

Abstract

Mariculture accounts for about one-half of total aquaculture production by weight. About one-half of the mariculture production consists of aquatic plants, with the remainder being fish and invertebrates. Nearly all of mariculture is inshore. In contrast, offshore mariculture, which is practised in the open sea with significant exposure to wind and wave action and with equipment and servicing vessels operating in severe sea conditions from time to time, is in its infancy and production is almost exclusively of fish and shellfish. There is an impetus for mariculture to move to the unprotected waters of the open sea. Issues at the local level include competition for space, water quality problems, and a negative public perception of mariculture's environmental and aesthetic impacts. At the global level, there is concern for food security with expanding population along with the conviction that the potential of the world's oceans to supplement the food supply is vastly underutilized. Prospecting for suitable locations is a critical part of spatial planning for offshore mariculture's near-future development. Thus, the objectives of this technical paper are to provide measures of the status and potential for offshore mariculture development from a spatial perspective that are comprehensive of all maritime nations and comparable among them, to identify nations not yet practising mariculture that have a high offshore potential for it, and to stimulate interest in detailed assessments of offshore mariculture potential at national levels.

Estimates of offshore mariculture potential are based on key assumptions about its near-future development: offshore mariculture will develop within exclusive economic zones (EEZs), will mainly use culture systems modified from inshore mariculture, and will mainly employ species with already proven culture technologies and established markets. These assumptions set the stage for the identification of analytical criteria. Thus, EEZs were used as spatial frameworks to define the limits of national offshore mariculture development. Potential was defined by the depth and current speed limits on offshore cages and longlines, the cost-effective area for offshore mariculture development, and the favourable conditions for grow-out of representative species: cobia (*Rachycentron canadum*), Atlantic salmon (*Salmo salar*) and blue mussel (*Mytilus edulis*), and integrated multitrophic aquaculture (IMTA) of the last two species. Verification and comparison with existing mariculture showed that, despite the limitations of the data, the results are indicative of offshore mariculture potential within the specified criteria.

Offshore mariculture potential is large. At present, 44 percent of maritime nations with 0.3 million kilometres of coastline are not yet practising mariculture. About half of the mariculture nations have outputs of less than 1 tonne/kilometre of coastline. About one-half of inshore mariculture production consists of aquatic plants, but there is little production of plants offshore. Scenarios using 5 and 1 percent of the area meeting all of the criteria for each of the three species showed that development of relatively small offshore areas could substantially increase overall mariculture production. Improvements in culture technologies allowing for greater depths and increased autonomies, as well as the further development of free-floating or propelled offshore installations, would add greatly to the area with potential for offshore mariculture development.

Remote sensing for the sustainable development of offshore mariculture is included as Annex 3 to this publication in recognition of the importance of remote sensing as a source of data for spatial analyses to assess potential for offshore mariculture, and also for zoning and site selection as well as for operational remote sensing to aid mariculture management.

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