

Revitalizing coastal livelihoods through capacity building in seaweed farming: A new hope for coastal communities in Kutch

D. Divu¹, Suresh Kumar Mojjada², P.S. Swathi Lekshmi¹, Jayesh D. Devaliya¹, Prachi S. Bagde¹, Sagar V. Jadav¹, T.S. Ramshad¹, Arsha Subramanian¹, Mayur S. Tade¹, V.V.R. Suresh³ and Grinson George³

¹Veraval Regional Station of ICAR-Central Marine Fisheries Research Institute, Veraval – 362 269, Gujarat

²ICAR-National Academy of Agricultural Research Management, Rajendranagar mandal, Hyderabad, Telangana 500030

³ICAR-Central Marine Fisheries Research Institute, Kochi-682 018, Kerala

*E-mail: divudamodar@gmail.com



The seaweed sector in India is poised for significant growth, receiving dedicated attention under the strategic vision of the Government of India and close monitoring by the Hon'ble Prime Minister's Office (PMO). Among the coastal states, Gujarat holds a leading position, with approximately 23,970 hectares identified as suitable for seaweed farming (Johnson *et al.*, 2020). In Gujarat, the Kutch district emerges as a key region of interest, contributing the highest number of potential seaweed farming sites, about 1,500 hectares. While several challenges hinder the optimal utilization of its marine resources, the region's strategic location near the Indo-Pak border, which has resulted in security restrictions limiting fishing activities to designated areas is an important one. As a consequence, coastal communities, which have traditionally relied on fishing for their livelihoods, are often confined to small sections of the coastline leading to the underutilization of the region's abundant marine resources and limiting income-generating opportunities for local families. Combined with a lack of alternative livelihoods, it has led to seasonal migration of youth to urban centres in

search of better economic prospects. The remoteness of these coastal villages, compounded by poor infrastructure and weak connectivity, further enhance vulnerability of the local communities. Given the various challenges faced by coastal communities, seaweed farming presents a sustainable and practical alternative livelihood. The region's natural coastal features, especially the high tidal amplitude and strong wave conditions make it suited for seaweed growth. Unlike other forms of aquaculture that may struggle in such environments, seaweed can grow well in areas with dynamic water movement. However, there is a need for region-specific technologies that address the local challenges and make the practice both viable and sustainable. For this, ICAR-CMFRI introduced a region-specific technological solution in the form of custom-designed High-Density Polyethylene (HDPE) rafts specifically developed to withstand the high tidal amplitude and harsh marine conditions along the Kutch coast in comparison to traditional farming methods which are often ineffective in such environments.

The widespread adoption of these innovations is contingent upon the local community's ability to understand and effectively implement them. Many coastal families still lack the necessary technical knowledge of seaweed cultivation, particularly about the use of HDPE rafts, limiting the potential for large-scale adoption and sustainability. In response to this knowledge gap, the Government of India, through ICAR-CMFRI, launched a comprehensive capacity-building initiative designed to raise awareness, enhance technical understanding, and encourage the adoption of seaweed farming as a viable livelihood option. The training programs emphasize hands-on learning, equipping local fisherfolk with practical skills and the confidence to use new, region-specific farming systems tailored to Kutch's unique marine conditions thereby securing sustainable livelihoods and enhancing regional resilience.

ICAR-CMFRI launched an extensive capacity-building initiative focusing on seaweed farming targeted over 26 remote and marginalized fishing villages along the Kutch coastline, including Lakhpur, Shinapar, Chher Nani, Narayan Sarovar, Koteswar, Kathada, Salaya, Modhwa, Tragadi, Jarapara, Juna Bandar, Mandavi, and others. Recognizing the need for localized, hands-on support, a series of customized training programs that went beyond theoretical knowledge and provided direct, actionable skills were designed. The initiative included "door-to-door" campaigns and "step-by-step" demonstrations tailored to the cultural and linguistic needs of the fishing communities. Given the diverse nature of the region, the training was delivered in local languages, including Gujarati and Kutchi, ensuring that all participants could fully grasp the content.



The training sessions were practical, village-specific, and designed to be culturally sensitive. Over 92 fishing families, totaling nearly 492 coastal fishers, participated

in the program. These families were introduced to the basics of seaweed farming, learning how to identify ideal farming locations, prepare and deploy custom-designed HDPE rafts, and understand the full cycle of seaweed cultivation, from seeding to harvesting. A key feature of the training was its focus on hands-on activities, where participants learned directly by doing, under the guidance of experts. This approach allowed participants to gain a deeper understanding of the raft installation process and the seaweed cultivation techniques. It also made them more confident in implementing the innovative technology on their own, empowering them to adapt the new methods to their specific needs and environments.

Beyond the technical aspects, the training also included crucial economic education, providing fishers with knowledge about market trends, potential returns, and the overall viability of seaweed farming as a sustainable livelihood. The economic component was designed to address the financial uncertainties of seaweed farming, offering guidance on how to manage risk, understand supply chains, and access markets for seaweed products. Additionally, environmental benefits such as the role of seaweed farming in mitigating coastal erosion and its potential for eco-friendly marine resource use were emphasized. This initiative helped families diversify their income sources, contributed to broader socio-economic benefits, such as reducing seasonal migration, combating poverty, and empowering women in the community. Women were particularly involved in the program, gaining practical knowledge and confidence to contribute to household income and take part in this emerging industry. As seaweed farming has a relatively low entry barrier and requires minimal capital investment, it has emerged as an ideal alternative livelihood for many families, especially in a region where traditional fishing and agricultural activities are becoming less viable. This initiative is laying the foundation for a sustainable seaweed farming industry along the Kutch coast. Over time, it is expected to contribute to a more resilient coastal economy, also aligning with national priorities such as marine conservation, climate adaptation, and sustainable development.

The initiative has played a key role in empowering local women by providing them with new skills and income-generating opportunities. Traditionally, women in these coastal communities had limited access to economic resources. Now, they have been trained in



various aspects of seaweed farming, including site preparation, raft management, and harvesting which has strengthened their roles within their families and communities. They have taken on leadership roles in marketing and distributing seaweed products, contributing to both their economic empowerment and an enhanced status in the local economy. Through these programs, women are emerging as important contributors to a sustainable industry, challenging traditional gender roles and promoting greater gender equality in coastal regions.



A series of advanced training and exposure visits to strengthen the practical knowledge of selected coastal fishers and women engaged in seaweed

farming initiatives in Kutch was also done. The chosen participants identified based on their active involvement and their potential to become catalysts for change within their communities, were taken to Tamil Nadu, a leading region for seaweed cultivation in India to broaden their technical understanding. There, they observed successful large-scale farming models through hands-on demonstrations, interactive sessions with experienced cultivators, and detailed exposure to efficient cultivation, harvesting, and post-harvest handling techniques. After completing the training, these individuals were designated as master trainers and are now actively sharing their knowledge with other stakeholders across coastal villages. Through locally led training sessions and peer-to-peer learning, they are playing a key role in expanding seaweed farming capacity along the Kutch coast, promoting wider community participation and ensuring long-term sustainability of the initiative. Continued institutional engagement, robust policy support, and well-developed market linkages will be essential to ensure the long-term success of seaweed-based livelihoods. With consistent efforts and collaboration, seaweed farming in Kutch can evolve into a replicable model for sustainable coastal development.