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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.

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).

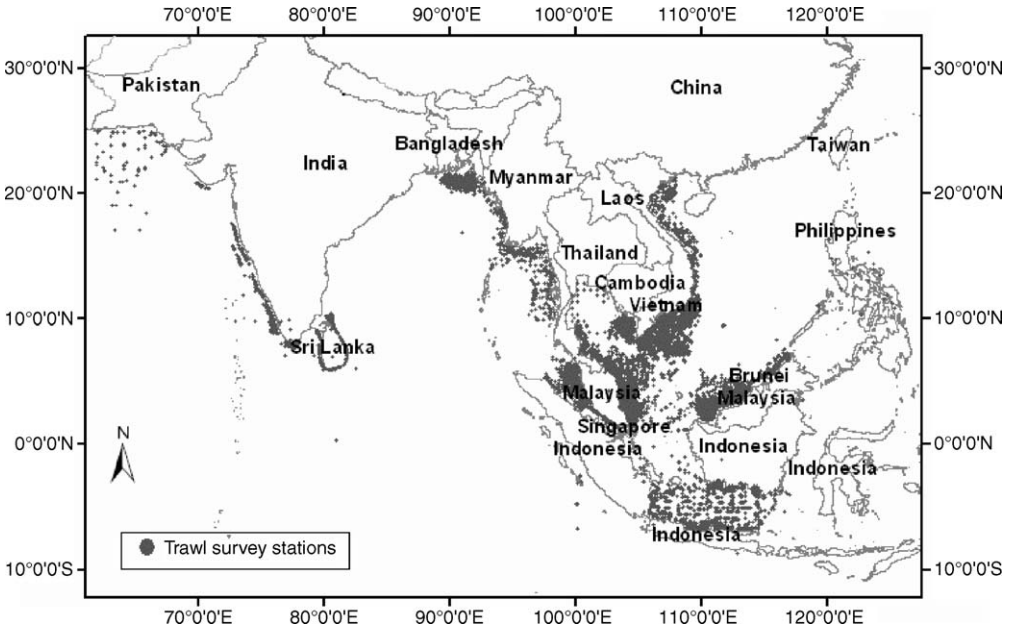

Fig. 1. Geographical coverage of scientific trawl survey data contained in the regional database ('TrawlBase').

thus difficult to access and analyze even under the best of circumstances. Retrospective analysis of these data would provide a fisheries-independent measure of resource status. The data can also be used to generate historic baselines for restoration and management. The availability of such baselines would avoid the potential 'shifting baseline syndrome' (Pauly, 1995) that can occur when only recent observations are available.

The value of these historic time series is not limited to fisheries management, but also extends into general ocean management and conservation. These data could be used to reconstruct past ecosystems (Holm, 2003) and examine the extent of changes over time, and the causes. They can also contribute to our understanding of current structure of marine fisheries assemblages. Generally, ecosystem level approaches require that the data are not only available, but also compatible across countries to enable joint analyses at the ecosystem level.

In July 1996, seven Asian countries participated in the "Sustainable Exploitation of Coastal Fish Stocks in Asia"[1] workshop. There, a consensus was achieved on the value of compiling and analyzing past trawl surveys (Silvestre and Pauly, 1997b). To facilitate the required analyses, a software tool was required to assist countries in addressing the issues regarding storage and access to the data. A prototype database and analytic tool for this purpose was presented and evaluated during the workshop (Gayanilo et al., 1997).

From 1998 to 2001, the database management system was further developed by the WorldFish Center. This was part of a regional collaborative project with eight South and Southeast Asian countries namely, Bangladesh, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Viet Nam[2] (Silvestre et al., 2000; Silvestre et al., 2003a). The result was the FiRST version 2001 (Fisheries Resource Information System and Tools) software which was further refined in 2003[3]. A regional database for scientific trawl survey data, referred to as 'TrawlBase', was also established.

