Experts warn booming seaweed industry

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Seaweed farms now produce more than 25 million metric tonnes annually. The global value of the crop, US$6.4 billion (2014), exceeds that of the world's lemons and limes. Credit: Gwang Hoon, UNU-INWEH / SAMS

A rising number of valuable uses being found for seaweed—from food and fertilizer to pharmaceuticals and industrial gels—is driving the rapid growth of an industry that could easily and needlessly drop into some of

the same pitfalls previously experienced in both agriculture and fish farming.

Drawing on the expertise of 21 institutions worldwide, UN University's Canadian-based Institute for Water, Environment and Health, and the Scottish Association for Marine Science, a UNU associate institute, today published policy advice to the burgeoning, multi-billion dollar industry to help it avoid expensive mistakes and pursue best practices, backed by relevant case studies involving crops like bananas and shrimp.

The authors note that seaweed farms now produce more than 25 million metric tonnes annually. The global value of the crop, US$6.4 billion (2014), exceeds that of the world's lemons and limes.

Seaweed farming has grown from the late 1950s into an industry offering sustainable employment in developing and emerging economies, notably China (which produces over half of the global total of seaweed—12.8 million tonnes) and Indonesia (27% of global production—6.5 million tonnes). Other major producers include the Republic of Korea and the Philippines.

Among the industry's many wide-ranging benefits:

- With fisheries stagnating, cultivating seaweed helps fill a gap and "is widely perceived as one of the most environmentally benign types of aquaculture activity, as it does not require additional feed or fertilisers," the authors say. Consequently, it has been actively promoted by government initiatives, particularly in many developing countries where communities have reduced access to alternative livelihoods or are involved in destructive fishing methods like dynamite fishing.
- Increasingly, seaweed cultivation is also being integrated with intensive fish farming to provide nursery grounds for juvenile

commercial fish and crustaceans, and to filter undesired nutrients, improve the marine environment and reduce eutrophication.

- Indirectly, seaweed farming has reduced over-fishing in many regions, providing coastal communities with an alternative livelihood. In some places, women have become economically active for the first time.

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Most of the seaweed produced is used for human consumption with much of the remainder used largely as a nutritious additive to animal feed or as a fertiliser.

In the last decade, seaweed cultivation has been rapidly expanding thanks to growing demand for its use in pharmaceuticals, nutraceuticals and antimicrobial products, as well as biotechnological applications.

Seaweed today is used in some toothpastes, skin care products and cosmetics, paints and several industrial products, including adhesives, dyes and gels. Seaweed is also used in landscaping or to combat beach erosion.

Problems of rapid expansion

"The rapid expansion of any industry, however, can result in unforeseen ecological and societal consequences," according to the authors.

Communities that come to depend on a single crop for their livelihood become highly vulnerable to a disease outbreak, as happened in the Philippines between 2011 and 2013 when a bacteria that whitens the branches of a valuable seaweed species caused a devastating loss to the communities involved, estimated at over US$ 310 million.

