

STRATEGY AND PRIORITIES FOR THE FRENCH RESEARCH ON Biodiversity

DOCUMENT PREPARED BY
THE FRENCH FOUNDATION FOR RESEARCH ON BIODIVERSITY (FRB)
in response to a request from the French Ministry of research



STRATEGY SUMMARY

Biodiversity research must address the major issues renewed today

The text of this strategy started from the realisation that the perception of questions on biodiversity has changed greatly over recent years: the issue of biodiversity is now of major importance on a worldwide scale, as much at a scientific level as at political, social and economic levels. Biodiversity appears to be one of the foundations of sustainable development and the concept of protecting biodiversity is now associated with that of its management and exploitation. Biodiversity can in fact be considered as a natural resource, which management methods can make either renewable or non-renewable. It is now admitted that the dynamics of global changes and globalization have a major effect on those of biodiversity; it is therefore important to understand the underlying mechanisms of these dynamics to attempt to control them.

This document identifies nine principal points that must be taken into account in developing a scientific strategy that builds on advances and dynamism of research while remaining in phase with a society concerned for its future and that of the planet:

- **A marked evolution of the perception of biodiversity by actors and researchers.** Priority was previously put on maintaining 'patrimonial' biodiversity, but this is now accompanied by a growing awareness of the role of ordinary and functional biodiversity, supplying useful services to human activities and societies.
- **Conceptual and methodological advances in different disciplines contribute to knowledge on biodiversity.** These advances allow us to envisage more complete, integrating and explanatory approaches.
- **The need to have better knowledge on the adaptive and evolutionary**

potential of biodiversity, not only on long but also short time scales: the way in which biodiversity can respond to global change means we must look at mechanisms of phenotypic plasticity and genetic adaptation that could be different from those working on long time scales.

- Ecologists often spontaneously favour the 'ecosystem' scale, notably for studying relationships between biodiversity and 'services', **while the issues at stake often require landscapes, territories and socio-ecosystems to be considered.**


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- The social and research questions ultimately raised imply an **integration of approaches in spatial and temporal terms as well as an interdisciplinary approach to work.**
- High expectations are made of the scientific community not only to improve understanding and demonstrate the dynamics of biodiversity linked to the dynamics of human societies, **but above all to build SCENARIOS that include the future of these dynamics.**
- Decision-makers too often have the impression that the results of research on biodiversity are not sufficiently useable either in their content or communication to help make choices: there is therefore a **true need for science-society and science-decision maker interfaces.**
- Increasing numbers of socio-economic players are themselves prone to evaluate in what way biodiversity can be a source of innovations for their activities and how it can be taken into account in their strategies, **but underline that scientific grounds in order to help in achieving this are strongly missing.**
- Society has seen a whole series of actions and initiatives develop (ecosystem restoration and mechanisms of compensation in biodiversity; establishment of green and blue connectivity networks - physical continuity and proximity between natural environments; development of texts regulating access/management/use of biodiversity, as well as compensation for impact on



this biodiversity... without ensuring parallel development of **research actions allowing objective criticism about these initiatives or offering guidance.**

Considering the challenges and the fact that these will become increasingly important in the years and decades to come, an ambitious research strategy is presented here.

Structure of the strategy

The present strategy is built on five complementary priority research axes:

- The first 'values' axis corresponds to cross-cutting reflection on research actions concerning the values of biodiversity: this is a strong original point of this strategy compared with all those made until now (national or international).
- Three complementary and coordinated axes (Documentation, Understanding, and Scenario-building) form the core of the research actions to perform. The 'Documentation' and 'Understanding' axes lead into the 'Scenario-building' axis, which itself continually feeds back into the first two.
- A fifth axis aims to develop research actions that allow, in the context of the scenarios previously built to better integrate biodiversity into human activities and think usefully about conditions to preserve it.



Priorities for research in the years to come

For each axis, a series of challenges and actions are identified for which the reader can find the details in the body of the text. Of all actions considered, ten priorities can be put forward, organised into three categories.

THREE PRIORITIES THAT WILL ULTIMATELY PROVIDE A STRONG STRUCTURE FOR THE ENTIRE FIELD OF BIODIVERSITY, AS THEY CAN SHAPE ITS FRAMES AND PERCEPTION

Priority 1: Reinforce and unite research on modelling and scenario-building of biodiversity dynamics; in fact, the relevance and credibility of biodiversity research will largely be assessed depending on the way in which research manages to respond to the expectations of decision-makers in providing scenarios of the future dynamics of biodiversity at different scales, integrating the idea of uncertainty. This will mean facing the challenge of modelling complex systems and **developing a coordinated French network of researchers to model future changes in biodiversity, in the shape of an institute concentrating on biodiversity modelling.** The establishment of such a structure should constitute a short-term inter-institutional priority.

Priority 2: Encourage research on ecosystem services and the values



of biodiversity, two key concepts that will play an essential role in the accounting for biodiversity by human societies in the years to come.

This implies continuing to analyse and improve our understanding of biodiversity-services relationships in ecosystems and processes of biodiversity valuation. It will also mean improving the representation of the functions performed and ecosystem services provided in the models and scenarios of biodiversity dynamics.

