# SUSTAINABLE DEVELOPMENT GOALS AND FISHERIES SECTOR
## PROGRESSING TOWARDS A SUSTAINABLE FUTURE

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## Introduction

With the present population trends, the global food demand is expected to rise 50% by 2030 and it becomes imperative to manage the resources thus to sustain this demand. The United Nations Sustainable Development Goals (SDGs) are a global call for action to achieve sustainable development by 2030 through a combined effort from all the countries. This Agenda 2030 for Sustainable Development is intended to foster growth while safeguarding the environment and bringing out a safer, healthier, and more prosperous world by 2030. SDGs are centered on five P's viz. people (wellbeing of all people), planet (protection of the earth's ecosystems), prosperity (continued economic & technological growth), peace (securing peace) and partnership (improving international cooperation). These five factors are interlinked and necessitate

| The Millennium Development Goals (MDGs) | |
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| Goal 1 | Eradicate extreme poverty and hunger |
| Goal 2 | Achieve universal primary education |
| Goal 3 | Promote gender equality and empower women |
| Goal 4 | Reduce child mortality |
| Goal 5 | Improve maternal health |
| Goal 6 | Combating HIV/AIDs, malaria, and other diseases |
| Goal 7 | Ensure environmental sustainability |
| Goal 8 | Develop a global partnership for development |

*Table 1. Millennium Development Goals (MDGs)*

integrated thinking and ways to achieve the objectives. There are 169 targets which are divided into 17 SDGs measured by 232 unique indicators which were developed aiming at economic growth, social inclusion, and environmental protection.

The fisheries and aquaculture sector plays a key role for the adoption and success of the SDGs because of its high contribution towards food and nutritional security especially in the rural areas. The sector also encompasses numerous opportunities for employment and income enhancement. And managing fisheries resources in a sustainable manner is central in achieving SDGs of the United Nations, a universal call to end poverty and hunger. Sustainable development in fisheries is a global challenge that will require countries and organizations to work together in a clear, cohesive, and meaningful manner. Sustainable development is described as development that meets current needs without jeopardizing future generations' ability to meet their own. In particular, the goals of poverty reduction (SDG 1), zero hunger (SDG 2), community wellbeing (SDG 3), gender equality (SDG 5), clean water and sanitation (SDG 6), economic growth (SDG8), responsible consumption and production (SDG 12), climate change (SDG 13) and life below water (SDG 14) are especially impactful and relevant to the fisheries sector. This article highlights the importance of achieving sustainable development goals in fisheries and sheds light to the status of fisheries and SDG in Indian context.

## Transition: MDG to SDG

The United Nations Millennium Development Goals (MDGs) were initiated in September 2000 when representatives from 189 Countries met at the

| Sustainable Development Goals (SDGs) | |
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| Goal 1 | No Poverty: End poverty in all its forms everywhere |
| Goal 2 | Zero Hunger: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture |
| Goal 3 | Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages |
| Goal 4 | Quality Education: Ensure inclusive and equitable quality education and promote life-long learning opportunities for all |
| Goal 5 | Gender Equality: Achieve gender equality and empower all women and girls |
| Goal 6 | Clean Water and Sanitation: Ensure availability and sustainable management of water and sanitation for all |
| Goal 7 | Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable, and modern energy for all |
| Goal 8 | Decent Work and Economic Growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all |
| Goal 9 | Industry, Innovation, and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation |
| Goal 10 | Reduced Inequality: Reduce inequality within and among countries |
| Goal 11 | Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable |
| Goal 12 | Responsible Consumption and Production: Ensure sustainable consumption and production patterns |
| Goal 13 | Climate Action: Take urgent action to combat climate change and its impacts |
| Goal 14 | Life Below Water: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development |
| Goal 15 | Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss |
| Goal 16 | Peace and Justice Strong Institutions: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels |
| Goal 17 | Partnerships to achieve the Goal: Strengthen the means of implementation and revitalize the global partnership for sustainable development |

*Table 2. Sustainable Development Goals (SDGs)*

Millennium Summit in New York. The countries committed to combat poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women by 2015 forming 8 goals, 18 targets, and 48 indicators (table. 1). With global, regional, national, and local efforts, the MDGs has shown commendable progress in achieving the targets proposed and it was one of the most successful anti-poverty movements in history as the number of people living in extreme poverty has declined by more than half. Thus, Millennium Development Goals (MDGs) have been replaced by the Sustainable Development Goals (SDGs) with a collection of 17 interconnected and indivisible goals that draw on the MDGs' accomplishments while being much wider, deeper, and more ambitious in scope. The United Nations Conference on Sustainable Development at Rio de Janeiro in 2012 gave birth to the SDGs with a vision to framework a set of common goals that addresses the world's urgent environmental, political, and economic challenges. The United Nations General Assembly adopted the SDGs in 2015, with the aim of achieving them by 2030 and enshrined in UN resolution known as the 2030 Agenda, or Agenda 2030. The United Nations General Assembly adopted the 2030 Development Agenda on 25 September, 2015 that entitled "Transforming our world: the 2030 Agenda for Sustainable Development," by 193 countries which includes 17 SDGs, 169 objectives and 232 indicators (table. 2). Thus, the SDG Agenda 2030 aims to create a world that is just, rights-based, equal, and inclusive, that provides a vision of a fairer, more prosperous, peaceful, and sustainable world in which no one is left behind.

