The construction of biodiversity as a political and scientific problem Initial results from an on-going survey

How has biodiversity defined itself as a public problem, by what processes has the notion become an important issue in public polices? This text presents a chronology of the phenomenon.

Biodiversity loss is now designated as a major and urgent environmental issue justifying rapid measures to reduce it, on all levels, and significant research budgets. This document will discuss this designation phenomenon, rather than public opinion on the dynamics of biodiversity or the various "representations of biodiversity".

The orientation of this study is that of the sociology of public policy which has, since the beginning of the 1970s, studied how certain topics become "public problems" (Gusfield, 1981; Cefaï and Trom, 2001). According to this school of thought, these problems do not exist on the basis of an objective reality, but because they are designated as problems during the process of defining, constructing and negotiating them. Conversely, other problems deemed by certain persons to be very real and important are never recognised as such by the public. Far from being automatic, the rise of issues to become and remain public problems is subject to highly selective processes resulting from collective mobilisation and needs to be analysed.

We propose here a chronology for the construction of biodiversity as a public problem since the appearance of the term in the middle of the 1980s, that will also make clear the major role played by scientists. From the beginning, the goal has been to include biodiversity not only in the political agenda, but also in the scientific agenda by showing that it is a relevant research topic. Biodiversity loss was constructed as both a political and scientific problem and it is this double nature that we need to understand.

We will use not only documents produced by the national and international biodiversity organisations, but also semi-directive interviews carried out in 2008 and 2009 with French researchers working on biodiversity. This material, still in the process of being gathered, will enable us to draw up an initial time line for the construction of biodiversity as a public, political and scientific problem. We will then make clear the links between the development of biodiversity into a public problem and certain recent changes in the scientific community.

Proposed time line

The contraction of the term "biological diversity" into "biodiversity" is generally attributed to W. G. Rosen, during a preparatory meeting of the National forum on biological diversity held in Washington in 1986. That is the moment in time that we see as the point at which biodiversity became a public problem. We distinguish three main periods corresponding to the emergence, acceptance and extension of the problem, and present for each period the main events that contributed to (or hindered) the definition of biodiversity as a political and a scientific problem.

Emergence of the term from the limited academic field where it first appeared (1986-1992)

Changes in nature in general and the disappearance of species in particular have worried certain scientists for many years and they "rang the alarm bell" (Chateauraynaud and Torny, 1999) well before biodiversity was ever an issue. In the 1960s, books with expressive titles were published, including Before Nature Dies by J. Dorst and Silent Spring by R. Carson, but were not acknowledged by political authorities. For many years, efforts to turn the damage done to the diversity of life into a public problem produced very limited results.

In this context, the invention of the term biodiversity constituted a true turning point in the "reception" of the warning issued by the researchers. D. Takacs has described how a small group of conservation biologists evolved into actual public-problem builders, notably by contributing to preparations for a national forum on biological diversity that received wide press coverage. Two years later, the proceedings, soberly titled *Biodiversity,* were published under the editorial management of E. O. Wilson, a naturalist known worldwide. It was thus from the scientific community that the notion of biodiversity emerged, or more precisely from a narrow interface zone between scientific production of knowledge and political awareness building. The notion was produced by experienced researchers who were of the opinion that it was their duty not only to observe and document biodiversity loss, but also to actively engage in slowing its progression and, to that end, to wage a political battle.

In 1991, an international research programme was launched, ranging far beyond conservation biology and addressing biology as a whole, genetics and systematics. One year later, the adoption of the Convention on biological diversity (CBD) during the Earth summit in Rio marked the start of political recognition for biodiversity. It was no longer just scientists declaring that the loss of life forms was worrying and deciding to mobilise their forces, but nations and states. From the National forum on biological diversity to the Rio summit, the notion made a triple jump, from 1) the United States to the rest of the world, 2) a recent and limited discipline, conservation biology, to a much larger scientific field and 3) the academic to the political sphere.

Acceptance of the concept with organisation of biodiversity research and strategies to counteract its loss (1992-2005)

In the research sector, the following period was characterised by efforts to evaluate, structure and innovate in terms of concepts and methods. Major international evaluations were launched. Following the Earth summit in Rio, the UN environment programme (UNEP) ordered a scientific study on the current status of knowledge on biodiversity and the related issues. The result was a multidisciplinary compendium of more than 1 000 pages, The Global Biodiversity Assessment, published in 1995. In 2001, another evaluation for ecosystems, the Millennium ecosystem assessment (MEA), was launched and made public its results in 2005.

In parallel, national and international research programmes were set up. In France, the Biodiversity dynamics and the environment programme started work shortly after the Rio summit. Founded in 2000, the purpose of the French biodiversity institute (IFB) was to coordinate biodiversity research in France and inform Europe and the world on the results. It launched a series of research calls and organised symposia that contribute to raising awareness of biodiversity in academia and federating research efforts. On the European scale, research was coordinated by the European platform for biodiversity research strategy.

