Biosphere

According to François Ramade (2002), the biosphere can be defined "in the simplest manner as the region on the planet where life is possible, and where all living beings are found". This concept, alongside that of the ecosystem, has given ecology its dimension as a global science of the environment. Curiously, geographers have not made much use of this notion, with the exception of bio-geographers (Braque 1988, Rougerie 1988). In recent years this focus has not been widely returned to. Thus, in the Dictionnaire de l'Environnement written by geographers and coordinated by Yvette Veyret in 2007, there are several entries for biodiversity, but the biosphere is absent. The terms was nevertheless coined by proponents who have become prominent in the social debate on environmental issues, and geographers fully intend to be part of this debate.

The biosphere, a central concept in global approaches in ecology

For the Austrian geologist Eduard Suess who forged the term (1875) biosphere referred to the complementary concepts of the lithosphere, the atmosphere and the hydrosphere, but is was static. The term was only really conceptualised with the publication in 1926 of The biosphere by the geo-chemist Vladimir Ilitch Vernadsky (see Drouin 1993). In this work, in an evolutionist perspective, he talks of the "biologisation" of the planet earth, whereby the development of life rendered the planet increasingly "habitable". Integrating the interactions between living organisms and the physical and chemical components of the environments in which they live, Vernadsky emphasises the fact that the biosphere forms a dynamic system in which living organisms, considered as "transformers that convert cosmic radiation into active terrestrial energy" (quoted by Matagne, 2002) have a pivotal role. Thus he was a pioneer, pointing to the essential function provided by plant cover in climate and its evolution, and underlining the importance of forest formations.

The perspectives opened up by Vernadsky were a source of inspiration for the scientists and philosophers who promoted globalising approaches to ecology, in which the physical environment, living organisms and humans are inter-dependent. At the time when the social issues of the environment were gaining ground, the concept of the biosphere was adopted in holistic approaches that consider this complex system as superior to the sum of its components. Thus the philosopher Jacques Grinewald (2006) placed the history of humanity within the history of the biosphere, in an article entitled "the industrial revolution on the scale of human history of the biosphere". In these perspectives, terms other than that of biosphere have sometimes been preferred, such as the "ecosphere", or the still much debated Gaia proposed by the physicist James Lovelock and the mo-microbiologist Lynn Margulis. These two authors indeed go even further, considering the biosphere to be alive.

In 2010, the "year of biodiversity", IUCN (the International Union for the Conservation of Nature), re-focusing debate on the future of the co-evolution of humanity and the biosphere, set out to promote an "ethic of the biosphere". According to Patrick Blondin (2010) this ethic was to be based on the requirement to seek out "the best means of ensuring sustainability and adaptability of the biosphere". To this end, he adds, to strengthen its own ability to adapt, humanity must be careful to maintain its potential for cultural diversification.

The question of the spatial organisation of the biosphere

In this debate, geography has the ability to give an picture of the patterns and layout of biological diversity, and of the spatial modulations of changes that affect the biosphere. Classically, vegetation has been used as an indicator of the geography of the biosphere. Botanical geography, or Alexander de Humboldt's "geography of plants", a discipline that in his 1805 speech he stated existed only in name, had its golden age, giving birth both to modern geography and to ecology. Yet it would seem today that the question of the spatial distribution of vegetation is of only minor interest, since the main rules and features are already known and established. The various classification systems describe vegetation as a mosaic of discrete homogeneous units, coinciding at points on the earth's surface whose ecological characteristics they are assumed to reflect; these units are grouped together, via a nesting of scales, to form larger units, producing the biomes and the biosphere itself. However these main features prove to be more uncertain than has been assumed, and the classic spatial models that we have inherited, taken literally, lead to inaccuracies, and even misapprehensions.

These spatial models, which were drawn up in earlier, different settings, with different modes of thought and different objectives from those pursued at the start of this 21st century, need to be aired, adapted and adjusted to answer the questions facing us since our societies have started to worry about the state of our terrestrial environment. For instance, we can seriously wonder if it is worth

HYPERSOL

persevering with the planisphere of the main terrestrial biomes as it stands, since it is little more than a myth: it represents vegetative landscapes as they would have been had humans never been there, or had the climate remained fixed since its beginnings, or had the list of these vegetative landscapes been closed once and for all a few thousand years ago. Paleo-biogeographical studies tell us clearly that this fictitious past has never existed, and that in the future, even if humanity disappears, the biosphere will never look like that.

