

Small-scale Fisheries and Biodiversity: Alleviating Poverty and Conserving Natural Resources

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Open access journals are of extreme value as a vehicle for disseminating and maintaining transparency in Science. Why: they are visible, methods and contents of the research are widely accessed by researchers from different fields (more often, researchers tend to subscribe periodicals of their own research areas). Moreover, open access journals facilitate developing countries to get access to scientific results, since *a posteriori* paid journals are usually expensive for researchers in those countries. *A posteriori* paid journals are the ones you pay to get an article you are interested in. By publishing in open access journals results from research are thus available to anyone. This means that among other things, research is more readily open to the scrutiny of scientists and subject to the real possibility of being replicable or tested by a greater universe of researchers (if methods are clear, of course). Results also become more readily available to non-researchers. In the case of Marine Sciences, the availability of research to non-scientists helps in management, development and conservation, since managers, governmental agencies and other interested (such as fishermen!) turn out to be able to see the new findings. "Visibility", with all attributes associated within, is then a very important feature in open access journals. Finally, open access journals democratize Science, helping developing and poor countries to access those, somewhat, 'inaccessible' findings.

The Journal of the Marine Science Research and Development covers among other fields, oceans, seas, marine organisms, ecosystem dynamics, waves, as well as geology. By working in fisheries, in particular doing research on small-scale fisheries, there are aspects that I highlight here. These aspects concern to the association of the current importance of managing fisheries and its relationships with development and poverty. In that regard, a theme of relevant importance in marine management is the relationship between *conservation of biodiversity and food necessity (food security) for livelihoods within small-scales fisheries*.

Small-scale fisheries abound in the tropics. They are often scattered alongside shorelines in small villages. These villages often have livelihoods based upon extraction of natural resources, such as plants, fish and other animals. Small-scale fisheries are the core of many livelihoods in coastal areas of developing countries. About forty years ago, many anthropologists, cultural ecologists and human ecologists aware of this association of development and change, reunited in a classic book by Smith [1], analysis of change within cultural-ecological-economic contexts of small-scale fisheries; examples are Blake [2] on fishermen from Madras, Bay of Bengal, Starr [3] on Lebanese fishermen, Christensen (1977) on Ghana fishermen and Breton (1977) on Venezuela, among others [4,5].

Currently, technological change and modernization are still drivers of change; however, additional drivers have pushed changes in small scale fisheries, such as the threat to marine resources, climate change and contaminants, among others. The threat to marine resources comes from a variety of sources: not only from industrial fisheries, but they might come also from artisanal fisheries [6]. Some species targeted by small-scale fisheries are especially vulnerable, such as slow growing or late mature organisms (groupers, for example). As an example, in Brazil,

many reef species have been caught at immature stages by artisanal fisheries [7]. Ironically, target species often have good market prices, providing good returns for fishermen. Thus, fishermen are frequently facing a dilemma of being forbidden to fish in periods, areas or for some species, for the support of conservation and the destabilizing of the core of their livelihoods. The need to conserve biodiversity without pushing local populations to lower levels poverty is then, urgent.

A preoccupation concerning small-scale fishery and food security is found in the literature [8,9]. The interchange of biodiversity conservation and the diminishing of poverty by providing drivers (or incentives) to conserve marine biological resources include mechanisms, such as PES [Payments for Environmental Services] [10]. The *FAO Technical Guidelines for Responsible Fisheries* [11] is also an attempt to associate fisheries policies and the management of small-scale fisheries, supporting food security and addressing poverty. Sumaila et al. [12] addressed beneficial subsidies associated with investment in the natural capital of fisheries by reporting community development programs in rural fisheries, involving local communities/livelihoods integrated into policy demands. Defeo et al. [13] addressed the importance of the social-ecological systems of small-scale fisheries considering the effects of climate change, markets and governance: for example, they concluded that weak governance, market globalization, fishing pressure and climate change contributed to resource depletion in shellfisheries of Latin America. Lopes et al. [14] have shown that marine protected areas did not visibly protect either fisheries or fishermen in fisheries from Paraty, SE Brazil. Berkes [15] have pointed out that there is need to understand motivation to conserve and that benefits can include economic, cultural, social and political aspects. Therefore, studies dealing with the challenge of managing marine areas and livelihoods are much needed.

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