## SDGs in fisheries and its importance:

The fisheries sector has shown tremendous growth over the years when compared to other food-producing sectors with a production of 178.5 million metric

tonnes (FAO, 2020). This increase in production is highly correlated with the livelihood of millions of people who depend on the sector for food, nutrition, and income. But the increase in population coupled with the increase in demand for fish and fish products has driven out the overexploitation of resources. With the fast expansion of the fishing industry that has increased the fishing pressure, leading to overfishing followed by juvenile fishing, and bycatch discards. According to the FAO, the percentage of marine fish stocks that are biologically sustainable has decreased from 90% in 1974 to 65.8% in 2017, while stocks fished at biologically unsustainable levels has increased, indicating the degree of exploitation. Overexploitation of fisheries resources, indiscriminate fishing due to open access and free rider mechanism, weak regulations, inadequate infrastructure, and habitat destruction are the major constraints and challenges of achieving SDGs in fisheries.

The SDGs proposed are highly interlinked when it comes to the fisheries sector and hence a coordinated effort is necessary to achieve sustainable development in fisheries which in turn have a significant synergic effect on achieving the SDGs.

Going through the SDGs 1, 2, 3 and 12, the targets can be fulfilled through fisheries as the development in the sector paves the way towards getting nutritional food resulting in achieving food security, health improvement and a better source of employment and income. Because fish is the cheapest, tastiest, and the most digestible form of animal protein, with higher proportions of unsaturated fatty acids. The fisheries sector offers key solutions for sustainable development, and is central for hunger and poverty eradication as fish is a good and cheap source of protein and it is rightly said "Give a man a fish, and you will feed him for a day. Teach a man to fish, and you have fed him for a lifetime ". Fish production has increased manifold since the 1940s and currently an estimated 59.51 million people are engaged (on a full-time, part-time, or occasional basis) in the primary sector of aquaculture (20.5 million people) which shows that the fisheries sector is vital as a source of employment and income generation. An estimated 820 million people are hungry globally which itself is a serious concern and achieving blue revolution in the sector is the need of the hour to combat this and ensure nutritious food for all. Fish, especially small fish, is rich in micronutrients such as vitamin A, iron, calcium, and zinc, as well as essential fatty acids, and provides nutrients and micronutrients that are important for cognitive and physical development, particularly in infants and children. Eating fish also increases the amount of iron and zinc absorbed from other foods in a meal.

When it comes to SDG 5, social sustainability, non-discrimination, gender equality, and mutual development are all important factors to consider. Women contribute almost half of the population, and perform nearly 2/3rd of its work hours but receive 1/10th of the world's income and own less than 1/100th of the world's property. About 66% of the women in rural areas are underutilized, but in agriculture and animal care the women contribute 90% of the total workforce. In fisheries, women play a vital role in the development of the sector and they are dependent on food, work, income and identity. Policy formulations and management in the field of fisheries will provide equal importance to women which will further lift women in the field of fish culture, vending, processing, value addition etc. thus achieving the goal. When it comes to climate change (SDG 13), 2020 has become the warmest year and sea level is rising due to thermal expansion and the impacts will be severe on fish and fisheries affecting the aquatic ecosystem and altering the fish distribution and productivity. In marine ecosystems, the rise in sea surface temperature (SST) is a direct effect whereas indirect effects like ocean acidification, sea level rise, coral bleaching and changes in wind speed and direction will affect the marine flora and fauna thus creating instability in fish stock and production. Also, the fishing pressure will increase due to the increase in temperature, change in rainfall, wind and fish abundance also with extreme weather events like cyclones and all as fishing is mainly dependent on the weather, climate and season.

