

Empowering Sustainability in Aquaculture: The Impact of NGOs

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Abstract

Aquaculture, a rapidly expanding global food industry, plays a key role in global food security and provides livelihoods for millions. However, its rapid expansion has raised significant environmental and social challenges, including overfishing, water pollution, habitat loss and climate change's adverse effects. This chapter explores the significant contribution of Non-Governmental Organizations (NGOs) in promoting sustainable fisheries and aquaculture management, focusing on how they address these challenges while supporting the livelihoods of fishers. NGOs contribute through on-ground project implementation, policy advocacy and raising awareness. The chapter emphasizes the variety of NGOs working across the globe, including *Greenpeace*, the *Aquaculture Stewardship Council* (ASC), the *World Wildlife Fund* (WWF) and India's *Jaljeevika*. Their efforts focus on promoting sustainable practices, safeguarding ecosystems, empowering local fishers and supporting research and innovation.

Keywords Aquaculture, Fishers, Livelihoods, Non-Governmental Organizations

1. Introduction

Aquaculture is the world's fastest-growing food sector, making fish a primary nutrition source and employment for many. That makes fishes the most farmed group of vertebrates in the world. As global water resources face increasing environmental and anthropogenic pressures, Non-Governmental Organizations are becoming increasingly important in addressing challenges.

The World Bank describes NGOs as "private organizations that engage in activities aimed at alleviating suffering, advocating for the poor, protecting the environment, delivering basic social services, or promoting community development." Broadly, the term NGO encompasses any non-profit organization that operates independently of the government and includes voluntary groups working at local, national, or international levels. These

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organizations are founded on core values and often rely, at least partially, on charitable contributions and voluntary efforts. While the sector has become more professionalized over the years, altruism and voluntarism continue to be its defining characteristics.

The key challenges for sustainable aquaculture include overfishing for commercial utilization, water pollution from intensive farming practices, habitat loss due to land-use changes and the negative impacts of invasive species. Furthermore, climate change poses additional threats, such as rising temperatures and acidification, which affect fish health and productivity. Sustainable aquaculture seeks to tackle these challenges by encouraging practices that minimize environmental impact, preserve natural resources and support the long-term well-being of fishing communities. Amidst challenges, NGOs are emerging as key players in protecting our ecosystems and supporting fisher communities. Although often overlooked, NGOs significantly impact sustainable fisheries and aquaculture management in maintaining healthy aquatic habitats.

In global fisheries, NGOs guide sustainable practices in protecting marine life, promoting sustainable fishing and advocating for ecosystems that can withstand climate change. The objectives of this chapter are to explore the NGOs role in promoting sustainable fisheries and aquaculture management by addressing environmental challenges, supporting fisher communities and protecting aquatic ecosystems, with a focus on the intersection of science, policy and community involvement.

2. Sources of Funding for NGOs

Non-Governmental Organizations (NGOs) are essential to society, focusing on social, environmental and humanitarian efforts. Developing a sustainable funding strategy is important for ensuring the long-term success of their work. NGOs receive support from a variety of funding sources, including individual membership fees, revenue from goods and services, corporate partnerships, crowd-funding, loans, collaborations with businesses, grants from philanthropic foundations and donations from local, state and federal agencies.

3. Types/ Categories of Non-Governmental Organizations (NGOs)

a) Environmental NGOs: They focus on conserving, preserving and sustainably managing natural resources. Their work significantly impacts both people and the environment, whether through hands-on project implementation or by shaping policies at local, national and international levels.

b) Advocacy NGOs: They advocate for specific causes and strive to shape public policy, often focusing on social, environmental, or political issues such as human rights and social justice.

c) Operational NGOs: They are dedicated to planning and executing development projects, working directly in communities to offer services and support in areas such as healthcare, education, disaster relief and poverty reduction.