Globally, there is increasing recognition of the need for long-term data management and a trend towards increased data availability via the internet, e.g. OBIS (Ocean Biogeographic Information System) (Zhang and Grassle, 2003). Global public databases such as FishBase (Froese and Pauly, 2000; http://www.fishbase.org), CephBase (http://www.cephbase.org), Hexacoral (Fautin and Buddemeier, 2002), Global Mangrove Database and Information System—GLOMIS (Baba et al., 2004) and ReefBase (Vergara et al., 2000; http://www.reefbase.org) have increased the availability of taxonomic, biological and management information. FiRST and TrawlBase were designed to complement these global databases.

This contribution describes FiRST (version 2004) and 'TrawlBase', with examples of how these have been used to date to facilitate retrospective analysis of trawl survey data in the participating countries. We conclude with suggestions for future directions in the development of FiRST. We recognize that database systems have been designed elsewhere for

[1] Organized by the WorldFish Center (formerly ICLARM—the World Fish Center) with support from the Asian Development Bank (ADB RETA 5651: "Review of Sustainable Exploitation of Coastal Fish Stocks in Asia".

[2] ADB RETA 5766: "Sustainable Management of Coastal Fish Stocks in Asia".

[3] World Bank/CGIAR Global Public Goods: Databases.

survey data (Strømme, 1992). However, FiRST differs from these not only in that it was developed in partnership with developing countries, and is designed to address their needs, but also in that it is freely available. TrawlBase is also the only regional trawl survey database established to date; as such, it has an important role to play in support of fisheries management at national and regional levels.

2. The fisheries resource information system and tools (FiRST)

2.1. Design and components

The FiRST (version 2001) was developed between 1998 and 2000 as a stand alone application with a user interface using Visual Basic and Microsoft Access as the database software (Garces and Silvestre, 2003). The detailed technical description and documentation of the database system is given by Gayanilo et al. (2001). In 2003, FiRST was reprogrammed into a web-based application. It uses active server page (ASP) and hypertext pre-processor (PHP) programming languages to develop the front-end interface and Microsoft Access or Microsoft SQL server 7.0/2000 as the database software. Key considerations in the development were:

- the use of open source or commonly used software to minimize costs in countries where resources are scarce;
- the ability to function on a range of operating systems (e.g., Windows 98, 2000 and XP, Linux);
- the facilitation of analyses in commonly used statistical software to increase the potential use of the data.

The main differences between FiRST (version 2004) and FiRST (version 2001) are: (1) a more user-friendly interface; (2) an improved system for data entry, summary and reporting modules; (3) a mapping module for displaying the data using Geographic Information System (GIS); and (4) a web-based interface which enables the system to be run from a central server. These improvements were driven by country partner's inputs through a technical workshop and feedback during the reprogramming.

The web-based version of the FiRST software and related documentation are downloadable at http://www.worldfishcenter.org/trawl/first/download/ with a template of a country database in Microsoft Access format. The software is also distributed on a CD-ROM which can be obtained from the WorldFish Center. FiRST requires the following minimum configuration for the system to work:

- Microsoft® Windows 98/ME/NT/2000/XP/2003;
- Microsoft® PWS or IIS Web Server;
- Microsoft® Internet Explorer 5 or later;
- Microsoft® Access or Microsoft® SQL Server 7.0/2000;
- at least 64MB RAM; and
- a 1024 × 768 high resolution monitor.

Before using FiRST, the data administrator has to install a web server, FiRST can then be installed on individual PCs linked to a local network. This allows the software and database to be held on a central server and accessed via the intranet or internet from other workstations with proper authorization (see section on Data Access). Running the software from a server will help countries to centralize their data in a single database (either in Microsoft Access or Microsoft SQL server formats), which will facilitate database maintenance and integrity. The 'server' can also be stand-alone if this is appropriate.

