

The Potential for Seaweed Culture to Provide Ecosystem Services and Useful Products

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ABSTRACT

The oceans cover 70% of Earth yet they yield only 1.5% (117 million metric tons (mt)) of the 7.6 billion mt of food that we produce each year. Can we make more productive use of them? If so, how and, in light of challenges now faced by global agriculture, should we try? This paper addresses these questions by looking at seaweed farming and the idea that a parallel, photosynthetically driven system of food production, a 'Marine Agronomy', could be developed at sea to supplement the food we grow on land.

Of the 18 million mt of seaweed farmed in the world in 2011, almost all of it was produced in Asia, mostly for food. Globally, there is potential to increase this production very substantially and, thereby, to contribute much more meaningfully to our overall food supply. However, for this to happen, society must accept the idea that some areas of our coastal and offshore marine waters will be farmed, like our lands, and be persuaded that the value created justifies the use of this public space. There are two broad groups of values that such an endeavor would bring – economic returns and environmental services.

Seaweeds are already valued as food in many parts of Asia and even in the western world when presented in Asian cuisine. Could they become valued more widely in future as 'sea vegetables', if terrestrial agriculture fails to produce all of the 5 billion mt of additional food that forecasters say we will need, especially if the claimed health benefits of eating them are verified? Seaweeds are also valued as raw material for processing to produce biofuel, animal feed, chemicals, paper, fertilizer and other renewable, derivative products. All of which would provide the economic value of thousands of jobs in primary activities that are at the core of our society's wellbeing.

Society may also find value in the environmental services provided by seaweed farms. By taking up nutrients and carbon dioxide from seawater they would reduce coastal eutrophication and ocean acidification, at least locally. And, by sparing freshwater and land that would otherwise be needed to expand terrestrial agriculture, they would ease the burden we now impose on our terrestrial habitat. Moreover, because seaweeds prosper without land or freshwater, a marine agronomy may be less vulnerable than our terrestrial one to the effects of climate change, providing us with a relief option should the worst come to pass.

Clearly, therefore, in return for access to the space in coastal waters that they would need, large-scale seaweed farms could offer society substantial value. This now needs to be tested and quantified, and the question for our society is: is it value enough to want to try?