Figure 1: Top-tier NGOs dedicated to sustainable aquaculture practices around the world

4. The Role of NGOs in Aquaculture Advancement

The FAO reports that nearly 60 million people depend on fishing or fish farming for their livelihoods. However, overfishing, illegal fishing, climate change, habitat destruction and pollution have led to the depletion of 90% of the world’s fish stocks. According to the World Wildlife Fund (WWF), at least 3 billion people rely on seafood as a primary source of protein.

The rapid growth of aquaculture, along with its environmental and social impacts, has become a major topic in discussions about the future of global food production. NGOs play a vital role in promoting ecological sustainability in aquaculture, working at the local farm level, across larger ecosystems and in the context of international trade. These NGOs are often driven by missions focused on the conservation of fisheries, marine and freshwater issues, or specific local concerns within the communities they serve.

NGOs play a crucial role in aquaculture by identifying needs and building essential skills. They organize regular training sessions where fisheries professionals can discuss both global and regional challenges. Many NGOs also publish high-quality scientific journals and offer financial and technical support to young scientists from developing countries, helping them carry out important research. Through workshops, conferences and publications, they address key issues facing fisheries. In the seafood industry, NGOs work to shape policies and raise consumer awareness about sustainability through campaigns and product guides.

5. Global NGOs Driving Change and Innovations in Aquaculture

The future of aquaculture depends on good governance, holistic management and immediate, sustained actions to tackle complex challenges. Increasing



Figure 2: Impacts of NGOs in promoting sustainable aquaculture

pressures from challenges like climate change, overfishing, habitat destruction and plastic pollution. In response to these ecological crises, NGOs worldwide dedicated to aquatic ecosystems' health have significantly increased since the environmental movement began in the 1960s. Numerous NGOs are operating globally, here are a few that work across various continents, impacting millions of fishers through their efforts toward sustainable aquaculture.

Aquaculture Stewardship Council (ASC) was launched in 2010, ASC is an impact-driven NGO focused on making aquaculture more sustainable. It sets strict standards for seafood and fish farms, ensuring high assurance throughout the supply chain. With a global presence, ASC operates in many countries, including India. By certifying fish farms that meet rigorous environmental and social criteria, ASC helps minimize the ecological footprint of aquaculture, protect biodiversity and prevent habitat degradation. ASC also raises consumer awareness by labeling certified seafood products, enabling consumers to make informed choices and supporting the demand for responsibly farmed fish.

The Sustainable Fisheries Partnership (SFP) SFP is a young, dynamic NGO that creates powerful information tools and methodologies to help companies engage directly with suppliers of natural resources. Its mission is to maintain healthy ocean and aquatic ecosystems, improve the livelihoods of fishers and fish farmers and secure food supplies. Instead of campaigning or providing eco-labels, SFP focuses on reducing barriers for industries to take action towards a more sustainable world. The organization operates based on two key principles: providing information and driving improvement.

The World Wildlife Fund (WWF) is an international NGO founded in 1961 and actively working across 6 continents on aquaculture and marine resource management to promote sustainability and protect biodiversity. WWF focuses on improving fishing and aquaculture practices by promoting responsible use of resources, reducing overfishing and protecting ecosystems like coral reefs and mangroves. Their efforts help ensure that seafood production can meet the growing global demand while safeguarding the health of the oceans. A key aspect of WWF's approach is collaboration with Indigenous peoples and local communities, recognizing them as stewards of their lands and seas.

The Environmental Justice Foundation (EJF) founded in 2000, is an NGO dedicated to creating a world where natural habitats and environments can both sustain and be sustained by the communities that rely on them for their livelihoods. EJF works globally to influence policy and drive long-term reforms that protect the environment and uphold human rights. They investigate and expose environmental abuses while supporting environmental defenders, Indigenous peoples, communities and independent journalists who are on the frontlines of environmental injustice. Their campaigns focus on ensuring peaceful, equitable and sustainable futures for all.

The World Forum of Fish Harvesters and Fish Workers (WFF) is an international NGO that represents 41 national organizations of traditional

small-scale fishing communities from Africa, Asia, Europe, Latin America and North America. It acts as a global voice for these communities, whose livelihoods depend on the sustainable management of fisheries resources. WFF's main goal is to empower small-scale fishers' organizations to influence national and international policies that affect their rights to access, use and manage fisheries resources. The organization works to protect and recognize the rights of small-scale and Indigenous fishers, while also preserving the unique cultures and traditions of fishing communities.