In aquaculture, extreme climatic events like flood, droughts and the change in temperature affects the dissolved oxygen level and other water quality parameters which significantly influence the flora and fauna thus affecting the production and output. The increase in production cost will have severe repercussions in the supply chain of the aquaculture products and this will affect the dependent communities and stakeholders. So, it is imperative to mitigate the climate change impacts for the development of the fisheries sector through research, adopting new farming techniques, setting carbon footprints, conducting restoration programs, and by efficient monitoring, management and action plans for achieving SDGs. The SDG 17 calls for strengthening the global partnership and in fisheries sector the linkages between governmental and nongovernmental organizations like Food and Agriculture Organization (FAO), Regional Fisheries Management Organizations (RFMOS), Indian Ocean Tuna Commission (IOTC), Marine Stewardship Council (MSC), WorldFish, Global Aquaculture Alliance (GAA) and all is very crucial. Out of 17 SDGs, the goal 14 is giving special reference to the fish and fisheries of the world that emphasize on life below water to conserve and sustainably use the oceans, seas, and marine resources for sustainable development. This goal has 10 targets (table.3) which broadly emphasizes on reducing pollution, protecting the ecosystem, managing resources by controlling over exploitation and enforcing management laws. The preference given in the SDG agenda for fisheries itself demonstrates the importance of the sector and managing the sector would substantially contribute to accomplishing other SDGs.

| Goal 14: Life Below Water | |
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| Target 1 | Reduce marine pollution: By 2025, prevent and significantly reduce marine pollution of all kinds, from land-based activities, including marine debris and nutrient pollution |
| Target 2 | Protect and restore ecosystems: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and act for their restoration in order to achieve healthy and productive oceans |
| Target 3 | Reduce ocean acidification: Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels |
| Target 4 | Sustainable fishing: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported, and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics |
| Target 5 | Conserve coastal and marine areas: By 2020, conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information |
| Target 6 | End subsidies contributing to overfishing: By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported, and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation |
| Target 7 | Increase the economic benefits from sustainable use of marine resources: By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture, and tourism |
| Target 8 | Increase scientific knowledge, research, and technology for ocean health: Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries |
| Target 9 | Support small scale fishers: Provide access for small-scale artisanal fishers to marine resources and markets |
| Target 10 | Implement and enforce international sea law: Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The future we want" |

*Table 3. Targets of SDG 14 (Life Below Water)*

While capture fisheries will continue to be important, aquaculture production is on the rise and plays an important role in ensuring global food security, accounting for 46% of total production and 52% of fish for human consumption with an annual production of 82.1 million tonnes (FAO, 2020). Although fishes are not calorie-dense, fish and fish products are appreciated as some of the healthiest foods on the planet and important for their high-quality proteins and essential amino acids, PUFAs and micronutrients, such as vitamins and minerals. Higher consumption of fish, with its diverse and valuable nutritional attributes, can directly reduce the prevalence of malnutrition and correct imbalanced high-calorie and low-micronutrient diets. The scientific studies suggest that the capture fisheries sector is in a struggling phase and aquaculture has a great role to play in food security and human welfare. The sector also has much to contribute towards achieving all of the SDGs by offering a cheap and nutritious protein source, but challenges such as disease outbreaks, competition for production factors, environmental and economic instability remain serious concerns that necessitate new innovative strategies to harness inclusive and sustainable growth. Moreover, from 7.8 million in 1995 to around 20.5 million in 2016 people are engaged in aquaculture and dependent on it as an income and employment source and of that 19 percent are women. It is

critical that aquaculture production be enhanced for improved efficiency of resources through research and development in the field of disease control, genetics, nutrition, biotechnology, and artificial intelligence in order to reach sustainability in the sector. Apart from this, structural transformation and innovation is required to change the phase of the sector. The expansion and development of the aquaculture sector in this direction has the scope and potential to drive the sector towards achieving the SDG objectives and targets.

## SDG in Fisheries: Indian Scenario

When compared to other food-producing sectors in India, the fisheries sector plays a significant part in the country's economic growth and continues to grow at a remarkable rate. India is the 2nd largest producer of fish in the world contributing about 6.3% of the global fish production and 16th largest maritime country. The sector has shown impressive growth with an average annual growth rate of 10.88% and provides employment to millions of people directly and many more indirectly. Despite the increase in fisheries and aquaculture production in India, sustainable development of the sector is a major concern as the country ranked 117 with a score (percentage) of 61.92 out of 193 countries in SDG index 2020. The marine fisheries sector of the country is facing serious challenges in attaining SDG targets which includes over exploitation, Illegal, Unreported and Unregulated (IUU) fishing, pollution, bycatch discards, juvenile fishing, climate change, destruction of marine ecosystem, socio-economic conflicts and low catch per unit effort majorly. While the inland sector faces underutilization of resources, lack of infrastructure, destruction and fragmentation of aquatic ecosystems, aquatic pollution, impoundment and channelization of water bodies, soil erosion, and modification of river, lake, and floodplain hydrological features, poor policies and management strategies. The culture sector is troubled with disease outbreaks, climate change, natural calamities, and increased competition on resources and factors of production. As underlined in the 17th SDG, it is vital for India to accomplish SDGs in fisheries through a collaborative cooperation between international organizations, fisheries departments, research institutes, and other stakeholders bringing out the Blue Revolution through sustainable and responsible development. The launch of Pradhan Mantri Matsya Sampada Yojana (PMMSY), a flagship scheme for the development of the fisheries sector as part of the Aatma Nirbhar Bharat Package, with an estimated investment of Rs. 20,050 crores for implementation over a 5-year period from financial year 2020-25 in all States/Union Territories will have the potential to catalyze the blue revolution and SDGs in fisheries. Because 42 percent of the PMMSY's total estimated investment is intended for the establishment and upgrade of fisheries infrastructure facilities, which is the need of the hour, the programme is expected to deliver sustainable development to the fisheries sector through comprehensive infrastructure development.

