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A regional database management system—the fisheries resource information system and tools (FiRST): Its design, utility and future directions

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Abstract

South and Southeast Asian countries have undertaken demersal trawl surveys to measure the fisheries potential of their waters throughout the 20th century. However, ensuring full use of, and easy access to the resulting data is a challenge in developing countries. The "Fisheries Resource Information System and Tools" (FiRST) was developed through a regional collaborative effort across eight South and Southeast Asian counties to meet these needs. FiRST is a data management system for scientific trawl survey data and includes data summary and visualization tools, an analytical routine to estimate biomass, and data import/export modules. The FiRST software has also facilitated the establishment of a regional database, 'TrawlBase', which contains more than 20,000 hauls or stations from scientific trawl surveys in 10 countries conducted between 1926 and 1995. The regional database is an important regional resource for coastal fisheries management complementing national fisheries catch statistics.

This article describes the refined version of FiRST (version 2004) and provides examples on how the database ('TrawlBase') has been used to date for analyses aimed at establishing historic resource baselines and examining the status of coastal fishery resources. The results show a severe decline of resource biomass to an average of 22% of pre-exploitation levels, with cases as low <4%. These results clearly demonstrate the strong impact of fishing on coastal resource biomass and diversity.
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Keywords: Database system; Fisheries resources; Information management system; Trawl surveys; South and Southeast Asia

1. Introduction

Information on the status and potential of resources is essential for sustainable management of fisheries. However,

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assessing the status of fisheries resources is a challenge, particularly in tropical developing countries where fisheries are usually multispecies in nature and information is limited (Simpson, 1982; Pauly, 1988; Silvestre and Pauly, 1997a). Determining current levels of fishing effort, and assembling time series of catch and species composition with reasonable accuracy and precision is often a monumental task. This lack of robust resource assessments limits the ability of managers to make informed decisions.

Trawl surveys have been used extensively as a fisheries-independent approach to measure the status of resources (Sissenswine et al., 1983; Gunderson, 1993; Smith, 1996). They are suggested to be the most straightforward way of determining the amount and type of species in an area, particularly for demersal species (Pauly, 1996). Many Asian countries have conducted scientific trawl surveys since the 1920s, principally to identify areas with a high fisheries potential (Aoyama, 1973; Simpson, 1982; Pauly, 1988; Silvestre and Pauly, 1997a,b). In South and Southeast Asia, over 300 trawl surveys covering approximately 40,000 trawl stations have been carried out (Table 1, Fig. 1). However, in many cases, the resulting datasets have not been used as fully as they could have to inform fisheries management. This is due to a range of data management issues, including that data are held by individuals who treat them as their private property, or by multiple organizations/institutions in a country or even by another country altogether. Also, such data are usually not in electronic format, poorly maintained, and

Table 1
Scientific trawl surveys that have been conducted in South and Southeast Asia derived from Appendix III in Silvestre and Pauly (1997a), trawl survey data contained in the national and regional ('TrawlBase') database within FiRST (version 2004) and current data custodians/users

Country	Data custodians/users	Survey area	National database		Regional database ('TrawlBase')	
			Period covered	Number of stations	Number of stations	Period covered
Bangladesh	Department of fisheries	Bay of Bengal (Indian Ocean)	1968–1991	3138	1450	1980–1987
Brunei darussalam	Department of fisheries	Brunei waters (South China Sea)	1949–1990	571	–	–
India	Central marine fisheries institute	West coast (Indian Ocean)	1948–1991	846	613	1994–1995
Indonesia	Central research institute for fisheries, directorate general of fisheries	Java sea	1972–1982	1947	1376	1974–1979
		Malacca strait	1973–1983	237	–	–
		Southern Indian Ocean	1980–1995	1308	–	–
Malaysia	Department of fisheries, fisheries research institute	West coast (Malacca Strait)	1926–1991	1931	1299	1926–1991
		East coast (South China Sea)	1926–1995	1760	2241	1926–1991
		Sabah/sarawak (South China Sea)	1927–1996	1682	775	1927–1993
Myanmar (Burma)	The WorldFish center[a]	Bay of Bengal (Indian Ocean)	1953–1983	881	395	1979–1980
Pakistan	The WorldFish center[a]	Pakistan waters (Indian Ocean)	1921–1985	1754	96	1976
Philippines	Bureau of fisheries and aquatic	Philippine waters	1947–1949	157	157	1947–1949
	Resources,	Manila Bay	1956–1996	768	37	1995–1996
	University of the	San Miguel Bay	1957–1993	192	64	1992–1993
	Philippines (Visayas)	Other areas in SE Luzon	1967–1995	96	62	1994–1995
		Samar Sea and Carigara Bay	1979–1996	596	458	1980–1995
		Visayan Sea	1976–1979	268	–	–
		Other Areas	1969–1991	210	60	1975–1979
Sri Lanka	Ministry of fisheries and aquatic resources development	Sri Lanka waters (Indian Ocean)	1920–1980	795	618	1920–1980
Thailand	Department of fisheries	Gulf of Thailand	1961–1996	10983	5890	1970–1995
		Andaman Sea (Indian Ocean)	1965–1988	398	–	–
Vietnam	Research institute of marine fisheries	Vietnam waters (South China Sea)	1960–1988	8799	4021	1979–1995
Southeast Asia	The WorldFish center[a]	South China Sea	1969–1973	925	925	1969–1973
Total				40242	20537	

[a] These are published datasets: Myanmar (Strømme et al., 1981), Pakistan (Yamanaka et al., 1977) and South China Sea (Senta et al., 1977; pers. comm. Tan Sen Min, SEAFDEC, Marine Fisheries Research Department, Singapore).

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