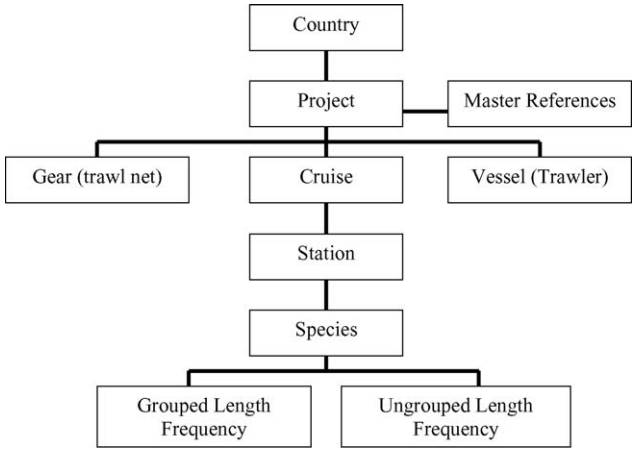

Fig. 2. Schematic representation of the main tables in FiRST (version 2004) and their relationships.

2.2. Database structure and data entry forms

The database system contains 10 interrelated main tables (Fig. 2; Table 2). The relationships of the main tables are illustrated in Fig. 3. The general features of the user interfaces or 'data entry forms' to these tables in FiRST are similar to the standard features of other Windows-based programs.

The 'Country form' contains basic country-level information. The 'Project form' contains project level information regarding the implementation and extent of the project, i.e., trawl survey. It also contains the original project objectives, which determined the sampling design. Linked to the 'Project form' is a 'Master Reference form' offering a list of reports and/or other publications produced by the projects in the country database. Within a project, there may be one or many cruises and the details of these are captured in the 'Cruise form'. The 'Vessel Description form' and the 'Gear form' contain the technical specifications of the survey vessel and fishing gear that are relevant to data analysis, respectively. These forms also allow the storage of the scanned or digital image of the gear or trawler (Fig. 4). The 'Station form' contains information such as the geographic location of each trawl (fishing) haul/station, geophysical conditions, and the trawling speed and depth (Fig. 5).

The main form in the database system is the 'Species form' (Fig. 6), which contains catch data at a given fishing station. The information is at species level where possible, depending on the original survey. The system stores scientific names and

Table 2
Main tables of FiRST (version 2004), and their contents and functions

Table	Contents
Country	Contains general country information.
Project	The projects undertaken in the country and relevant details (e.g., objectives, collaborating institutions, implementing agencies).
Cruise	Information describing a particular cruise (fishing trip) within a project (e.g., date of sampling, survey area).
Gear description	The specifications of the trawl gear(s) used in the project(s), particularly parameters required to estimate the area swept by the gear (e.g., headrope length, cod-end mesh size).
Vessel description	Technical details of the vessel(s) used in the project(s), particularly those that influence the fishing power of the vessel (e.g., gross tonnage, overall length).
Station	Station-related parameters that are important for analysis and interpretation of data (e.g., geographic location and geophysical condition of the station and trawling period).
Species	Catch composition data for a particular station by species/taxa (in weight and/or number).
Grouped length frequency (GLF)	Length frequency data grouped by length classes, for individual species. This is linked to the Species table.
Ungrouped length frequency (ULF)	Contains individual length measurements of samples by species/taxa. This is linked to the Species table.
Master references	Contains a list of reports/publications related to a country-specific project. The table is linked to the Project table.

