

CHAPTER 1

INTRODUCTION

Numerous bodies of inland waters are widely distributed in Southeast Asia and the fisheries production from such waters is one of the sources of people's animal protein. The capture fisheries sector, utilizing these inland waters, provides employment opportunities and revenues to millions of peoples in the rural areas.

1.1 Background

Inland waters refer to permanent water bodies found inland from the coastal zone areas and whose properties and uses are characterized by permanent, seasonal, or intermittent occurrence of flooding. Aside from their role as fish habitats, inland waters are also used as fishing grounds by capture fisheries as well as sites for fish culture. Inland waters generally refer to lakes, rivers, brooks, streams, ponds, inland canals, and dams. Similarly in Southeast Asia, inland water bodies include rivers, lakes, floodplains, reservoirs, wetlands, and inland brackishwater water systems, e.g. estuaries (**Figure 1.1**).

Inland capture fisheries as defined by FAO (2011), is the extraction of living aquatic organisms from natural or man-made inland waters, but excluding those from aquaculture facilities. While inland fisheries could generally mean the commercial fishing operations done in freshwater bodies surrounded by landmass, some fishing activities like capture fisheries, harvest the fish living naturally in inland water bodies. Fish farming or aquaculture is also another form of inland fisheries, where the aquatic species are raised in tanks, ponds or pens and cages in water bodies, to marketable sizes for human consumption. Specifically, inland capture fisheries refers to all kinds of harvesting of naturally occurring living resources in freshwater environments, while freshwater aquaculture refers to the farming of fish in freshwater environments, *i.e.* commercial production of fish in ponds or enclosures, usually for food. In Southeast Asia, fishing activities in inland waters usually start at the onset of the rainy season when fish migrates from main rivers to other water bodies for feeding or spawning, and end during the middle of the dry season when the fish goes back to main rivers. The phenomenal floodplain areas that are formed during the wet season and the lowland swamps become productive fishing grounds for inland capture fisheries and related activities, where large volumes of fish are harvested.

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Figure 1.1 The productive fishing ground: a) The River, b) Floodplain, c) Riparian Vegetation, and d) Swamp Forest

The Southeast Asian region is endowed with enormous areas of natural inland water resources, such as river systems, lakes, floodplains, reservoirs, dams, and wetlands. **Figure 1.2** shows the important rivers and lakes in the region, with Indonesia having more than 256 million ha of inland water bodies, followed by Myanmar with more than 82 million ha, Thailand with more than 66 million ha, and the Philippines with more than 12 million ha. Cambodia has the Tonle Sap Great Lake that could expand from 250,000 ha to more than 1.6 million ha during the wet season (Pongsri *et al.* 2015).

Fisheries in inland waters provide food security, livelihood, cultural and religious identity, recreation, and serve as a source of income for millions of people globally (Welcomme *et al.* 2010; Lynch *et al.* 2016). Inland fisheries have long been a vital component of economic security in sustaining and alleviating the conditions of the poor and disadvantaged communities around the world, their subsistence of which depends on the products from wetlands and other inland resources.

