OPEN ACCESS Freely available online

ISSN: 2155-9546
Journal of Aquaculture Research & Development

Perspective

Aspects of Blue Nitrogen to Manage Nutrient Neutrality

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DESCRIPTION

The seas and oceans are environments that accept many terrestrial nutrients, and it is estimated that about 20% of the human-controlled nitrogen input to any region is exported to the marine environment. These excess nutrients can have a negative impact on the local environment, largely characterized as human-induced disturbances in the marine environment. This increased flow of nutrients into the ocean has a variety of effects, including changes in phytoplankton species, proliferation of harmful algal blooms, increased troublesome macroalgal blooms, and reduced water clarity [1]. This can have direct impacts on protected areas, reducing or downgrading their protected status.

Nutrient accumulation in water systems poses risks to human health and eutrophication of freshwater and marine environments. Agriculture and wastewater are the two main sources of nitrogen and phosphorus in the UK aquatic environment and are the focus of current control measures. These measures include reducing nitrate pollution diffused from agricultural practices through nitrate vulnerable zones, regulations to reduce and prevent pollution diffused from agriculture, and various measures to control nitrate and phosphorus pollution from point sources [2]. It is aimed at reductions by sewage treatment plants through voluntary plans or discharge permits.

Increased urbanisation of catchments reflected in new housing which has led to a significant reduction in water quality and also increases in the nutrients of aquatic environments [3]. These types of impacts have led to number of regulators in Europe and UK to stop developments within certain catchments by preventing further deterioration of water quality and contain subsequent impacts on conservation areas. The 2 main current directives aimed at maintaining quality of aquatic ecosystems are the Marine Strategy Framework Directive (MSFD) while the habitats directive regulates the protection of certain species and habitats. Though noted directives has no longer applied, since its withdrawal from the EU, their provisions have been incorporated into the laws and its devolved governments withdrawal act 2018 and amendments to exit regulations and their principles seem likely to be maintained.

Level playing field provisions in the trade and cooperation agreement which cover areas of environment and climate law require a non-regression from levels of environmental protection to which divergences impacting trade between the parties could trigger appropriate remedial and rebalancing measures [4]. A focus on reducing the risk of excess nutrients from point sources is more limited than climate change approaches that focus on both limiting and avoiding emissions and improving actions to remove target compounds from the environment. Competent authorities recognize that current measures are not sufficient to meet existing policy objectives unless targeted interventions prevent current deterioration and mitigate additional pressures from climate change and population growth. In the UK, much of the designated waters are affected as a result of increased urbanization resulting in nutrient richness [5].

In response, many councils, wildlife groups and private companies have developed nature-based nutrient mitigation solutions to land-use change as part of the Solent Nutrient Trading pilot project. The scheme is based on the conversion of currently intensively cultivated land (poultry, dairy, etc.) to other land uses such as green meadows, forests or lowland pastures. This mitigation solution will allow the Wildlife Trust to sell nitrate credits to developers to provide them with much-needed nutrient mitigation. All systems included in the guidance are terrestrial, but priority is given to trading nutrient credits for watershed management of nutrients using marine solutions. For example, in Greenwich Bay (USA), nitrogen removal values for mussels and oysters are estimated annually by the Connecticut Department of Energy and Environmental Protection. Regulation of biogeochemical cycles, such as nitrogen and carbon cycles, is an important ecosystem service provided by the marine environment. By managing these ecosystems, we can protect and enhance these ecosystem services. For example, mangrove and seagrass meadow management can help improve carbon storage and mitigate climate change in the form of carbon sequestration and storage in marine habitats. In addition to the blue carbon potential of marine sediments, there is also a great potential for marine habitats to store and remove nitrogen from the marine environment (blue nitrogen).

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Received: 27-Feb-2023, Manuscript No. JARD-23-20534; **Editor assigned:** 02-Mar-2023, Pre QC No. JARD-23-20534 (PQ); **Reviewed:** 17-Mar-2023, QC No JARD-23-20534; **Revised:** 22-Mar-2023, Manuscript No. JARD-23-20534 (R); **Published:** 29-Mar-2023, DOI:10.35248/2155-9546.23.14.744

Citation: Mathe B(2023) Aspects of Blue Nitrogen to Manage Nutrient Neutrality. J Aquac Res Dev.14:744.

Marine sediments and biomass are recognized as two of the largest reservoirs of organic nitrogen in the biosphere.

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