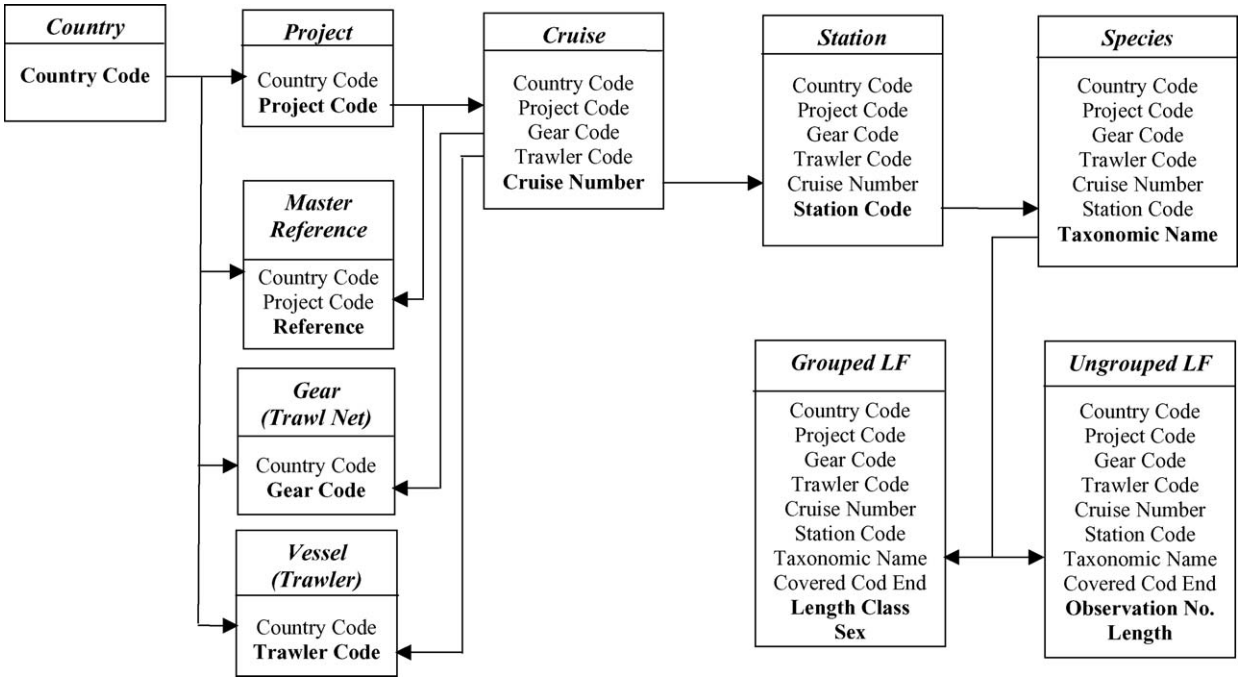

Fig. 3. Schematic representation of the detailed relationships (all of which are one to many) between the main tables in FiRST (version 2004) including the primary key (in bold) and foreign keys (not bold) in each table.

species codes. FiRST enables scientific names to be checked against FishBase (using FishBase 2003 and its online version at http://www.fishbase.org). Any synonyms detected are stored for information but the valid scientific name is used in summaries and analyses. The species code can be encoded directly, or selected from a list. The list can be based on ISSCAAP[4], NANSIS[5] or a country-specific list. The storage of the original names and codes used by the countries enables any records to be traced back to original data sources if this is required.

For each taxon, the total catch in number of individuals and/or total weight is stored. If the catch was subsampled, the total catch for a species is calculated before entry. If specimens were sampled for length–frequency information, the number of specimens is recorded. FiRST stores length frequency data for individual species in either a grouped or ungrouped format. When grouped length frequency data are stored, the user defines the size of the length classes, lower limit of the smallest length group and the class interval.

2.3. Data summaries and visualization

FiRST (version 2004) contains analytical routines and reporting formats that allow the user to generate results in terms of catch, catch per unit effort (CPUE, standardized by

[4] ISSCAAP—International Standard Statistical Classification of Aquatic Animal and Plants.

[5] NANSIS is a software for fishery survey data logging and analysis developed by FAO.

