Maritime Fisheries of Sri Lanka: Sustainability, Policy, and Coastal Livelihoods

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Introduction

Maritime Fisheries of Sri Lanka: Sustainability, Policy, and Coastal Livelihoods brings together biological science, social research, and governance analysis to address one of the island's most vital sectors. Small-scale fisheries are a cornerstone of food security, employment, and coastal identity in Sri Lanka; yet these fisheries operate within complex socio-ecological systems that face overexploitation, habitat loss, market pressures, and climate-driven change. This book synthesizes field-based stock assessments, socio-economic surveys, and policy review to propose practical, evidence-based pathways toward more sustainable and resilient fisheries governance.

Our approach is explicitly multidisciplinary. Biological chapters examine species status, gear impacts, and spatial dynamics; social-science contributions explore household livelihoods, gender roles, and community institutions; policy-focused sections analyze legal frameworks, co-management models, and economic instruments. Methodologically, the work draws on a blend of quantitative stock-assessment techniques, participatory mapping and household surveys, value-chain analysis, and institutional review. Where data are sparse, the book highlights pragmatic methods for decision-making in data-poor contexts and shows how local knowledge can complement scientific monitoring.

A recurring theme is co-management—forms of shared governance that align fishers’ incentives with conservation and stewardship goals. Several chapters present tested co-management models, describe the procedural steps needed to build trust and capacity, and evaluate trade-offs between top-down regulation and community-led approaches. Equally central are strategies for mitigating harmful gear impacts and reducing bycatch through design and selective fishing practices, which are presented with both experimental results and field-tested recommendations suitable for managers and NGOs.

Livelihood diversification and market measures are discussed as essential complements to biological management. Fisheries-dependent households often require alternative incomes or value-addition opportunities to reduce pressure on vulnerable stocks; the book examines micro-enterprise, post-harvest handling improvements, and market-based incentives that can improve incomes while supporting sustainability. Social equity—particularly the role of women and young people in coastal economies—is emphasized throughout, because resilient governance must be inclusive to be durable.

Finally, the conclusion-oriented chapters synthesize policy recommendations and outline measurable indicators of success. Readers will find actionable pathways for

implementation, monitoring frameworks, and adaptive strategies that account for uncertainty, including climate variability and shifting markets. While the focus is Sri Lanka, many of the approaches and lessons are applicable across the region—offering practitioners, managers, and civil-society actors a pragmatic toolkit for steering small-scale fisheries toward long-term ecological and social resilience.

CHAPTER ONE: Sri Lanka's Maritime Environment: Oceanography, Habitats, and Fisheries

Sri Lanka, a teardrop-shaped island nestled in the northern Indian Ocean, boasts a coastline stretching approximately 1,620 kilometers. Its unique geographical position, between latitudes 5°54'N and 9°52'N and longitudes 79°39'E and 81°53'E, makes it a pivotal point for marine biodiversity and oceanographic phenomena. The island is separated from India by a channel that is generally less than 20 meters deep and a mere 35 kilometers wide at its narrowest point. This tropical setting, characterized by warm waters, underpins a rich tapestry of marine and coastal ecosystems that are intrinsically linked to the nation's fisheries and coastal livelihoods.

The maritime domain of Sri Lanka is considerably larger than its land area, encompassing a territorial sea of 21,500 square kilometers and an Exclusive Economic Zone (EEZ) of 517,000 square kilometers. This vast expanse of ocean, along with internal waters including lagoons and estuaries covering 1,580 square kilometers, forms the essential resource base for the country's fisheries. The fisheries sector is a cornerstone of Sri Lanka's social and economic life, providing employment to around 575,000 people directly and indirectly, and contributing significantly to the national diet as the primary source of animal protein.

Oceanographic Features and Monsoon Influence

The waters surrounding Sri Lanka are dynamic, heavily influenced by the bi-annually reversing monsoon winds of the Indian Ocean. These monsoons dictate the surface currents and play a crucial role in shaping the island's weather patterns, bringing rain to different regions at different times of the year. Understanding these patterns is not only vital for agriculture and daily life but also for comprehending the productivity and distribution of marine life, which directly impacts fishing activities.

The Southwest Monsoon (known locally as the Yala season) typically occurs from May to September. During this period, strong winds push surface waters, creating distinct current patterns. The Southwest Monsoon Current (SMC) flows eastward between the equator and Sri Lanka, and the island deflects this current southward along its western coast. Concurrently, along the eastern coast, a southward flow results from the Sri Lanka Dome recirculation, a fascinating oceanographic feature. This monsoon brings heavy rainfall to the southwestern regions, including cities like Colombo, Galle, and Matara, and impacts the wet and intermediate climatic zones.

Conversely, the Northeast Monsoon (Maha season) prevails from December to

February. During this time, monsoon winds from the northeast bring moisture from the Bay of Bengal, causing currents to reverse direction. The Northeast Monsoon Current (NMC) flows westward, transporting water from the east. Both monsoon periods see a southward convergence of flow along the southern coast, which is also identified as a major upwelling region. This upwelling brings cooler, nutrient-rich subsurface waters to the surface, leading to higher biological productivity and influencing the aggregation of marine species, including large cetaceans like blue whales. The Northeast Monsoon primarily affects the dry zone and semi-arid zones, bringing heavy, frequent rainfall.