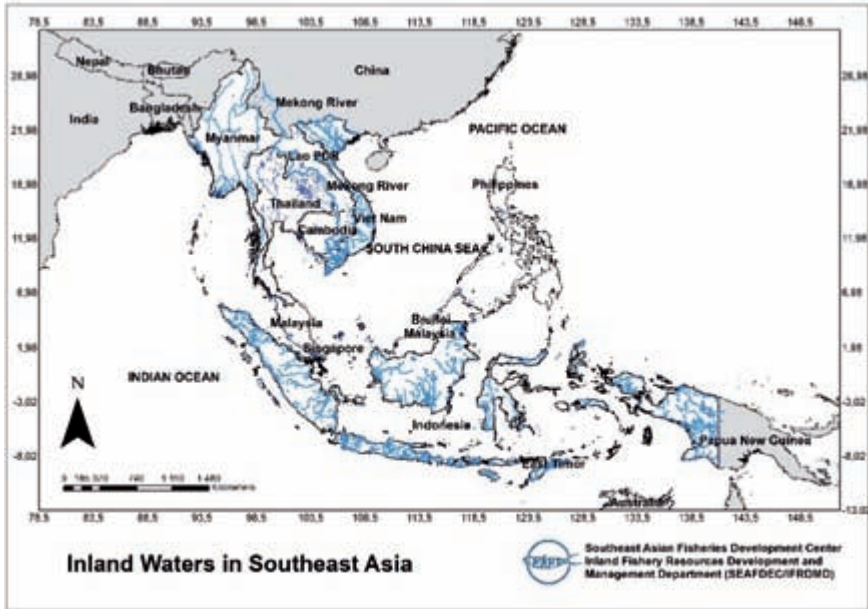


Figure 1.2 Distribution of inland waters in Southeast Asia

Inland waters are hosts to large numbers of aquatic species that have already adapted to the many types of ecosystems. However, most inland water resources have been degraded or even lost mainly as a result of destructive human activities. The pressure exerted on the habitats and the environment in inland waters is also felt by the aquatic communities. Some aquatic species are static and with little movements in a specific habitat while others move between different habitats. Changes in the aquatic environment caused by fishing and non-fishing activities could disrupt the sustainability of the inland water resources. Destructive fishing practices such as the use of poisonous substances and electric shock damages the whole fish community while irresponsible management of aquaculture operations negatively impacts on the quality of the water, which is untreated and oftentimes discharged to the surrounding aquatic environment resulting in eutrophication.

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The pressure on habitat and its environment on inland waters will be reacted by aquatic communities. Some species are static and move little for a specific habitat, and others moving between different habitats. The changes of the aquatic environment caused the fishing and non-fishing activities could disrupt the sustainability of the inland water resources. Destructive fishing practices such as using poisonous substances and electric shock damaged the whole fish community as well as inadequate management of aquaculture negatively impacted the water quality. Modification of water bodies (damming or dredging) damaged the spawning ground, changed the fish migration pattern, and harmed fish feed organisms. Competition on utilizing the freshwater resources among several sectors (e.g. development projects) damaged the aquatic ecosystem.

1.2 Inland Waters for Inland Fisheries

The inland fisheries sub-sector is one of the essential socio-economic components for many countries in the Southeast Asian region, and its contributions in rural communities are particularly significant in terms of alleviating poverty, ensuring food security, and sustaining people's nutritional well-being. The sustainability of inland capture fisheries depends much on the quality of the aquatic habitats and ecosystems. Therefore, while aiming for the sustainability of inland fisheries, the fisheries sector should recognize that the inland water ecosystems are also being utilized by other development sectors. It is under such a circumstance that the role of inland fisheries in economic development should be valued so that its importance as source of food especially for the rural communities is well recognized by planners and policymakers, and its significance in economic development boosted (**Figure 1.3**).