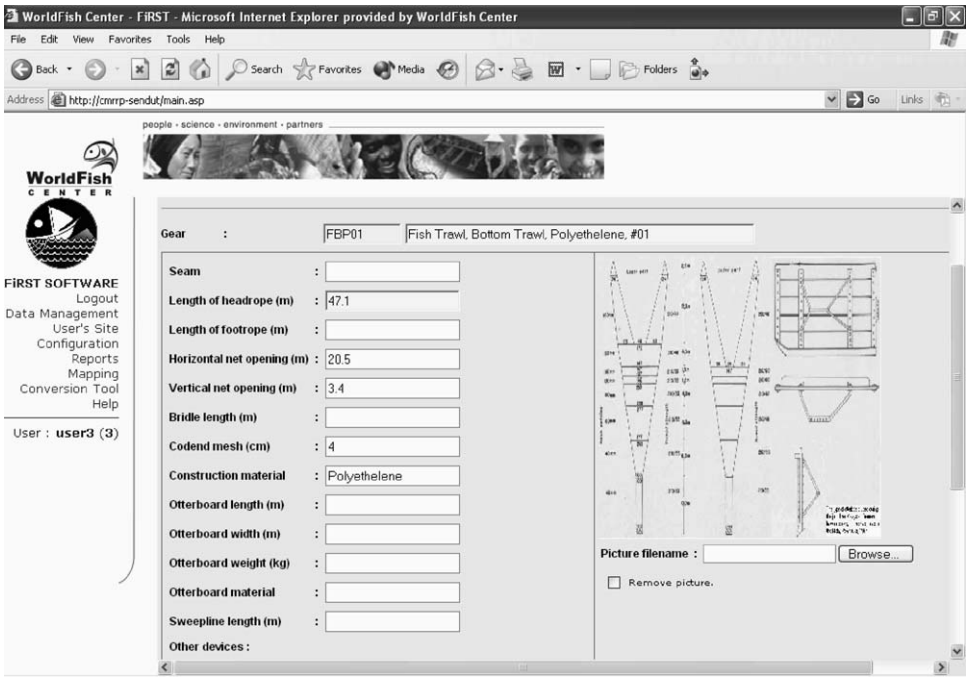

Fig. 4. The gear details form in FiRST (version 2004). Scanned picture of the gear used for the trawl survey can also be stored.

duration of the trawl) or estimates of biomass. The biomass is estimated using the swept-area method (Pauly, 1984; Sparre and Venema, 1992) with the formula:

$$B = \frac{C/f_{\text{mean}} A}{a X_1}$$

where B is the biomass; C/f_{mean} is the mean catch per unit of effort (CPUE); A is the total area covered by the survey (and to which the estimated biomass refers); a is the area swept by the gear during one haul; and X_1 is the escapement factor, i.e., the proportion of fish in path of the trawl gear that is actually

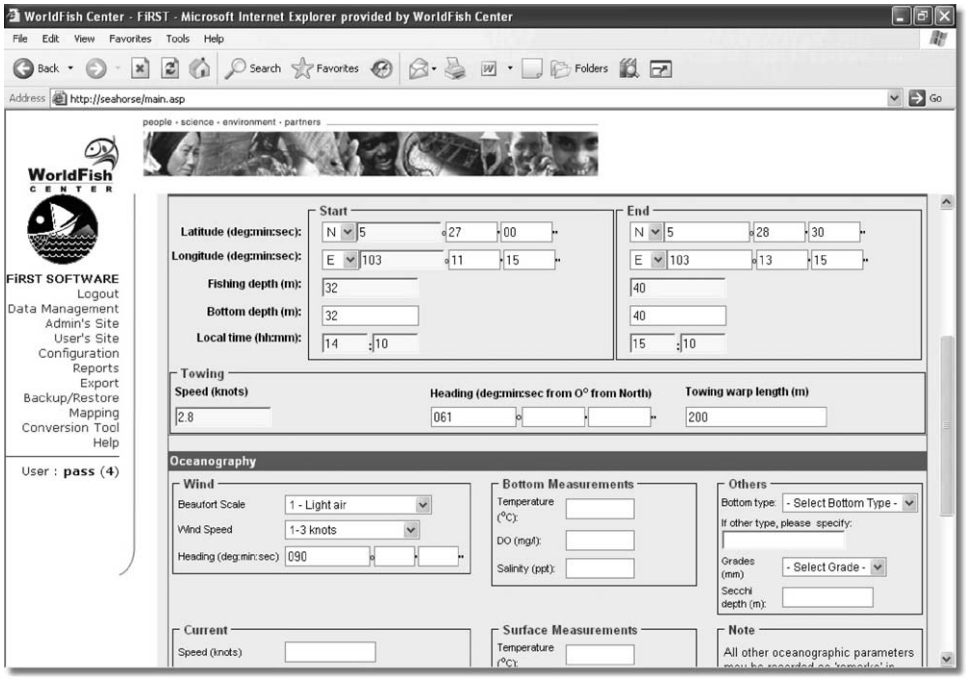

Fig. 5. The station form in FiRST (version 2004) to record station-related information.