Between these two primary monsoon seasons, Sri Lanka experiences inter-monsoonal periods. The first inter-monsoon season occurs from March to April, characterized by warm conditions and scattered thunderstorms, particularly in the afternoons and evenings. The second inter-monsoon, from October to November, sees widespread rain across the island due to weather systems from the Bay of Bengal, sometimes leading to floods and landslides. These transitional periods are marked by humid weather, with no single region being overly affected, though short bursts of heavy rain are common. The varying monsoon patterns mean that different coastal areas offer optimal fishing conditions at different times of the year.

The continental shelf surrounding Sri Lanka is relatively narrow, averaging about 20 kilometers wide, though it can extend up to 35 kilometers. It is narrowest in the south and widens significantly north of the Kalpitiya Peninsula, encompassing the Jaffna Peninsula. The shelf extends to a bathymetric line of 150 meters, beyond which the continental slope descends steeply, in some areas at an inclination of about 45 degrees, to depths greater than 2,000 meters. This dramatic underwater topography, dissected by eight canyons including one of the world's largest at Trincomalee, creates diverse marine environments. The interaction of ocean currents with this bottom topography can also modify local current patterns, leading to acceleration, deceleration, or changes in direction.

Vital Marine Habitats

Sri Lanka's marine environment is a mosaic of critical habitats that support its rich biodiversity and underpin the productivity of its fisheries. These include coral reefs, mangrove forests, and seagrass beds, all of which are vital for the health of the marine ecosystem and the resilience of coastal communities.

Coral reefs, in particular, are invaluable ecosystems. Sri Lankan waters host over 208 species of hard coral, with reefs predominantly found along the southern, eastern, and northwestern coasts. These reefs are classified as fringing reefs, patchy reefs, sandstone reefs, and rocky reefs, and are generally located offshore but close to the shore, typically within 40 kilometers of the coast. They are essential to marine biological resources, supporting 25% of marine species globally and providing habitat

for around 400 species of reef and reef-associated fish in Sri Lanka, from a total of nearly 1,000 known species. Commercially important invertebrates like lobsters, prawns, and crabs also thrive in these reef environments. Beyond their ecological significance, coral reefs also act as natural barriers, protecting the coast from erosion and supporting tourism. Notable reef systems include the Bar Reef Marine Sanctuary, one of the largest in Sri Lanka, covering over 300 square kilometers and home to 156 species of coral and 283 species of fish, and the Kayankerni Reef, a vital marine sanctuary in the Batticaloa District.

Mangrove forests are another crucial coastal habitat, typically found at the confluence of fresh and saltwater in estuaries and lagoons. Sri Lanka's mangroves are particularly diverse, with 21 species and 18 associates identified, representing one-third of the world's mangrove species diversity. These ecosystems are indispensable as nursery grounds for many fish, prawns, and crabs, with juveniles migrating to the mangroves to feed before returning to the sea as adults. Mangroves also contribute to coastal water quality by filtering pollutants and stabilizing shorelines, offering protection from erosion and storm surges. They are significant carbon sinks, playing a critical role in climate change mitigation. Despite their ecological importance, mangroves have faced threats from conversion for aquaculture and housing development, as well as pollution. However, Sri Lanka has made significant strides in mangrove conservation and restoration, becoming the first nation to legally protect all its remaining mangrove forests.

Seagrass beds, locally known as 'Muhudu thruna' in Sinhala and 'Wattawa' in Tamil, are marine flowering plants that form meadows in shallow coastal waters, estuaries, and lagoons. Sri Lanka boasts 15 of the 72 seagrass species found globally, with an estimated 37,137 hectares of seagrass meadows concentrated in areas like Negombo, Mannar, Jaffna, Batticaloa, and Puttalam. These underwater meadows serve as vital nurseries and feeding grounds for a wide array of marine organisms, including commercially important fish and shellfish, sea turtles, and dugongs. Like mangroves, seagrasses are effective carbon sinks, playing a crucial role in mitigating climate change impacts and absorbing pollutants. They also stabilize the seabed and protect microbial flora. However, these valuable habitats are vulnerable to industrial and agricultural runoff, coastal development, unregulated fishing, and aquaculture. Sri Lanka has been a proponent of seagrass conservation, leading the initiative for World Seagrass Day, and is undertaking restoration projects to combat their degradation.

Marine Biodiversity and Fisheries Resources

The confluence of these dynamic oceanographic conditions and diverse habitats creates a rich environment for marine life, making Sri Lankan waters a hotspot of biodiversity. More than 1,300 species of marine fish have been reported in Sri Lankan waters. The coastal fisheries resources are diverse, including small and large pelagic fish, demersal fish, coral reef fish, and various invertebrates such as shrimp and crabs.

Small pelagic fish constitute a significant portion of the coastal catch, historically accounting for about 70%. The marine sub-sector of fisheries is of considerable social and economic importance along Sri Lanka's entire coastline. The total marine fish catch in 2019 amounted to 415,490 metric tons, with coastal fisheries contributing 242,580 metric tons and offshore and deep-sea fisheries adding 172,910 metric tons. Beyond local consumption, Sri Lanka's fisheries support an export industry for species like tuna, shrimp, lobster, crab, and sea cucumber, generating significant foreign exchange earnings.

Sri Lankan waters are also home to a spectacular array of larger marine animals, drawing ocean lovers and underwater explorers. The island is renowned for its populations of blue whales, dolphins, sea turtles, and manta rays. Spinner dolphins, known for their acrobatic displays, are abundant, and large gatherings of sperm whales can be observed off the coast. These migratory species often frequent areas influenced by the productive upwelling zones. The rich marine life, coupled with the varied coastal and oceanographic features, creates a complex and vibrant environment that is both a source of livelihood and a treasure trove of natural heritage for Sri Lanka.

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