

## NATIONAL POLICY INTERFACE OF SDGS AND SUSTAINABLE AGRICULTURE

### Goal 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

The ocean and seas cover 70% of the Earth's surface area, host the largest connected ecosystem, and play a central role in climate stability, oxygen generation, nutrient cycling, food production, and coastal protection. Marine and coastal areas are most vulnerable to pollution from both land- and marine-based activities (UNEP, 2010). Agricultural runoffs cause pollutants and nutrients such as nitrogen and sulphur to enter coastal waters, which removes, alters or destroys natural coastal ecosystems (Hilmi, et al., 2015). Excess use of fertilizers and pesticides in agricultural fields gets washed down to the rivers during heavy rainfall, ultimately reaching the oceans and seas and damaging the marine ecosystem (UN Environment Programme, 2022). The release of sulphur and nitrogen into the atmosphere through agricultural activities such as residue burning and excess use of fertilizers and pesticides also contribute to ocean acidification (Oceanus, 2008). Climate change impacts increase in storm surges and sea-level rise, which can cause to saltwater infiltration in freshwater aquifers, leading to soil salinization and, hence, reducing agricultural productivity.

India is one of the major pesticide-producing countries in Asia, with an annual production of 90,000 tonnes, and it stands in the twelfth position in the world in manufacturing pesticides (Khan, Zia, and Qasim 2010). In India, 52,466 MT of chemical pesticides were used by different states and union territories during FY 2022–23 (Directorate of Plant Protection, Quarantine & Storage, 2023).

### National Policy and Stakeholder Mapping

Policies	Stakeholders	Pre-Production	Production	Post-Production
Integrated Coastal Zone Management	Ministry of Environment, Forest and Climate Change	X	X	
Ocean Services, Technology, Observations, Resources Modelling and Science	Ministry of Earth Sciences	X		
Swachh Bharat Abhiyan, 2014	Ministry of Jal Shakti	X	X	
Coastal Regulation Zone Notification	Ministry of Environment, Forest and Climate Change	X	X	
Coastal and Marine Spatial Planning (CMSP)	Ministry of Environment, Forest and Climate Change	X		
Conservation of Natural Resources and Ecosystems	Ministry of Environment, Forest and Climate Change		X	
Paramparagat Krishi Vikas Yojana	Ministry of Agriculture and Farmers Welfare	X	X	
The Water (Prevention and Control of Pollution)	Ministry of Environment, Forest and Climate Change	X		X

Act, 1974 and associated rules				
The Water (Prevention and Control of Pollution) Cess Act, 1977 and Associated Rules	Ministry of Environment, Forest and Climate Change	X		X
Environment (Protection) Act was enacted, 1986 and Associated Rules	Ministry of Environment, Forest and Climate Change	X		X
National River Conservation Program	Ministry of Jal Shakti	X		X

### Synergies and Trade-offs

Land-based anthropogenic activities contribute to coastal ecosystem damage because of excessive use of fertilizers, pesticides, coastal development projects, and pollution (Blanc, Freire, and Vierros, 2017). In 2020, nearly 200 million tonnes of nitrogen fertilizers were used globally. At the same time, nitrogen fertilizers accounted for around 56% of the total global consumption, and phosphate and potash fertilizers held shares of 24 and 20%, respectively (Statista, 2023). In 2019, globally approximately 2 million tonnes of pesticides were utilized, of which 47.5% comprised herbicides, 29.5% insecticides, 17.5% fungicides, and 5.5% other pesticides (De, et al., 2014). Excess use of fertilizers and pesticides in agricultural fields also makes agriculture unsustainable in the long term. Chemicals from agricultural activities ultimately reach oceans and seas, contributing to eutrophication and subsequent de-oxygenation (Hilmi, et al., 2015; UN Environment Programme, 2022). In water, excess pollutants promote the growth of algae, which trigger toxic blooms that can kill fish and nitrate in drinking water harms human health.

Targets	Synergy	Trade-off
<b>Target 14.1:</b> Prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution		
<b>Target 14.2:</b> Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans		
<b>Target 14.3:</b> Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels		
<b>Target 14.4:</b> 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		
<b>Target 14.5:</b> Conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information		
<b>Target 14.6:</b> 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		
<b>Target 14.7:</b> 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		
<b>Target 14.a:</b> 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		
<b>Target 14.b:</b> Provide access for small-scale artisanal fishers to marine resources and markets indicators		
<b>Target 14.c:</b> 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'		

### Gaps and Barriers

A critical issue is the insufficient understanding of the threats and pressures related to sustainable coastal management (UN Environment Programme, 2021). Poor implementation of policies and laws across multiple governance levels is also a significant challenge due to a lack of interest and knowledge amongst stakeholders (UN Ocean Conference, 2022). Furthermore, the lack of infrastructure and technology for addressing marine pollution from land-based activities hampers effective mitigation efforts (UN Environment Programme, 2021). Cross-institutional cooperation across sectors and jurisdictions remain weak (Paul, 2021). Insufficient investment and funding for coastal blue carbon ecosystems further hinder the overall development and resilience (UN Ocean Conference, 2022). Area-based conservation measures and management tools, such as marine spatial planning and marine protected areas, can promote ecosystem-based approaches (Blanc, Freire, and Vierros, 2017).