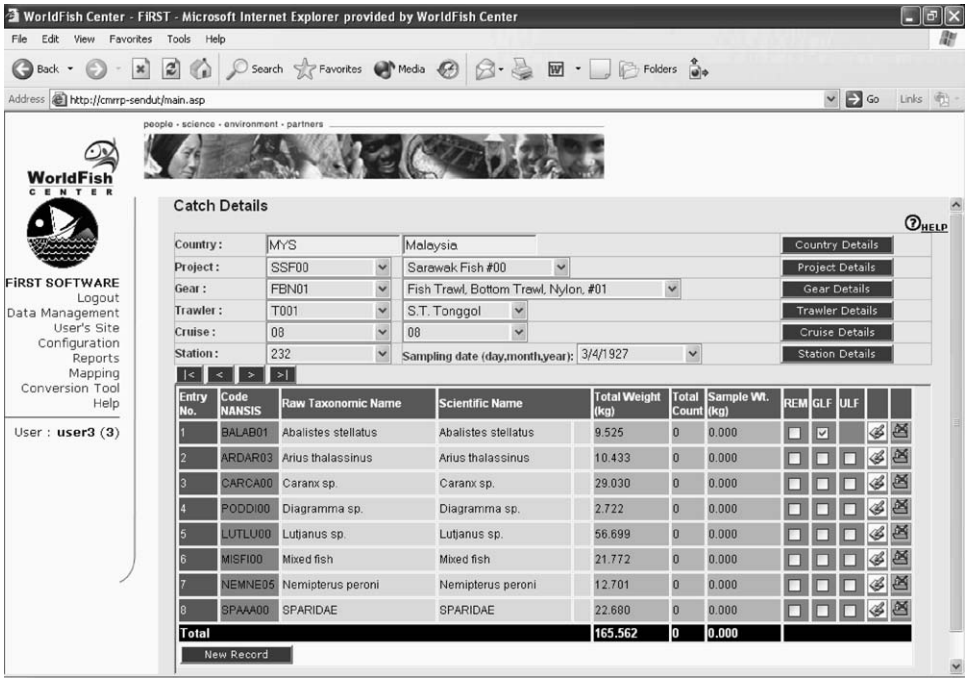

Fig. 6. The species form in FiRST (version 2004) to record catch composition for a particular station. Note that the last two columns indicate presence of related data (e.g., length–frequency).

retained by it. The swept area is defined by:

$$a = tvhX_2$$

where t is the duration of the trawl haul; v is the trawling speed; h is the length of trawl's headrope; and X_2 is the effective width of the trawl relative to the length of the trawl's headrope.

This approach requires a value for headline width in the 'Gear form'. In the absence of headline width, the default value of 0.5, proposed by Pauly (1980a) for Southeast Asian waters is used. Alternatively, the user can enter another value. The procedure is analogous for the escapment factor above (X_1), whose default value, based on Pauly (1980a,b) is also set at 0.5. The estimates of catch, mean catch per unit effort and biomass can be calculated for the survey area as a whole or stratified by depth.

FiRST (version 2004) also facilitates analyses through other statistical programs. The system enables the user to export data in the required format (see data formats under data access) for fish stock assessment software, notably the FAO-ICLARM Assessment Tools (FiSAT; Gayanilo et al., 1996), or ecosystem modeling tools such as Ecopath with Ecosim (Christensen and Walters, 2004; http://www.ecopath.org).

Visualization of the geo-referenced data is possible through the mapping module (see Fig. 1). Currently, the module allows users to map station locations, species distribution and biomass by station. The maps can also display base maps of bathymetry and countries' Exclusive Economic Zones.