## Achieving Sustainable Development Goals in Indian Fisheries:

The comprehensive action points to achieve SDGs in Indian fisheries is mentioned in Figure 2. There are several key strategies that can be implemented to achieve SDGs which includes:

## Culture fisheries

- Implementing sustainable aquaculture practices using environmentally friendly techniques such as recirculatory systems, integrated multi-trophic aquaculture, and organic and biodynamic aquaculture
- Diversifying the species of fish and shellfish grown in aquaculture operations to reduce the risk of disease and improve overall productivity
- Encouraging the use of renewable energy sources, such as solar or wind power, in aquaculture operations
- Developing mariculture to increase the efficiency and sustainability of aquaculture operations
- Ensuring responsible fish farming using responsible feeding practices, minimizing the use of antibiotics and chemicals, and ensuring the health of farmed fish
- Promoting transparency and traceability by implementing traceability systems to ensure that farmed fish can be traced back to the farm of origin, and providing transparent information about the origins and sustainability of farmed fish to consumers
- Developing sustainable feed sources using sustainable feed ingredients, such as plant-based proteins, and minimizing the use of fishmeal and fish oil in feed


*Fig. 1 & 2. SDG indicators & action points for Indian Fisheries*

● Collaboration and partnerships by working with governments, NGOs, and the private sector to develop and implement sustainable aquaculture policies and practices

● Investing in research and development for new sustainable aquaculture technologies and practices and to improve our understanding of the environmental impacts of aquaculture

## Capture fisheries:

- Implementing sustainable fishing practices using selective fishing gear, reducing bycatch, and implementing catch quotas and area closures to protect vulnerable fish populations

- Promoting responsible fish sourcing by ensuring that fish caught by the industry is sustainably sourced and certified by relevant certification schemes

- Enhancing transparency and traceability to ensure that caught fish can be traced back to the point of catch and providing transparent information about the origins and sustainability of caught fish to consumers

- Supporting small-scale fisheries by providing technical assistance, capacity building and access to markets to small-scale fishing communities

- Collaboration and partnerships with governments, NGOs, and the private sector to develop and implement sustainable fishing policies and practices

- Investing in research and development to improve our understanding of fish stocks and the environmental impacts of fishing, and to develop new sustainable fishing technologies and practices.

- Addressing the illegal, unreported, and unregulated (IUU) fishing by implementing stricter regulations, monitoring and enforcement to combat IUU fishing which is a major threat to the sustainability of fish stocks.

## Way Forward:

From the Millennium Development Goals, it is evident that it has accelerated global development, and that

fulfilling SDGs is significant for a prosperous and sustainable world. The achievement of Sustainable Development Goals (SDGs) in fisheries is crucial for global progress towards a sustainable and prosperous world. Fisheries and aquaculture are a vital component of global food security and have much to contribute to the success of the SDGs. Sustainable management of fisheries is crucial as they are not only confined to SDG 14, but can also significantly contribute to achieving reducing poverty (SDG 1), food security (SDG 2), promoting community well-being (SDG 3), achieving gender equality (SDG 5), ensuring clean water and sanitation (SDG 6), fostering economic growth (SDG 8), and promoting responsible consumption and production (SDG 12) among other goals. However, the term "sustainability" has become a marketing phrase, and regulations and policies alone are not enough to achieve the targets. Instead, a holistic approach to implementation and monitoring is necessary to ensure true sustainability. Global partnerships and agreements with all stakeholders in the sector, such as innovation and transformation, funding, international trade flows, and strengthening data collection and analysis, are essential to achieving the SDG targets in fisheries. Additionally, new methods and approaches that support the successful implementation of policy and management requirements for sustainable fisheries and ecosystems are needed to ensure global fisheries sustainability. It's also worth noting that AI is being increasingly used in combination with other advanced technologies such as big data, IoT, and remote sensing can play a significant role in helping to meet the sustainable development goals (SDGs) related to fisheries.

***References are available upon request from the corresponding author***