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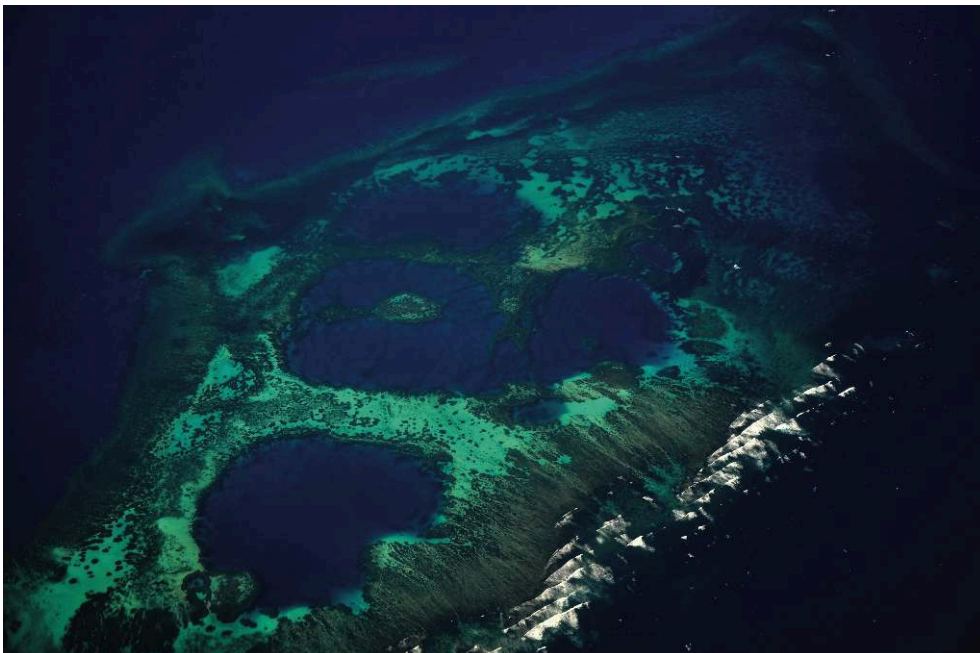
Biodiversity, from the Ocean to the City

Gilles Boeuf

EDITOR'S NOTE

Excerpts from the Inaugural Lecture 19 December 2013

Source: La lettre, no. 38, June 2014



The coral ecosystem, a biodiversity "hot spot" for oceans, here the great southern reef in New Caledonia

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- 1 **How to obtain an objective estimate of species diversity and biodiversity is one of today's crucial questions.**
- 2 This is no simple challenge, as everything is evolving very rapidly and the mass destruction of habitats is constantly leading to the disappearance of an unknown number of species. Equally alarming is the disappearance of human descriptors of diversity: systematicians and taxonomists. Major scientific organizations' current evaluations do not support the task of describing newly discovered species. Entire groups no longer have specialists in France, nor even in Europe or anywhere in the world.
- 3 While "amateurs" can play (and have always played) a leading role for the major species, a significant share of the description of biodiversity will always be the prerogative of researchers and teachers working in research institutions and organizations – either because access to living materials is difficult (hydrothermal sources, deep waters, tropical forest canopy, etc.), or because these amateurs lack interest in "small and very difficult things" or "ugly" things. Today's major research organizations, universities and especially museums must facilitate again the work of scientists devoted to these activities and that of specialists working on less easily identifiable groups. But amateurs also possess immense biological knowledge on the distribution of species, their biology and their ethology. The revival of the "participatory sciences" is well on its way, and over half of the new descriptions of species are by amateurs.
- 4 In the mid-eighteenth century Karl Von Linné, the father of "binominal" systematics (Latin name in two words: gender and species), counted approximately 12,000 living plant and animal species. There are currently just over 2 million species recorded, described and deposited in museums. And we are fully aware that we are still far off the mark. Every year, between 16,000 and 18,000 new species are described (still 800 of which are in Europe and 10% in the marine environment): who knows the actual number of currently existing species? How long will it still take to describe everything? And will we have the time? We estimate that between 1.5 and 2% of all species that have populated the planet since its early beginnings are alive today.
- 5 Knowledge on living groups varies widely. The major species were described first, together with species from "interesting" taxons, for various reasons. It is clear that, although we are probably getting there for mammals, for example (there are still bats, small rodents and insectivores to discover), there is still a considerable and most likely unsuspected number of unknown species among nematodes, molluscs, arachnids, crustaceans, and insects. And while the situation is not too bad for "higher plants", including trees, what about fungi, micro algae, protists, bacteria, and viruses? In fact, since the latter evolve extremely rapidly, we can legitimately ask ourselves whether human activities are not actually causing an increase in their number of species. All of this brings us back to the crucial question of the notion of "species".
- 6 How can this wealth be estimated in terms of species? It is essential to do so if we wish to obtain reliable measurements of extinction rates. Ideally species would be counted one by one, for each known biotope, but this is of course unfeasible in the vast majority of cases. And most importantly, how can we get from a list of species to an estimate of biodiversity? Every effort must be made and it is especially by comparing results and

their coherence that we will be able to assess the relevance of very different approaches.

- 7 Biodiversity is not synonymous with a wealth of species. Of course, the former depends on the latter, but it also includes genetic, phylogenetic, morphological, physiological, biochemical, endocrine, ethological and ecological forms of diversity, and all possible combinations. Biodiversity is far more than a catalogue or an inventory of species; it is much rather the entirety of the relations which living beings have established between themselves and with their environment. It is in fact the living fraction of nature.

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