Vegetation is not the mere mirror of the environment: the combination of the ecosystems that form the biosphere does not necessarily coincide in detail with the spatial structure of the vegetation. This is true both of the structure that is readily perceptible in the general aspect of the vegetation, and of the more subtle structure that emerges from an accurate inventory of the flora. These two structures are most often not on the same scale, and the processes that generate them and make them evolve are only partly the same. The correspondence between vegetation and environment – this theory that the vegetation mirrors the environment, all the more accurately where it has been possible to take account of all the species making up that vegetation – should thus not be assumed. More simply, it can be stated that the variations observed in vegetative cover are indicators of certain biological and ecological processes, on variable time scales (and it is these processes that together form the ecosystems). The variations are also indicators of the impact of human societies on the different environments (Alexandre & Genin, 2010). Once the rules have been redefined in this manner, the geography of vegetative cover can continue to contribute usefully to providing a geographical representation of the biosphere, which i fact requires constant redefinition.

Biosphere reserves, territories for experimenting sustainable development.

The notion of the biosphere has also gained popularity via the establishment from 1976 by UNESCO of a network of "biosphere reserves". These occupy a particular position in the geography of protected natural areas (Depraz, 2008), in that they can be defined as experimental territories for ideas developed by the scientific community in different organisations or international conservation programmes. They arose from reflection launched by UNESCO with the collaboration of IUCN in September 1968 in Paris on the "scientific foundations of the rational use and the conservation of the resources of the biosphere". This reflection was continued from 1971 in the Man and Biosphere programme (MAB-UNESO).

The central aim of MAB-UNESCO was the creation of biosphere reserves, which were not to be parcels of nature placed under a cloche, but spaces in which economic activities would be reconciled with the sustainability of the natural resources (although the project did concede the need for a "central" zone strictly devoted to conservation and research, to satisfy the proponents of a natural environment completely protected from human disturbance). This compromise was intended to guarantee improved well-being for local populations. We can see here what IUCN referred to in 1980 as sustainable development, a phrase that has, since then, met with considerable success in the dual context of the ideological reappraisals following the collapse of the Soviet Union, and the rise of environmental concerns.

see also: "biome", "biocoenosis"

Bibliographie

bibliography

-ALEXANDRE F., GENIN A., 2010. - Les niveaux d'organisation du couvert végétal, question géographique et écologique. Géopoint 2010 : Les échelles pour les géographes et pour les autres (Groupe Dupont et UMR ESPACE, Université d'Avignon et des Pays de Vaucluse : 3 et 4 juin 2010) ,
-BLANDIN P., 2010. – Biodiversité. L'avenir du vivant. Paris : Albin Michel (coll. Bibliothèque Sciences), 260 p.
-BRAQUE R., 1988. - Biogéographie des Continents. Paris : Masson, 470 p.
-DEPRAZ S., 2008. – Géographie des espaces naturels protégés. Genèse, principes et enjeux territoriaux. Paris : Armand Colin (coll. U), 320 p.

-DROUIN J.-M., 1993. - L'écologie et son histoire. Paris : Flammarion (coll. Champs), 213 p. [Texte publié en 1991 sous le titre Réinventer la Nature aux éditions Desclée de Brouwer].
-GRINEWALD J., 2006. – La révolution industrielle à l'échelle de l'histoire humaine de la biosphère, Revue européenne des sciences sociales, Tome XLIV (2006), 134 : 139-167.
-MATAGNE P., 2002. - Comprendre l'écologie et son histoire. Paris / Lausanne : Delachaux et Niestlé, 208 p.
-RAMADE F., 2002 (2e édition). - Dictionnaire encyclopédique de l'Écologie et des Sciences de l'Environnement. Paris : Dunod, 1075 p.
-ROUGERIE G., 1988. – Géographie de la biosphère. Paris : Armand Colin (coll. U), 288 p.
-SUESS E., 1875.- Die Entstehung der Alpen. Vienne : W. Braumüller, 168 p.
-Vernadsky W.I., 1926 ; 2002 pour l'éd. française (poche).- La biosphère. Paris : Le Seuil (coll. Points Sciences), 277 p
-VEYRET Y. éd., 2007. - Dictionnaire de l'Environnement. Paris : Armand Colin, 404 p.

HYPERGEO