

## Marine aquaculture's role in providing nutritional security in a changing environment

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**Abstract:** The world produces less than 2 % of its food, fiber and biofuel from the sea despite the fact that oceans cover 70 % of the earth and receive 70 % of its solar energy. Instead we use 70 % of available freshwater and 40 % of our land through agriculture to feed and clothe ourselves. Future world food security plans developed by governments and international agencies often focus mainly on improving agriculture with an occasional nod toward fisheries, but rarely consider what aquaculture, especially marine aquaculture could provide. Marine aquaculture represents a food production approach that uses less freshwater, feed and land resources than agriculture, is more energy efficient and emits fewer greenhouse gasses than agriculture. In addition, marine aquaculture is relatively buffered from some aspects of climate change. For example, marine aquaculture does not suffer from droughts or floods, and is buffered from extreme storm events and temperature changes. Properly sited and managed, marine aquaculture can provide ecosystem services that help wild stocks persist under changing environmental conditions. Finally, the nutritional quality of aquaculture products is high relative to terrestrial products, increasing the nutritional quality of the diet for society. Marine aquaculture needs to articulate the advantages it represents to world nutritional security so discussions and planning for future food security under a changing climate can be informed.

**Key words:** N/A

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### Annotated bibliography

(1) U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015 – 2020 Dietary Guidelines for Americans, 8th Edition, December 2015. Available at <https://health.gov/dietaryguidelines/2015/guidelines/>.

Every five years the US government reviews current nutritional research and analyzes US food consumption patterns to develop guidelines. Seafood is chronically under consumed by all age groups and both sexes. This has real impacts on human health and results in increased heart disease, stroke and dementia in the US population. Americans consume about half of what is recommended for optimal human health.

(2) Forster J. and Radulovich R., 2015: Chapter 11 - Seaweed and food security, in "Seaweed Sustainability" (ed. by Tiwari B. K. and Declan J. T.), Academic Press, San Diego, pp. 289-313.

Makes the case for a marine agronomy based on seaweeds analogous to terrestrial agronomy that currently provides the majority of our food and fiber.

(3) Hall S. J., Delaporte A., Phillips M. J., Beveridge M., and O'Keefe M., 2011: Blue Frontiers: Managing the Environmental Costs of Aquaculture, The WorldFish Center, Penang, Malaysia.

Provides a comparison between aquaculture and terrestrial production from an environmental perspective.