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Revitalizing seaweed cultivation across Southeast Asia to empower coastalÂ communitiesÂ

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Seaweed cultivation, a key pillar of coastal economies, is especially vulnerable to rising sea temperatures and heat stress, which slow growth and increase susceptibility to disease. This threatens not only local livelihoods but also regional industries that depend on seaweed as a raw material for food, pharmaceuticals and cosmetics. Furthermore, it can also impact the country's foreign exchange earnings, as seaweed is an export commodity. For major exporters like Indonesia, the worldâ??s second-largest seaweed producer this puts foreign exchange earnings at risk.

In Singapore, seaweed farming is still in early stages. Several pilot projects, startups, and research initiatives are laying the groundwork for development of seaweed. Despite the seaweed farming being in experimental stages, climate change is shaping how farms are planned, operated, and studied. In addition, rapid urbanization has significantly altered coastal ecosystems, leading to habitat loss and declining marine biodiversity, including native seaweed species. Whereas in Indonesia and the eastern provinces of Papua, seaweed farming has long been a critical source of income which is now impacted by climate change and environmental degradation.

As climate resilience becomes increasingly critical, Southeast Asiaâ??s future lies in regional collaboration leveraging Singaporeâ??s innovation ecosystem alongside Indonesiaâ??s aquaculture potential to restore and revitalize the seaweed industry. Sustainable seaweed farming not only supports biodiversity but can also offer coastal communities, from Papua to

Pulau Ubin, a stronger, more secure economic future.

The Rise and Fall of Fakfak Papuan Seaweed Farmers

The marine tourism in Southeast Asia extends beyond the coastal landscape and vibrant marine life. It is deeply rooted in the livelihoods and cultures of coastal communities, many of whom rely on the ocean not just for sustenance, but also for economic survival. Tourists can explore traditional fishing villages, learn about the coastal communities and enjoy fresh seafood. However, this marine biodiversity is slowly facing threats due to overfishing and climate change.

The decline of seaweed production can also be observed in Fakfak Regency, West Papua. In Kokas, which was previously a center for seaweed production, this status is no longer held due to the difficulty of obtaining seaweed seeds and harvest failures, as the crops are affected by the "ice-ice" disease.

Eryanak farmer group is collaborating with Kaleka, a national non-profit research organization that works with farmers, fishers, and forest-dependent communities so they can cultivate in a way that benefits nature and people by establishing a seaweed seed nursery. The process began with the formation of the group until the establishment of a nursery (floating cages and moorings) at three points, as well as the procurement of approximately 300 kg of *Eucheuma cottonii* seaweed seeds from Tual, Maluku.

Golaf explained, "The Eryanak Seaweed Farmer Group was initially formed because seaweed began to disappear from Kokas waters due to several factors such as the ice-ice disease and changes in water quality. Since no farmers had successfully re-cultivated it, our group built a seed nursery to produce and provide seeds suitable for the current conditions of Kokas waters."

The obstacle previously faced by this group was the unavailability of high-quality seaweed seeds for seaweed farmers in their village. This highlights the importance of establishing a seed nursery that is expected to provide seaweed varieties proven to survive in the water conditions of Kokas.

The establishment of the seaweed seed nursery serves as the axis of their movement, aiming to provide various varieties of seaweed broodstock for resistance testing in the waters. This nursery also conducts observations of changes in environmental conditions (temperature, salinity, and pH) and seaweed growth to determine potential production.

The Future Hope for Papua's Marine Resources

The efforts undertaken by the Eryanak Seaweed Farmer Group, together with Kaleka, have successfully restarted seaweed cultivation. So far, approximately 300 kg of seeds have been distributed to 6 members of the farmer group, out of a total of around 220 kg of seeds. This is considered progress compared to the previous halt in seaweed cultivation.

"Yes, most of the residents of Kokas are still not fully convinced to jump back into seaweed cultivation because of previous failures. But now they can gradually start again because they are assisted with the provision of seaweed seeds and also water quality measurements," **Golaf** said.

To make seaweed development more attractive, the farmer group still needs assistance with facilities and infrastructure such as seaweed moorings, ropes, anchors, buoys, and fuel for boats used to reach the moorings.

Through a restorative economic approach, the Eryanak Seaweed Farmer Group is also more optimistic about the development of seaweed cultivation in their village. The hope is that this small endeavor can be an initial step to drive the local economy of Fakfak's coastal communities in West Papua.