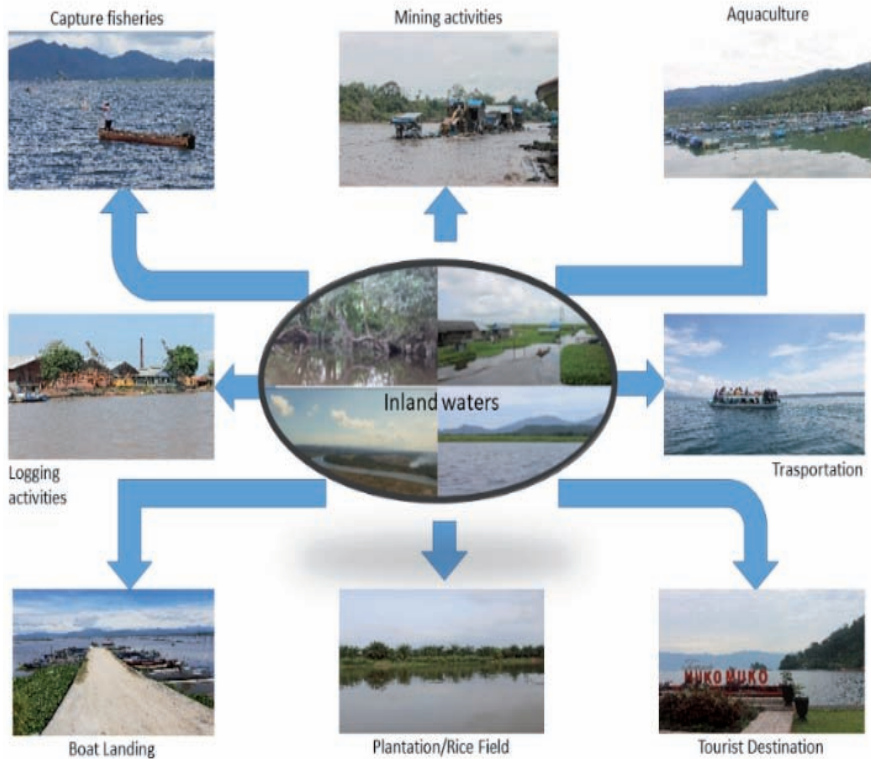


Figure 1.3 Inland waters utilization

Nonetheless, policy makers should be made aware of the impacts of various activities being undertaken by other sectors in inland waters, e.g. impacts of alteration of the habitats of aquatic organisms on fishery production. Although many development projects are proposed for enhancing national economies and improving the quality of life of people especially in low-income countries, policy makers should be cautioned that such projects could possibly lose the high productivity potentials and aquatic ecosystem services. Advocacy is necessary to ensure that in every project implemented, the balance between economic development and environmental sustainability is ensured.

In this regard, it has also become necessary that the inland fishery resources should be responsibly managed for sustainability, e.g. promotion of management measures that involves all stakeholders,

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especially in making management decisions. Adapted from FAO (1997), SEAFDEC (2017) defined fisheries management as “*the integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources, and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities to ensure continued productivity of the resources and accomplishment of other fisheries objectives.*” This implies that the primary purpose of fisheries management is to establish appropriate system of management rules based on defined objectives, as well as a mix of management means to implement the regulations, which are put in place by a system of monitoring, control, and surveillance (Wilson *et al.* 2003). SEAFDEC (2017) added that many types of management measures are applicable for the inland resources in Southeast Asia, taking into account the various ways that water bodies are being utilized, *i.e.* for domestic consumption; industrial production; agricultural production; water barrier construction; and recreational uses (FAO 1997; World Business Council for Sustainable Development 2006). Such measures include co-management, community-based fisheries management, integrated management, government-based management, and the Ecosystem Approach to Fisheries Management (EAFM), where EAFM gives due consideration of the surrounding conditions of the fishery sector. However, there are challenges that hinder the successful promotion of inland fisheries in the region, *e.g.* insufficient data and information, environmental degradation, overexploitation of the fishery resources. These concerns should be addressed for the sustainability of inland fisheries.

Considering that information on the status and trends of inland fisheries is widely recognized as crucial in serving as primary data for keeping the sustainability of development and management of this sub-sector, the SEAFDEC/IFRDMD had started compiling data and information on inland fish and fishery activities in the ASEAN Member States (AMSs), namely: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam. Exchanging of information on the present status of inland fisheries in the Southeast Asian region as well as seeking practical and precise methods on collection of data on inland fisheries, particularly on catch statistics, fishing gears, management measures, and livelihood, have also been promoted in the AMSs through workshops, meetings, and in-house training sessions.

This book therefore includes the status of inland fisheries in Southeast Asia, the threats to inland water environments and fisheries, and management options for now and in the future that would enhance the economic well-being of the rural communities and promote environment-friendly practices.