodiversite_une_association_pour_un_transport_aerien_mieux_integre_a_son_environnement.pdf

- (iii) A time-lasting inscription will be made of the mitigation sites will be carried out by the property managers, making use of need be of their right to pre-empty properties, or via management agreements that place contractual measures on the environmental obligations. Methods of ecological engineering allow operators to restore or to create mitigation units that still require some experimentation and research investigations, to guarantee that the objectives will be attained, to increase the 'success rate' and to reduce - wherever possible - the time need to restore the ecological *quo ante* status on the sites "destroyed".

7. Political spheres should be informed as objectively as possible in order for the legal representatives (MPs, Senators ...) be in a position to make informed decisions. Research on biodiversity is therefore unavoidable, and it must, by essence of the subjects, be multidisciplinary. When investigations are conducted rigorously, they will lead to using the scientific findings and conclusions to acquire new knowledge and thereby facilitate the decision making processes and also help in campaigns to correctly inform the public at large. From a scientific point of view, the very concept of biodiversity should be re-examined and reinforced, with the hope that the media handling of the issues will meet our expectations. If notwithstanding, a legal framework proves necessary, for inclusion in (or in compliment to) the draft bill of law on "Re-conquest of biodiversity, Nature and landscapes", this also will call for grounding in solid scientific terms, with the concern:

- (i) to maintain a high level of flexibility of approaches in order to preserve natural wealth, even increase the latter;
- (ii) to take into account the adaptive and evolutionary properties of living matter, which allow them to remain viable and where the natural processes generate a diversity and necessary and sufficient to let evolution play its essential role;
- (iii) to implement best technologies and best practices;
- (iv) to encourage and promote on the agenda the adoption of a new long term economic and social development policy, based on "ecological transition", with the constant concern to improve wellbeing, of both today's and tomorrow's Societies;
- (v) to advance plan local land planning policies including biodiversity as a possible resource, as a non 'delocalizable' asset, benefiting the territories and their economies.

Finally, NATF advocates that a better overall knowledge of the dynamic nature of biodiversity should be encouraged and promoted, along with the various contributing factors and processes that lead to change, notably the effect of random phenomena. This extended knowledge base is necessary to promote a dynamic, adaptive management for biodiversity, a step towards truly ecology-intensive engineering, the in which conservation would constitute only one of the measures.

Appendix: NATF minority position

The objections expressed by a minority of NATF Fellows during the vote relate on one hand, to the way the scientific discussion on erosion has been presented and, on the other, to the stance advocated in respect to land planning policy decisions.

- The minority willingly recognize that our knowledge about the biodiversity erosion phenomenon is impacted by numerous uncertainties. But the factors that can lead to over- or under-estimations as to the amplitude of the phenomenon and supportive arguments should be presented in a balanced manner. The minority deems that this is not the case. **In more global terms, the minority considers that rather than single out the uncertainties, which may induce a degree of “nonchalance” in relation to biodiversity erosion, the Academy would be more in its role if it were to address a precautionary message (or underscore responsibilities) to public authorities concerned.**
- The draft Advice Note submitted for the vote immediately sets out the relationship between conservation of biodiversity and land planning in antagonistic terms “hampering economic development and job creation” ... for projects that are deemed “nonetheless useful”. The minority considers on the contrary that the challenge today in land planning is to see development of natural capital resources included as a component part of land planning, in order to assure that the “territories” allow for “truly” sustainable economic and social development. **The minority would have welcomed seeing this other, novel, vision of land planning added to the finalized Advice Note as a background reasoning, enabling an expression of some undisputed skills shared by Fellows of NATF in this field.**