Priority 3: Develop scientific bases for innovation in the field of biodiversity valuation as a source of new biotechnologies and in the usage of biodiversity as a basis for sustainable activities. The domains concerned are vast and involve genetic resources, chemical ecology, ecological engineering, biomimicry etc. Creativity and rigor are of prime necessity in order to evaluate the true potential that biodiversity can offer human activities and societies in the future. Inter-institute think-tanks could help in the emergence of research questions and action proposals.

THREE ESSENTIAL PRIORITIES TO UNLOCK THIS DOMAIN:

Priority 4: Reinforce knowledge about the least-known compartments of biodiversity, so as to provide data on local and global scales that are relevant to an approach for understanding and modelling biodiversity dynamics. In both terrestrial and marine habitats, entire compartments of biodiversity remain poorly or entirely unknown in terms of their constituents (species and sub-species level) and of the role played by these organisms in ecosystem function. Liaising with international efforts, French research must, in its fields of competence and geographical sphere of influence, contribute its most recent investigation tools to explore uncovered areas that otherwise potentially limit the relevance of scenarios on the future dynamics of biodiversity. Choices will be made here so as to rapidly mobilize the national scientific community on several priority work areas of international importance.

Priority 5: Reinforce and coordinate biodiversity observatories at the

national level to be able to obtain long data series. This will be done through a structure of the 'ECOSCOPE' type. Biodiversity research would be severely

hampered without such a structure to serve as a base for the whole field. Such observatories, to be established both on mainland France and French overseas territories, can also serve as experimental terrain. They will include collections and networks of actors, and will fully consider the pressures exerted on biodiversity. The sites of long term observation on man-environment systems, allowing the study of combinations of man, environment and biodiversity, will be essential here and material and human means will need to be foreseen in the long-term. The ECOSCOPE should logically fit into the framework of the European coordination structure LifeWatch, which should become the European section of the international project GEOBON. The transformation of this need for coordination into a solid reality implies rapid dialogue with all actors.

Priority 6: Study those key mechanisms that are still poorly covered, in order to understand and predict the dynamics of biodiversity, such as the role of evolutionary processes of spatial distributions. Analysing the importance of rapid adaptive processes operating over short time spans and particular spatial disposition patterns must be a priority. In the same way, developing research that integrates the vision of ecosystem services via different levels



of organisation, without necessarily favouring the ecosystem level, and making this research compatible with studies on biodiversity dynamics at larger scales will be essential. One part of this research could feed the field of research on biodiversity protection and associated actions, and likewise the definition of relevant biodiversity indicators and the pressures at work on biodiversity. To address this action there must be a rapid response in terms of human resources and financial incentives.

FOUR CROSS-CUTTING PRIORITIES TO UNDERPIN THE RELEVANCE AND CLARITY OF FRENCH BIODIVERSITY RESEARCH:

Priority 7: Develop the interdisciplinary character of biodiversity research. Biodiversity research and its future dynamics need a kind of prospecting that brings together life science, social sciences, engineering, physics and mathematics, as well as earth sciences. Analysing the appropriate modes of direction and *ad hoc* levels of organisation to address the challenges of biodiversity involves approaches that are fundamentally interdisciplinary. But this interdisciplinarity is difficult to put into practice. A special effort needs to be made towards the generalisation of interdisciplinary approaches, with combined explanation and training,

identification of integrative questions likely to attract researchers from different disciplines and mobilization of different communities, notably via important common projects and objectives. This could lead to thematic calls, targeted funding, and recognition via an adapted research evaluation process.

Priority 8: Favour the cross-over between temperate, tropical and Mediterranean, between terrestrial and marine, and between wild and domestic issues. The pooling of concepts and methods, plus the coherence of the research plan dictates this kind of cross-over. A particular issue here is to integrate the subjects addressed by the 'genetic resources' community and those of the other communities of the 'biodiversity' domain, and to succeed in recognising genetic resources as a component of biodiversity. A special effort must also be made to help the development of biodiversity research in developing countries, in coordination with research on development.

Priority 9: Rethink education and training to better prepare students for biodiversity issues. This consists of a general way of responding to the need for training, expert advice and also information in relation to decision makers (both elected representatives and administrators), businesses, NGOs

and the general public. The need for pluri-disciplinary approaches in biodiversity study must be relayed at the university level by the establishment of departments integrating different disciplines.

Priority 10: Help the scientific community to organise itself in response to society's growing need for expert advice. Improving the integration of biodiversity into human activities can be done via the development of renewed interfaces between the actors of biodiversity. This requires, in particular, rethinking and organising French scientific expertise on biodiversity in the framework of public and private decision making processes, and favouring the involvement of scientists in international negotiations. The FRB constitutes a well-designed interface of that kind and should serve as a necessary French science-society platform for biodiversity and ecosystem services in relation to the future IPBES.

The major challenge that the scientific community must face for planet earth in the coming years is therefore not only to provide different quantitative and qualitative elements (in-depth characterisation and monitoring of biodiversity, scenarios of different scales of biodiversity dynamics, indicators, etc.) needed in order to respond to questions posed by society, but equally to produce and deepen knowledge and new concepts (organisation levels relevant for dealing with biodiversity services, frameworks for attributing values to biodiversity, best means of governance, etc.) likely to radically modify the very content of the biodiversity debate.



This scientific strategy has been written by the French Foundation for Research on Biodiversity (FRB) in response to a December 9th 2008 request from the French Ministry of research. This document completes the French Strategy for Research and Innovation.

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