Greenpeace founded in Canada in 1971 by a group of environmental activists, Greenpeace is an independent global network with 26 national and regional organizations across more than 55 countries. The network plays a key role in fisheries by advocating for sustainable fishing practices and marine conservation. Its campaigns focus on issues like overfishing, destructive fishing methods and illegal fishing, which damage marine ecosystems and deplete fish stocks. Greenpeace works to protect vulnerable fish species and promote ecosystem-based fisheries management, urging governments and corporations to adopt policies for long-term sustainability. Known for its nonviolent direct actions, Greenpeace has become one of the most visible environmental organizations in the world.

5.1. Regional NGOs Driving Change and Innovations in Aquaculture

As per NITI Aayog, India has approximately 1.87 lakh NGOs. Uttar Pradesh has the highest number of registered NGOs, followed by Maharashtra and Delhi. Today, these NGOs play active roles in governance, collaborating with key rights-holders like Indigenous communities and stakeholders, including industry and government bodies. Here are a few of the pioneering NGOs that have contributed to significant changes in aquaculture practices that impact India's aquaculture sector.

Jaljeevika, a Pune-based NGO, focuses on empowering small-scale fishers by enhancing community resilience and livelihood opportunities through the use of existing water bodies, technology and institutional support. Also provides alternative business avenues by promoting inland fisheries, providing access to credit and markets and promoting entrepreneurship. It has also empowered women in a male-dominated industry. *Jaljeevika* has transformed the lives of over 10,000 farmers across many states by utilizing government programs and digitized technology, such as IoT-based sensors for pond management; it is revolutionizing the aquaculture sector, making it a sustainable livelihood source.

NIRMAN is a respected NGO in Odisha known for its humble yet dedicated civil society services. It focuses on improving the livelihoods of Indigenous people, smallholder farmers and traditional fishers through the conservation of biodiversity, ecological agriculture, land tenure and the sustainable management of natural resources. Recognizing the serious threat posed by biodiversity loss to the livelihoods of the natural resource-dependent poor, NIRMAN believes in the power of local communities to preserve biodiversity and manage resources sustainably. The organization has consistently worked

towards conserving biodiversity by empowering farmers, who have been the custodians of crops, plants, livestock and fisheries for generations.

The South Indian Federation of Fishermen Societies (SIFFS) is a leading NGO representing small-scale artisanal fish workers in Southern India. For over two decades, SIFFS has focused on empowering fishers by controlling fish marketing and inputs to free them from middlemen. Its initiatives include livelihood protection through appropriate technology, policy research and advocacy for artisanal fishers' interests, sustainable resource management and promoting alternative employment, particularly for women, to diversify and develop the community's economic base.

Dakshin Foundation is a Kerala based NGO dedicated to environmental sustainability and social justice. Using interdisciplinary research in ecology, sociology, economics and law, *Dakshin* strengthens local and national networks to empower grassroots communities in conservation and decision-making. Their initiatives include mangrove restoration, fish farming training and market linkages for fishers. The foundation focuses on sustainable fisheries, marine conservation, resource governance and community well-being.

Environmentalist Foundation of India (EFI), an NGO founded in 2007, it is dedicated to wildlife conservation and habitat restoration throughout India. The Chennai-based NGO is renowned for its scientific restoration of over 167 water bodies in multiple states. EFI cleans and revives polluted lakes and ponds, removes invasive species and constructs G-shaped islands in water bodies. That provides safe breeding grounds for fish, improving biodiversity and ensuring a sustainable fish population. Their work enhances water quality and availability, which directly benefits small-scale fishers by boosting fish stocks and supporting local fisheries-dependent communities.

