

# Climate change and sustainable seafood

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## Executive summary (150-200)

- Food has one third GHG emissions
- Climate change may affect seafood production capacity
- Sustainable seafood practices contribute to GDP
- Ocean based solution to climate change can promise reduced dependence on land-based economy.
- Ocean based food can serve to minimise the land-based food dependence

## Definitions

- Greenhouse gas (GHG) emissions – emissions that cause rise in temperature of earth atmosphere
- Blue food – blue food refers to food from the ocean
- Climate change mitigation – activities that lower the impact of climate change
- Climate change adaptation - activities

## Problem

Ocean is a source of food and home to many species and a source of medicine and renewable energy. UN sustainable development goal SDG-14 emphasises on conservation of marine assets and life below water.

Food constitutes one third of the manmade greenhouse gas emissions worldwide. [1] 600 million people - which is approximately 10% of the world's population lives in the coastal areas. And around 2.4 billion (approx. 40% of world population) people live within 100 km from the coast. [2] Livelihood on coastal land is entangled with ocean-based economy in many aspects from food, culture, trade, tourism, and transport.

However, climate change has adverse effects on the ocean biodiversity which may result in impacting the ocean-based economy. On the other hand, ocean-based solutions may promise to reduce overall manmade emissions. The aim of this briefing is to drive attention of policymakers towards the development and advancement of sustainable seafood industry to utilise ocean potential to minimise the manmade GHG emissions from food industry.

## Scope

Seafood promises high nutritional value being rich source of protein and vitamins. Ocean based food has lower carbon footprints makes it an environmentally benign

choice. This 'blue food' needs more attention to decarbonise the impact from food consumption. This will help to share the stress on land-based food production. Increased attention to seafood may also generate more innovative and healthier food alternatives. This may help to create more job opportunities in the ocean-food industry.

'Blue-food' has a potential to achieve the sustainable development goal 2 - [SDG2 for zero hunger](#).

### **Climate change and sustainable aquaculture**

Climate change has affected the food generating capacities of oceans. There are several approaches this potential can be utilised either by expanding the existing aquaculture domain and increasing ocean-based food dependence or by bringing in reforms in the existing aquaculture practices to adapt to climate change. [3]

The climate change is predicted to impact the fish growing industry in a negative way and the global fishmeal and fishoil production is predicted to decrease by the end of the century due to the climate change. [4] However, assumption in the modelling studies and unavailability of complete data may vary the projection in various regions. Another factor is scale, effect of climate change on aquaculture at domestic level may differ from the commercial level. Thus, further research is needed. Secondly, limited research is available that discusses the climate change adaptation in aquaculture. [5]

The expansion of seafood production without considering the climate change factor would be unsustainable. The climate change adaptive aquaculture practices will be more promising in the long run, however, might not fulfil the per capita demands on fishing. In fact, a combination of these approaches is necessary. [3]

### **Decarbonising with plant-based seafood**

Other than fish, three broad categories of seafood include mammal animals, seaweed & algae, and other aquatic plants including flowering plants.[6]

Demand for plant-based food is rising as vegan movement is rising globally for various environmental, cultural, and ethical reasons.[7] Seaweed harvesting is one of the initiatives for fulfilling the demand of plant-based sustainable seafood. Other ocean-based flowering plants have been used as food source in different cultures globally.[8]

Seaweed can store carbon from manmade greenhouse gases. The carbon dioxide in the atmosphere interacts with ocean, either via physical or via biological processes. The ocean waves act as a physical sink for carbon dioxide that goes into the ocean deep inside and gets converted into different organic compounds via biological methods. [9] There are certain market based and regulatory restrictions associated with seaweed-based farming at present. [9] It is necessary to consider if the expansion of seaweed farming is economically viable.[10] The seaweed farms can be utilised in wastewater treatment for removal of heavy metals and other applications such as food supplement production, bioplastics or biofuel production. [9]

### **Processing, storage, and associated industries**

Extracts from seaweeds and other seafood are widely used as gelling agents, food additives and in variety of commercial products such as shampoo, shower gels [11] Therapeutic and medicinal applications is another key area where the seafood has found its application.[12] The extraction of chemicals, gelling agents thickening agents and medicine from the seafood is an ever-growing industry and needs further attention and a sustainability check.

The seafood is a key player in restaurant industry which is closely associated with tourism. Development of innovative ocean food-based recipes may further increase the consumer demand for seafood. Furthering the investments in ocean-food based restaurant chains including the plant-based seafood may promise reduced carbon footprints of hospitality industry.

A sustainable reform in ocean-based food industry may bring a transformation in closely associated industries such as hospitality, pharmaceutical and tourism.

### **Conclusions and recommendation**

Ocean based food has just unlocked its potential for the climate adaptation however, there is a long way to go. Despite a list of health and nutritious benefits, sea-food consumption is limited by variety of reasons such as availability, affordability familiarity and other psychological factors based on an Australian case-study [13]

This further encourages the need for investment in research and development in food science at academic and industrial level. Cross-sectoral collaboration, public and private partnerships, and climate change adaptive policy reforms can promise decarbonisation and lowering the overall GHG emissions through marine food alternatives.

Following areas are enlisted where ocean-based food related policy research and development is foreseen

- Environmental impact of seafood and its products
- Development of modelling techniques to predict the climate change effect
- Creating more business opportunities in the seafood and processing industry
- Expansion of existing sea food industry with sustainability check at place
- Climate change adaptive policy reforms in existing seafood industry
- Furthering investing in seaweed farming
- Research and development of commercial consumer products from seaweed

## References

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