In step with the organisation of biodiversity research, governments and the EU have launched efforts to counteract its loss. In France, however, ten years passed between CBD ratification in 1994 and formulation of the National biodiversity strategy in 2004. On the EU level, the Habitats directive was voted in 1992 and the Union has progressively set up the Natura 2000 network of sites intended notably to preserve biodiversity. In June 2001, the EU Member States set the goal to halt biodiversity loss by 2010. On the world level, the same objective was adopted by the Summit on sustainable development in Johannesburg in 2002.

Governments were becoming quite familiar with biodiversity. Following the G8 meeting in Évian in 2003, President Chirac decided that France would organise an international conference on biodiversity. The conference, which took place in Paris in January 2005, recommended launching international consultations in view of creating an international mechanism of scientific expertise on biodiversity (IMoSEB), i.e. an "IPCC for biodiversity"[1] .

Extension with international negotiations to create an "IPCC for biodiversity" (since 2005)

Since that time, repeated observations have shown that biodiversity loss has continued in spite of scientific progress (Barbault and Chevassus au Louis, 2004). Though not contested, the existence of a scientific problem, frequently presented as the fact that species were disappearing faster than others were discovered, was not considered sufficient to explain the failure to halt biodiversity losses[2]. Beside the fact that it remained insufficient, the available knowledge also appeared to be insufficiently integrated in public environmental policy. That explains why the issue was presented as a problem at the interface between science and politics.

1. http://www.fondationbiodiversite.fr/

2. The European environment agency thinks that the goal to halt biodiversity erosion by 2010 will not be met, in spite of progress in certain fields (EEA, report N°4/2009, page 7).

The IMoSEB (International mechanism of scientific expertise on biodiversity) executive secretariat was assigned to IFB[3], which organised meetings on the various continents from February 2006 to November 2007. The consultation phase ended with a request to the UNEP executive director to convene a meeting to discuss the creation of a science-politics interface for biodiversity. During the spring of 2008, representatives from the IMoSEB consultation process and the Millennium ecosystem assessment continuation process met and decided to construct a single mechanism called the International platform for biodiversity and ecosystem services (IPBES).

In November 2008, an initial meeting on the IPBES was held in Putrajaya (Malaysia). The decision was made to analyse the problems in the science-politics interfaces. In February 2009, the analysis was submitted to the UNEP governing council, in Nairobi, where a second intergovernmental meeting was held in October 2009. Reservations continued to be expressed by certain State representatives (notably the U.S. and Brazil) who requested clarifications on the IPBES mandate. The meeting ended with a decision to organise a third and last meeting in view of a final decision to launch or refuse IPBES. Following the third meeting recently (June 2010) held in Busan (S. Korea), the creation of IPBES would now appear certain.

Role of the scientific community

For a long period, ecology was not considered a science on a par with other disciplines and special fields in the life sciences, notably molecular biology. The point here is not to argue that the researchers alone succeeded in establishing biodiversity as a public problem in order to achieve strategies targeting recognition of their discipline and professional stature, but simply to note their role in this process among other constructors of public problems. It is also to evoke the issues and effects of this dynamic process in terms of the changes in the practices employed in ecology research.

Biodiversity research at the centre of a revolution in the natural sciences?

In France and specifically within CNRS (National scientific research centre), the creation of the Environment and sustainable development department in 2006, recently replaced by the National institute for the environment and ecology, was designed and perceived as meaning that the environmental sciences had achieved a new level of recognition in academia. Since 2000, a number of laboratories that were previously entirely devoted to molecular research have created teams for ecology research and the number of publications in the environmental sciences has increased considerably.

Work on biodiversity builds on these changes as well as contributing to reinforce them, in that biodiversity provides a powerful argument for programming efforts to modernise ecology that call on the example of the major projects to explore space, matter (the atom) and the genetic code.

« We need a major research effort of the size of the space exploration programmes for the exploration of the Earth's biodiversity, the causes and consequences of its loss, and the best means to conserve and use it. »
(M. Loreau, Oaxaca conference)

« We have since split the atom, landed on Mars, and deciphered the genetic code. Ironically, with only 1.4 million species recorded, many in only the most superficial terms, and perhaps as many as 80 million to go, the age of exploration of the biological world has barely begun. »[4]

Work on biodiversity is accompanied by new levels of instrumentation and equipment in laboratories, i.e. modernisation of the discipline via greater technical means. For a number of years, ecology has borrowed on the progress made in various other disciplines such as mathematical modelling, statistics and molecular biology. The techniques (e.g. barcoding[5]) used in systematics are also being modernised. Systematics, a science that has been in crisis for a long time, hopes to have found, via the biodiversity crisis, a chance for a new start. Finally, the workshop zones (long-term observation and experimental sites used by networks of teams from different disciplines) and ecotrons (controlled-environment facilities for experiments, simulating the real environment) have been created since 2000 to contribute to the modernisation of the discipline through the establishment of "large facilities" for observation and experimentation.