Aaranyak, an NGO founded in 1989, is dedicated to biodiversity conservation and enhancing human well-being through applied research, education, advocacy and community engagement. *Aaranyak* plays a crucial role in restoring the river dolphin population in the Ganga River, recognizing the species as a key indicator of the river's overall health. As the river dolphin's survival reflects the overall ecological condition of the river, its efforts focus on safeguarding this species to ensure the broader health of the freshwater ecosystem. By protecting the dolphins, *Aaranyak* contributes to maintaining water quality, which in turn supports the survival of other fish species and sustains the livelihoods of local fishing communities dependent on healthy river ecosystems.

Aahwahan founded in 2009, the Foundation is an NGO dedicated to improving the welfare of economically weaker sections (EWS) of society. It works towards eradicating poverty while promoting a sustainable environment through collaborations with universities and innovative solutions. Recognizing that 70% of the rural population relies on agriculture and allied sectors, *Aahwahan* focuses on developing infrastructure that

empowers farmers with modern techniques. Also works to restore lakes and ponds to enhance biodiversity and support sustainable income sources to improve the livelihoods of rural communities.

Vrutti founded in 2004 and based in Karnataka, works extensively with economically and socially marginalized groups by employing sustainable livelihood approaches. With collaborative efforts, it empowers local communities to manage fisheries sustainably and has supported over 21,000 artisanal fishers. Their long-term goal is to strengthen the livelihoods of small-scale fishing communities while ensuring the sustainable use of fishing resources.

Centre for Agriculture and Rural Development (CARD), established in 2000, is a premier NGO committed to transforming rural India through agriculture. CARD plays a pivotal role in promoting sustainable farm livelihoods, with a strong focus on livestock farming, fisheries, goatery and dairy sectors. CARD has built strong connections with small-scale industries and start-ups using a cluster approach, incorporating scientific input from ICAR to improve profitability. Their goal is to boost fish production and productivity in the country while coordinating fishery development in a more integrated and holistic way.

Bharatiya Jana Seva Mission, an NGO based in Kolkata, West Bengal, envisions a society where people actively shape their futures. The organization works to empower its target groups through various developmental programs, including women's empowerment, entrepreneurship development, skill enhancement, consumer rights and farm-based livelihoods. Its initiatives also focus on agriculture extension, environmental conservation, handicrafts and youth self-employment. Additionally, the organization offers training on fish farming and management through social media, benefiting thousands of farmers across India.

India's extensive coastline and inland water bodies have long been a vital source of livelihood for approximately 25 million fishers and fish farmers at the primary level, with double that number involved along the value chain. To ensure the sustainable use of resources and uplift the livelihoods of fisherfolk, numerous NGOs have been working tirelessly at the grassroots level. These organizations are dedicated to promoting sustainable aquaculture practices, providing essential training and support and facilitating market access for fishers.

5.2. Case Study: Successful NGO Interventions at Sundarbans, West Bengal

The Sundarbans ecosystem faces significant challenges due to extreme climatic events like Aila, Hud Hud, Fani, BulBul, Amphan, Yaas, Remal and frequent floods, along with the constant intrusion of saline water into local water bodies. These natural calamities have a devastating impact on the region's economy, threatening the livelihoods of fishers who rely on the ecosystem for survival. Women in the Sundarbans play a crucial role in the fisheries sector, often engaging in small-scale aquaculture. However, they

face numerous obstacles, including limited access to resources, lack of formal training and the ongoing threat of natural disasters. These challenges make it difficult for them to sustain their livelihoods and achieve financial security.

In response, several NGOs have been working tirelessly to improve the livelihoods of women in the Sundarbans by offering comprehensive support for fish farming. One such organization, the *Kultali Milan Tirtha Society*, based in Kultali, Basanti in the Sundarbans, has partnered with the Indian Council of Agricultural Research Institute. Together, they provide essential fisheries inputs, such as quality fish feed, fish seeds, lime and medicines, to women from vulnerable communities. This program aims to empower women fishers, helping them to sustain their livelihoods and contribute to the rural economy. It stands as a symbol of hope, resilience and the determination of these women to overcome adversity with courage and strength. The success of this initiative is largely driven by effective public-private partnerships, which play a key role in securing the livelihoods of fishing communities and advancing several Sustainable Development Goals (SDGs).