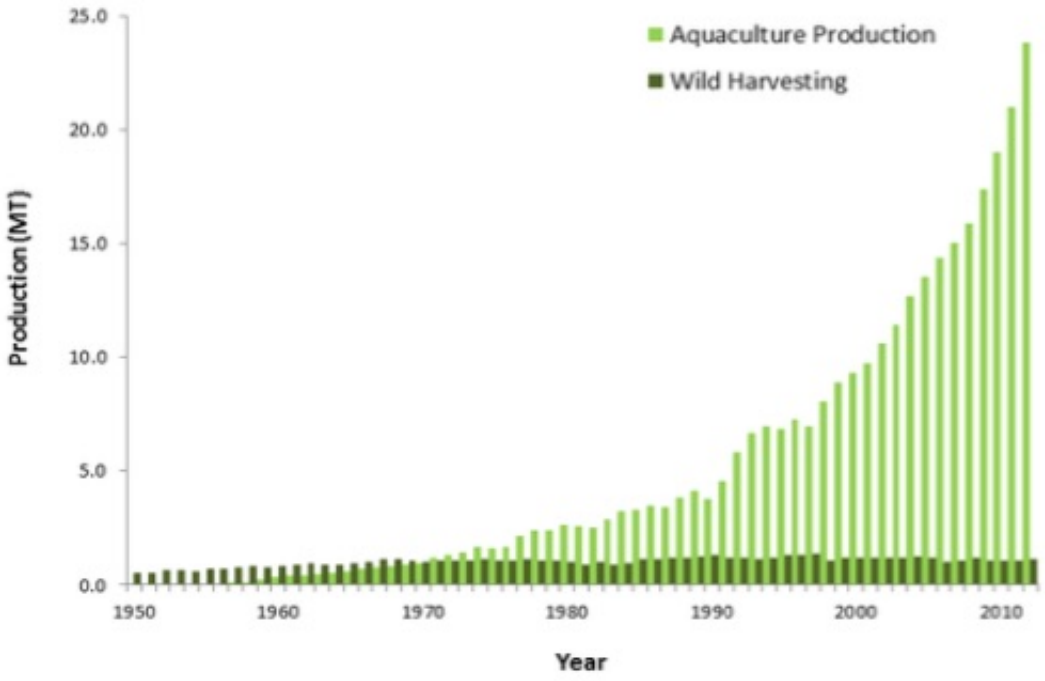

Figure 1. **Global seaweed aquaculture production (1950-2014). FAO (2015)**

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The authors say the industry needs to guard against non-indigenous pests and pathogens, to promote genetic diversity of seaweed stocks and to raise awareness of mistakes in farm management practices (such as placing the cultivation nets too close together, making the crop more vulnerable to disease transfer and natural disasters).

"In addition, the illegal use of algicides / pesticides, with unknown but

likely detrimental consequences for the wider marine environment, user conflicts for valuable coastal resources and rising dissatisfaction over the low gate prices for the crop can all result in negative impacts on the industry."

The experts note that increasing demands being placed on the marine environment and competition for maritime space (renewable energy, aquaculture, fisheries, et cetera) necessitates coordination and co-operation between different users, an ecosystem-wide management approach and marine spatial planning (MSP) for aquaculture, alongside regulation to protect the wider marine environment.

In a nutshell, the key points for the seaweed industry come down to:

- Biosecurity—preventing the introduction of disease and non-indigenous pests and pathogens
- Investing in risk assessment and early disease detection
- Building know-how and capacity within the sector
- Cooperative planning to anticipate and resolve conflicts between competing interests in finite coastal marine resources, and
- Establishing management policies and institutions at both national and international levels

"Rapidly increasing seaweed cultivation globally will be good for commerce and open up a range of new products, but we must also try to minimise any negative effects that this industry may have on coastal marine environments. The seaweed industry must be developed in a sustainable way that considers not just how to maximise profits but maintain the highest biosecurity standards to prevent the introduction of pests and disease. It will also be crucial to develop new indigenous disease-resistant strains of seaweed, wherever possible," said lead author Elizabeth J. Cottier-Cook, SAMS.

More information: Cottier-Cook, E.J., Nagabhatla, N., Badis, Y., Campbell, M., Chopin, T, Dai, W, Fang, J., He, P, Hewitt, C, Kim, G. H., Huo, Y, Jiang, Z, Kema, G, Li, X, Liu, F, Liu, H, Liu, Y, Lu, Q, Luo, Q, Mao, Y, Msuya, F. E, Rebours, C, Shen, H., Stentiford, G. D., Yarish, C, Wu, H, Yang, X, Zhang, J, Zhou, Y, Gachon, C. M. M. (2016). Safeguarding the future of the global seaweed aquaculture industry. United Nations University and Scottish Association for Marine Science Policy Brief. ISBN 978-92-808-6080-1. 12pp.

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