A drumbeat of environmental crisis

The purpose of ecotrons and workshop zones is to provide the tools required "to answer a certain number of questions that are crucial for the future of our planet" (website of the Montpellier ecotron, **http://www.ecotron.cnrs.fr/**). In general, biodiversity work is linked to ever-present references to global change and an environmental crisis which has contributed to making ecologists legitimate spokespersons on the topic, capable of analysing and documenting the problem. These references contribute heavily to reinforcing the standing of ecology research, while creating major expectations as to the usefulness of the results for understanding and improving the environment. For example, mention has been made of a sixth extinction which, though not approved unanimously by the scientific community, is the title of a call for projects by the National research agency in the spring of 2009[6].

References to the climate are also ubiquitous in official parlance as well as in the interviews. The point is generally to present the efforts to address climate change as a

3. In February 2008, IFB merged with the Office for genetic resources and its role was taken over by the Foundation for biodiversity research.

4. NOVACEK, M.-J., 1992, The Meaning of Systematics and the Biodiversity Crisis, *in :* ELDREDGE, N. (Ed.), *Systematics, Ecology and the Biodiversity Crisis*, p. 101-108, New York, Columbia University Press, 108 p.

5. Barcoding consists of decoding DNA sequencese of plant and animal specimens in the Natural history museums in order to identify them genetically and not only morphologically.

6. "The sixth extinction - Quantifying the loss of biological divesity. Understanding and acting on the related biological, economic and social processes."

model for what should be done for biodiversity, on both the scientific and political levels. Particularly concerning IPBES, references to IPCC (Intergovernmental panel on climate change) are frequent. Even though many draw attention to the differences between the two problems, notably the fact that biodiversity is more complex due to the absence of simple indicators measuring its loss, the climate example is presented as both a successful precedent to be followed and as a potential competitor in terms of the attention granted by the public and authorities, as is made clear in this remark, "*Global warming may dominate headlines today. Ecosystem degradation will do so tomorrow*" (Foundation for biodiversity research, FRB, 2008).

Contacts with the economic sphere

Fairly recently, biodiversity started to be frequently associated with "ecosystem services", e.g. in the name of IPBES. The idea that ecosystems supply humanity with different services that can be identified and priced was expressed by Daily in 1997[7], then popularised by the Millennium ecosystem assessment, which has proposed a typology. In April 2009, the group led by B. Chevassus-au-Louis submitted its report on "economic approaches to biodiversity and ecosystem-related services".

The idea of ecosystem services has elicited some criticism and discussion on the part of those who regret that economic aspects are increasingly present in biodiversity issues. At this point in our survey, it would appear, however, that many researchers feel that the spread of this notion enables them to better communicate on the topics of their work by inserting them in an economic context that is deemed unavoidable. Similarly, some researchers who have been contacted by local governments or companies to design ecological compensation or restoration projects hope to elevate ecology to the level of other physical, chemical or biological sciences characterised by their wide use in the business world and numerous contracts between business and research.

These contacts with the economic sphere contribute to a process of greater "credit" (in every sense of the word) for biodiversity research. Links with private companies were initiated immediately following the creation of IFB (and, on the international level, the Convention on biological diversity) via the Orée association and have been consolidated by the new Foundation for biodiversity research. Many groups of private corporations (construction materials group, natural substances and beauty group, etc.) are present in the FRB strategic steering committee. Another example is the recent creation (February 2008) of CDC Biodiversité, a subsidiary of the CDC State bank, that is active in biodiversity compensation and finance, thus contributing to closer ties between researchers and the economic sphere.

7. DAILY, G.C., (Ed.), 1997, *Nature's services: societal dependence on natural ecosystems*, Island Press.

8. It would be worthwhile to study the situation of paleontology and certainly other disciplines as well.

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Conclusion

Since the warning launched in the 1980s, biodiversity loss has become a problem addressed by a growing number of organisations, on all levels, active in observation, monitoring, assessment, regulation, funding and management. It has come to the point where this proliferation of organisations, all "owners" of the same stake, now contributes to an uncertain and continuously changing situation, in that their responsibilities often seem to overlap.

Today, biodiversity loss tends to be redefined as not only a scientific and political problem, but more precisely as a problem at the interface between science and politics, as was made clear by the international negotiations in recent years on the creation of an "IPCC for biodiversity".

This success in turning biodiversity into a public problem is linked to the efforts of researchers in ecology and systematics. After having made a major contribution to issuing the warning, researchers now tend to position themselves as "researcher-experts". In that the environmental crisis is now fairly widely acknowledged, they offer diagnostics and, *in fine*, decision-aid tools. In noting that work on biodiversity contributes to a transformation of research in ecology and systematics (and more generally in the natural sciences[8]), placing them on a footing closer to that of more "established" disciplines, it is not our intent to imply that researchers are "selling" biodiversity to enhance their status, but rather to look closely at the many and complex links between the construction of biodiversity as a public problem and current changes in the academic sector. Our survey will enable us to examine more closely and clarify those links. ■

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