Additionally, NGOs like the *Nature Environment and Wildlife Society (NEWS)* are supporting local communities by promoting mangrove restoration projects. These efforts not only protect coastal ecosystems but also create nursery grounds for fish species, helping to preserve biodiversity and ensure a steady supply of fish. This dual approach benefits both the environment and the fishers who rely on it for their livelihoods.

6. Impact of NGOs on Policy and Practice

6.1. Changes in Global Aquaculture Practices Due to NGO Advocacy

Non-Governmental Organizations (NGOs) play a key role in shaping policies for sustainable fisheries and aquaculture around the world. They work with international organizations, governments and private companies to promote practices that protect marine life, ensure food security and support the livelihoods of fishing communities. NGOs conduct research, lobby for change and take part in global discussions at forums like the Food and Agriculture Organization (FAO) and the United Nations (UN) to push for better environmental standards and sustainable practices.

For example, groups like the *World Wildlife Fund (WWF)* and *Greenpeace* have been instrumental in supporting the *Marine Stewardship Council (MSC)* certification, a global eco-label for sustainable fishing. This has encouraged fisheries worldwide to adopt more sustainable practices to access markets. NGOs also work on policies to help fisheries adapt to the effects of climate change, finding solutions that are both good for the environment and financially viable for small-scale fishers (Shenoy and Rajpathak, 2021).

In addition, NGOs contribute to global agreements like the United Nations Sustainable Development Goals (SDGs), especially SDG 14, which focuses on protecting and using water resources sustainably. Through their work, NGOs make sure that the voices of smaller, often overlooked fishing communities are heard, helping to create policies that are fair and inclusive for all.

6.2. Changes in Local Aquaculture Practices Due to NGO Advocacy

At the local level, NGOs have a direct influence on aquaculture practices by implementing grassroots projects and initiatives that promote sustainable and community-driven approaches. They often work closely with local fishers, government bodies and educational institutions to share knowledge about best practices, resource management and the environmental impact of aquaculture. For example, in coastal areas of India, NGOs like the *FishMarc* (a division of Vrutti) and *M.S. Swaminathan Research Foundation* (MSSRF) have collaborated with fishing communities to introduce sustainable practices, such as Integrated Multi-Trophic Aquaculture (IMTA). IMTA is a method that reduces environmental pressure by farming multiple species in a balanced system. This approach not only boosts productivity but also reduces waste, limits the need for antibiotics and improves water quality.

NGOs have also been successful in promoting community-based resource management. Through advocacy and training programs, they encourage fishers to adopt more sustainable methods, such as limiting overfishing, respecting seasonal bans and utilizing selective fishing gear to reduce bycatch. These practices help maintain ecological balance and protect vulnerable species, ensuring long-term benefits for both the environment and the local economy.

7. Conclusion

Aquaculture now supplies more than half of the seafood consumed globally, but the industry's rapid growth also brings significant challenges. With 33% of wild fish stocks being overexploited, relying solely on wild-caught seafood cannot support the world's growing population (Pandey *et al.*, 2024). As a result, farmed seafood is becoming more important and is expected to increase in the future. However, the rapid growth of aquaculture has sometimes resulted in poorly managed fish farms, leading to environmental damage, water pollution and unsafe working conditions. This is particularly concerning as seafood serves as a vital source of livelihood and affordable protein for billions, especially in developing nations. To ensure the future of sustainable seafood farming, aquaculture practices must be conducted responsibly, considering both people and the planet. NGOs have become central to this effort, playing a key role in shaping sustainable aquaculture standards. Their work in building local capacity, promoting awareness of sustainable methods and developing community-driven approaches has not only transformed how communities interact with aquaculture but also demonstrated effective pathways toward achieving Sustainable Development Goals (SDGs). In India, the world's second-largest fish producer, NGOs are actively helping fishers adopt more sustainable and welfare-conscious farming techniques, providing a model for broader regional and global progress.

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