OPEN ACCESS Freely available online

ISSN: 2155-9546
Journal of Aquaculture Research & Development

Commentary

Cultivating Living Waters through Regenerative Aquaculture

Ivica Herak*

Department of Marine Ecology and Sustainable Aquaculture, University of Dubrovnik, Dubrovnik, Croatia

DESCRIPTION

Regenerative aquaculture represents an approach to aquatic food production that aims to improve environmental quality while producing fish, shellfish, seaweed, and other aquatic resources. Instead of focusing only on harvest volume, this production method considers the condition of surrounding ecosystems before, during, and after cultivation. The objective is to support healthy water bodies, encourage biological diversity, improve natural nutrient cycling, and maintain long-term productivity. As food demand continues to increase across many regions, aquatic farming systems that contribute positively to natural environments are receiving greater attention from researchers, producers, and coastal communities.

Many conventional production systems have achieved significant gains in seafood availability, yet some operations have also been associated with nutrient accumulation, habitat modification, and declining water quality when management practices were unsuitable. Regenerative aquaculture seeks to reduce these concerns by designing farms that function in cooperation with ecological processes rather than working against them. The concept values restoration alongside production, allowing farming activities to contribute to healthier aquatic environments over time.

Seaweed cultivation is one of the most widely discussed examples of regenerative production. Marine microalgae absorb dissolved nutrients directly from seawater during growth. In locations where nutrient concentrations have increased because of agricultural runoff or other human activities, seaweed farms may assist in reducing excess nitrogen and phosphorus. At the same time, harvested seaweed supplies raw material for food, cosmetics, pharmaceuticals, animal feed, fertilizers, and biodegradable products. This combination of environmental improvement and economic value has encouraged wider interest in expanding seaweed cultivation in suitable coastal waters.

Shellfish farming also contributes to regenerative objectives through natural filtration. Oysters, mussels, and clams continuously filter suspended particles from surrounding water as they feed. This biological activity may improve water clarity under appropriate environmental conditions. Healthy shellfish beds also create habitats that support numerous marine organisms, including juvenile fish, crabs, algae, and microorganisms. Such biological communities increase ecological diversity while providing additional ecological functions within coastal ecosystems.

Habitat restoration frequently accompanies regenerative aquaculture projects. In several coastal regions, shellfish reefs have declined because of pollution, habitat destruction, and excessive harvesting. Restoration programs combine commercial production with reef rehabilitation by introducing cultured shellfish into degraded environments. These developing reefs provide shelter for numerous marine species while increasing structural complexity along the seabed. Similar efforts involving seaweed cultivation may supply temporary habitat

Genetic diversity also deserves careful consideration when expanding aquatic farming. Responsible hatchery management seeks to preserve healthy breeding populations while avoiding excessive dependence on a narrow genetic base. Maintaining diverse broodstock populations supports disease resistance, growth performance, and adaptability across future generations. Careful breeding programs also reduce the likelihood of undesirable genetic effects should culture organisms interact with wild populations.

Water quality monitoring remains an essential part of regenerative aquaculture. Modern farms increasingly apply sensor technology to observe dissolved oxygen, temperature, salinity, and nutrient concentrations. Continuous observations allow farmers to respond rapidly when environmental conditions change. Better information supports feeding decisions, stocking management, and harvest planning while reducing unnecessary resource use. Digital monitoring also contributes valuable environmental records that assist scientific research and long-term farm evaluation.

Community participation contributes significantly to successful regenerative projects. Coastal residents often possess valuable knowledge regarding seasonal water movement, local

Correspondence to: Ivica Herak, Department of Marine Ecology and Sustainable Aquaculture, University of Dubrovnik, Dubrovnik, Croatia, E-mail: ivica.herak@unidu.hr

Received: 28-Apr-2026, Manuscript No. JARD-26-32670; **Editor assigned:** 30-Apr-2026, PreQC No. JARD-26-32670 (PQ); **Reviewed:** 14-May-2026, QC No. JARD-26-32670; **Revised:** 21-May-2026, Manuscript No. JARD-26-32670 (R); **Published:** 28-May-2026, DOI: 10.35248/2155-9546.26.17.1108

Citation: Herak I (2026). Cultivating Living Waters through Regenerative Aquaculture. J Aquac Res Dev. 17:1108.

Copyright: © 2026 Herak I. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

biodiversity, and historical environmental changes. Collaboration among farmers, scientists, conservation organizations, and local authorities creates opportunities for management plans that respect ecological conditions while supporting economic activity. Such cooperation can strengthen public confidence in aquaculture when farming practices demonstrate positive environmental outcomes.

Economic performance remains an important consideration for producers. Regenerative aquaculture offers opportunities through diversified production rather than dependence on a single species. Farms cultivating seaweed, shellfish, and finfish together may benefit from multiple income sources, reducing financial risk associated with fluctuating market demand or environmental variation. Additional opportunities may arise through ecotourism, educational programs, habitat restoration contracts, and specialized seafood markets interested in environmentally responsible production methods.

Scientific research continues to expand knowledge regarding microbial communities associated with regenerative systems. Beneficial microorganisms participate in nutrient cycling, organic matter decomposition, and water quality maintenance. Improved understanding of these biological interactions supports farm designs that encourage balanced ecological processes instead of relying primarily on external chemical inputs. Continued investigation also contributes to more efficient production while maintaining environmental quality.

CONCLUSION

Regenerative aquaculture reflects an evolving perspective in aquatic food production that values ecological improvement alongside commercial output. By combining seaweed cultivation, shellfish production, habitat restoration, efficient nutrient cycling, responsible breeding, environmental monitoring, and community participation, this approach demonstrates that seafood production can contribute positively to aquatic ecosystems. Continued scientific investigation, thoughtful management, and practical innovation will influence how regenerative aquaculture develops in the coming years, supporting healthy waters while providing nutritious food and sustainable economic opportunities for coastal societies.