

A world without mangroves: global decline of socio-ecological functions in an era of increasing anthropogenic pressure

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The aim of my thesis is to highlight and raise awareness about the continuing degradation of mangroves and the consequences of this loss on the socio-ecological functions at a global scale. For that aim, a complex combination of objectives has already been initiated and will be pursued with a goal to achieving the final result in August 2020. First, the socio-ecological functions of each mangrove species will be collected in the scientific literature and then completed with the help of the best professional judgment based on more than 50 years of cumulative expertise of the scientific collaborators of the SERM laboratory. The species will then be linked to their country of habitat via the diversity already described in the scientific literature. Hypotheses will then be established as to which functions within a country would be most affected by the loss of one or the other species. For this, socio-ecological redundancy will be taken into account, so that a number will be assigned to each function according to the number of species contributing to it (Mouillot et al., 2014) and it will be possible to say per country for how many functions redundancy is minimal. In a second stage, a more practical part is carried out since it involves the international sending of questionnaires to several entities specialized in mangroves. The main questions concern species that have been in decline for the last decade, and this independently for each locality/country. This step will allow, thanks to the work previously carried out, to make the hypothesis for each country of the species in decline, and consequently of the risks for the associated functions. This deduction based on simple correlations will be illustrated independently for each function on a world map. A first colour code in which each colour is representative of a stage of danger of the function and a second colour code illustrating the redundancy of the function will be used. The third step concerns the data about the evolution of the mangrove area that will be gathered and made available for the different countries thanks to the FAO, UNEP, IUCN, Mangrove Watch, Global Mangrove Watch, etc. databases. The information collected for each country will also be illustrated, juxtaposed and compared with qualitative degradation information and this will support the hypotheses made on the decline of the species. A rapidly and continuously decreasing area in a country will give credibility to the threat of functional loss already established by qualitative degradation within that country. The precautionary principle is an inherent part of my thesis. Indeed, its results will make it possible to see what is likely to happen (at the socio-ecological level) if this irreversible damage continues, with, of course, a certain margin of uncertainty. In fact, according to Principle 15 of the Rio Declaration: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

Reference

David Mouillot, Sébastien Villéger, Valeriano Parravicini, Michel Kulbicki, Jesus Ernesto Arias-González, Mariana Bender, Pascale Chabanet, Sergio R. Floeter, Alan Friedlander, Laurent Vigliola, and David R. Bellwood (2014) Functional over-redundancy and high functional vulnerability in global fish faunas on tropical reefs. *Proceedings of the National Academy of Sciences of the United States of America*, 111 (38). pp. 13757-13762.

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