Article: RT516

Biotica Research Today

Vol 3:3 149/150

2021

Carbon Footprint: An Assessment Approach for the Environmental Impacts of Seafood Production

Vignaesh Dhanabalan[1*], Vinothkumar L.[1], Manivannan M.[1] and Martin Xavier K. A.[2]

[1]Paraprofessional Institute of Fisheries Technology, TNJFU, Madhavram, Chennai, Tamil Nadu (600 051), India

[2]ICAR- Central Institute of Fisheries Education, Mumbai, Maharashtra (400 061), India

Open Access

Corresponding Author

Vignaesh Dhanabalan

e-mail: vignaeshd@gmail.com

Keywords

Carbon footprint, Greenhouse gas, Global warming potential, Life Cycle Assessments

How to cite this article?

Dhanabalan *et al.*, 2021. Carbon Footprint: An Assessment Approach for the Environmental Impacts of Seafood Production. Biotica Research Today 3(3): 149-150.

Abstract

The seafood industry became progressively interconnected at an international scale, as it is most traded globally. It is now common practice to travel farthest extent of oceans for capturing and the transporting of fishes to market. Therefore refrigeration of seafood products is needed at all stages that substantially increase the energy expenditure. As a result of these factors, carbon footprints of seafood products are necessary to integrate into assessments of their seafood sustainability. Carbon footprint is described as the sum of greenhouse gas (GHG) emissions occurred from various stage of a product's life cycle. This is expressed in terms of CO_2 equivalents or Global warming potential (GWP). Primarily four stages of the life cycle of various food products were important. Those include production, processing, transportation and preparation of a product. There are also different advantages and disadvantages of incorporating carbon footprint in seafood industry.

Introduction

The increased understanding on climate change had promoted the calculation of carbon footprint of different food products. Carbon footprint is described as the sum of greenhouse gas (GHG) emissions occurred from various stage of a product's life cycle *i.e.* production, transport, processing and preparation of a product. These emissions are caused directly and indirectly by an individual, organization, event and product. The carbon footprint is also named as Global Warming Potential expressed in terms of carbon dioxide equivalent of all GHG emitted. Life Cycle Assessments (LCA) method was used to study the environmental impacts of products. LCA is an internationally accepted method and the guidelines for conducting the assessment were provided by ISO standards (ISO 14040 and 14044). The measurement of seafood industry's carbon footprint provides substantial data on climate induced changes on marine ecosystems, catch capacity of fisheries stocks and the energy input needed to produce a given amount of seafood.

The Concept of Carbon Footprint

The CF determines the amount of heat trapped in the atmosphere by a certain gas relative to the amount of heat trapped by CO_2 (Roos et al., 2013). This is expressed in terms of CO_2 equivalents or Global warming potential (GWP) for the sum of different greenhouse gases and calculated as follows.

$$CF\ (kg\ CO_2e) = Amount\ of\ CO_2 \times 1 + Amount\ of\ CH_4 \times GWP_{CH4} + Amount\ of\ N_2O \times GWPN_2O$$

Where, $GWPCH_4$ is the global warming potential for CH_4 and $GWPN_2O$ is the global warming potential for N_2O. The CF of different food products is variable and the significant effects due to carbon emissions were not studied widely.

Article History

Received in 03rd March 2021

Received in revised form 11th March 2021

Accepted in final form 12th March 2021

E-mail: *bioticapublications@gmail.com*

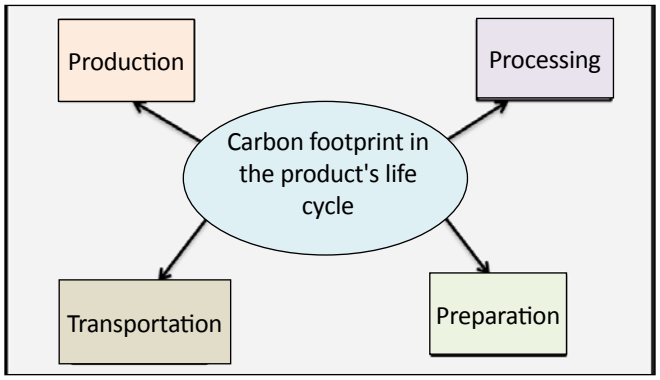

Figure 1: Schematic representation of carbon footprint in the product's life cycle

Emission of GHGs during the Food Product's Life Cycle

Principally four stages of the life cycle of various food products are important. Those include production, processing, transportation and preparation of a product. The supply chain of fishery products has increased that led to the long distance trade consuming significantly more fossil-fuel energy for transportation. The use of imported ingredients in the basic diet could also consume four times the fuel energy and emit higher CO_2. The common deliveries of fish required to preserve fish freshness in food supply chain places considerable stress on the environment.

Advantages of Incorporating Carbon Footprint in the Seafood Industry

The incorporation of CF has possibly gives several key benefits on both the producer and consumer ends of seafood industry (Madin and Macreadie 2015)

• Provides comparative information to the consumers and entrepreneurs regarding the impact to climate change caused by the various products

• Creating awareness among food industry about use of semi or partially processed food products as raw material produces lower CF than use of raw material as such

• Promotion of sustainable seafood products to the consumers

• Preferential buying and choices of consumers towards the product that has lower carbon footprint

• Evident information on alternative operations to achieve lower carbon emissions could be understood thus potentially greater demand by retailers and consumers

Limitations in Incorporation of Carbon Footprint in Seafood Industry

There are also certain challenges associated with the incorporation of CF in the seafood industries which are as follows.

• The unavailability of standard methodology for the calculation of CF (for example: Life Cycle Assessments)

• The lack of proper production chain information for the calculation of CF

• Collecting sufficient and reliable data enabling the confided verification process and determining the way of presenting the information to consumers and producers

• The quantification of the CF components against environmental measures such as fisheries harvest sustainability and the product preparation life cycle

• The cost of producing the CF information that depicts the economic feasibility of the sources and information

Tools Available for the CF Calculation

Different tools were available to estimate the personal and household GHGs and to explore the effect of various techniques to lower those emissions (Center for Sustainable Systems, University of Michigan. 2017). They are;

• Global footprint network

• The nature conservancy

• U.S. Environmental Protection Agency

• Global Fishing watch

• Friend of the sea

Conclusion

To understand the appropriateness of carbon footprint as an indicator for the environmental impact of seafood production, a measure of land use and impact of environmental consequences are mandatory. The information such as water use, treatment of effluent water is also needed in the life cycle assessment. Therefore food product selection based on the environmental impacts will be a part of challenges to reduce the greenhouse gas emissions. Several tools were used for the estimation of GHGs emissions for the calculation of carbon footprint.

References

Center for Sustainable Systems, University of Michigan. 2017. "Carbon Footprint Factsheet." Pub. No. CSS09-05.

Madin, E.M., Macreadie, P.I., 2015. Incorporating carbon footprints into seafood sustainability certification and eco-labels. *Marine Policy* 57, 178-181.

Roos, E., Sundberg, C., Tidaker, P., Strid, I., Hansson, P.A., 2013. Can carbon footprint serve as an indicator of the environmental impact of meat production? *Ecological Indicators* 24, 573-581.