A solution-oriented integrated ocean science agenda can provide innovative ideas and fundamental knowledge to enhance sustainable development and human–ocean interactions (Visbeck, 2018). Additionally, investing in developing resources for farmers and communities in coastal areas through training and good practice validation can support local communities (UNEP, 2018). Community-based management and co-management with transparency and local benefit-sharing are important (Govan, et al., 2009). The interface between land-based agricultural run-off and marine ecosystems can be strengthened in policy and programmatic mandates.

### Emerging Policy Solutions

**Legislative Frameworks such as Coastal Regulation Zone (CRZ) Rules, the Water Act (1971), and the Environment Protection Act (EPA) to Manage Agricultural Runoff**

- **Incorporating, strengthening, and integrating CRZ rules, the Water Act, and EPA to manage agriculture runoff:** Agriculture contributes to soil erosion and nutrient runoff that have detrimental effects on marine ecosystems. CRZ rules primarily focus on regulating coastal activities rather than land-based agricultural activities, limiting their applicability in managing agricultural runoff. By incorporating land-based agricultural rules into CRZ, it can address the issue of runoff to marine bodies.
- **Quantification of runoff through the Water Act:** The Water Act plays a crucial role in monitoring and regulating the rate of runoff from agricultural sources. However, accurately quantifying runoff and its impact remains an under-examined aspect.
- **Integration of measures in EPA to regulate impact on marine systems:** Sustainable agriculture requires examining land-use conversions in protected or coastal areas and finding a balance between environmental protection and agricultural practices. Existing regulations in the EPA can include the applicability of land-based agriculture in coastal areas.
- **Integration of regulatory measures:** Addressing agricultural runoff necessitates an integration of regulatory measures and soft rules/guidelines, which can incorporate the impact of agricultural runoff by involving stakeholder consultations and encouraging the participation of the public and industries that are involved in marine-related activities.

#### **Cross-cutting Mechanisms for Focus on Marine Systems**

- **Spatial planning:** Coastal and marine spatial planning, predominantly at the state and district levels, can offer a platform for multi-sector stakeholder discussions for holistic and innovative solutions.
- **Education and awareness raising:** Awareness levels need to be increased in farmers about the harmful impacts of excessive fertilizer and pesticide use on marine ecosystems. Effective communication and coordination between government agencies responsible for agriculture and marine conservation will promote integrated management efforts. Upscaling clusters that promote reduced fertilizer and nutrient usage can mitigate nutrient runoff.
- **Expanding the definition of agriculture:** Expanding the definition of agriculture to include diverse aspects of coastal agriculture will help in sustainable land use. Not only are oceans impacted by agricultural operations, but coastal agriculture is also impacted by the oceans as an environment, with sea-level rise, saltwater intrusion, and cyclones impacting coastal areas. Agricultural practices like deforestation and land reclamation can exacerbate coastal erosion.
- **Resilience building for coastal agriculture:** Creating resilience strategies for coastal agriculture requires a deep understanding of the specific challenges posed by the coastal environment. This includes finding alternative livelihoods for people living in coastal areas affected by saltwater intrusion and sea-level rise. Converting natural coastal habitats into agricultural land disrupts the delicate balance of these ecosystems.

#### **Paramparagat Krishi Vikas Yojana (PKVY) for Strengthening Water Quality Monitoring Mechanisms**

- **Integrating monitoring systems in PKVY:** Within programmes like PKVY, incorporating water quality monitoring and assessing the nutrient export from agricultural fields to water bodies can provide valuable insights. It is essential to factor in the economic value of ecosystem services, nutrient loss, and soil erosion associated with agricultural practices.

## **Strengthen Reporting on Metrics for Policy Design and Implementation**

Some proposed metrics that could be monitored include:

- Number of monitoring systems for agriculture run-offs
- Percentage of marine pollution caused due to land-based agriculture
- Allocation of budget for ocean-based research, including study of the implications of sea-level rise and saltwater intrusion on agriculture and monitoring of agricultural run-off