2.4. Data access

Data access protocols in FiRST, established based on consultations with the national research partners, include: (1) restricted—only users with proper authorization (i.e., user lever 2 and higher); (2) conditional accessible—data which are older than 5 years, unless otherwise indicated by the national database coordinator; and (3) fully accessible—data with no restrictions as to their distribution and use (Gayanilo et al., 2001). The trawl data contained in FiRST can be obtained from the country and permission must be secured with the particular country for data access of country-specific data (see Table 1 and http://www.worldfishcenter.org/trawl for contact details of the partners). Authorized users can export the data from the FiRST database in Microsoft Access (.mdb) format. The software also enables the user to export reports (or data summaries) in a variety of formats such as Crystal Reports 8 and Crystal Reports 7 (.rpt), Microsoft Excel (.xls), Microsoft Word (.doc), Rich text (.rtf), and Adobe Acrobat (.pdf). The data can be filtered by country, project(s), cruise(s), geographic limit, sampling dates, depth range or station(s).

2.5. Data contents and illustrative examples of the analysis results

Currently eight countries have established national databases (Table 1) mostly Microsoft Access-based and a regional database (in Microsoft SQL format) is maintained by the WorldFish Center. Currently, country custodians have

been designated (see Table 1) and they are responsible in updating their national databases. The updated national databases are then submitted to the WorldFish Center for updating the regional database and in some cases for data validation. The regional database, TrawlBase, contains data from 20,620 hauls, comprising 335,983 records from the partner countries and including published trawl data from 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) (Table 1, Fig. 1). The data span the years from 1926 to 1995. The major fishing areas covered by 'TrawlBase' include: South China Sea (East Coast, Sabah and Sarawak, Malaysia: 926–1995; Vietnam: 1979–1995); Gulf of Thailand: 1961–1996; Malacca Strait (West coast, Malaysia: 1926–1995); Java Sea (Indonesia: 1974–1979); Bay of Bengal (Bangladesh: 1980–1987; Myanmar: 1979–1980); Indian Ocean (India: 1994–1995; Pakistan: 1976); and several coastal areas within Philippine waters (1947–1995).

Based on analyses of compiled trawl survey data in 'TrawlBase' by researchers from national fisheries research institutions, there has been substantive degradation and over-fishing of coastal fish stocks in the areas covered by the studies (Table 3). The analyses indicate that catch rates, and hence resource biomass, have declined to an average of 22% of original ('baseline') biomass levels prior to development of trawl fisheries in the areas studied (see Abu Talib et al., 2003; Barut et al., 2003; Kongprom et al., 2003; Khan et al., 2003; Stobutzki et al., 2006). Some areas now have less than 4% of their original biomass (Table 3). Analysis of the length–frequency data in FiRST showed an average exploitation ratio ($E = F/Z$) of 0.59 for the dominant species (see Appendix C in Silvestre et al., 2003a). This is well above the optimum range (i.e. $E = 0.2$–0.5; Pauly, 1984) indicating overfishing and confirming the trends in biomass decline from the trawl surveys (Silvestre et al., 2003a; Silvestre and Garces, 2004). These trends in biomass have been incorporated in a report by the Asia-Pacific Fishery Commission to demonstrate the urgent need for action to address fisheries management in the region (see Sugiyama et al., 2004).

The data have also been used for preliminary fish assemblage analyses and ecological modeling. The analyses of current assemblages show boundaries at about 50 and 100 m depth (Silvestre et al., 2003b; Alias, 2003; Campos, 2003; Khongchai et al., 2003; Mustafa, 2003; Nurhakim, 2003). The preliminary ecosystem models are a step towards examining the ecosystem level changes through time (Christensen et al., 2003). This type of information is useful for management, as it allows for designing or revising zonation schemes. We suggest that more analyses of this type should be performed in the future.

The outputs of the analyses facilitated through FiRST have been used by national workshops to develop strategies for coastal fisheries management (e.g., Abu Talib et al., 2003; Silvestre et al., 2003b). FiRST has also become a basis for other national databases within some countries. For example, in the Philippines, the structure and design of FiRST was modified to produce a database for their National Stock Assessment Program (Barut, 2004). The aim is to ensure long-term viability of the software and regional database, which will contribute to a solid basis for countries to formulate and implement sound fisheries management policies (Garces and Silvestre, 2003).

3. Future directions

Building on the gains from the regional collaborative effort the future development of FiRST is envisioned to:

(i) increase the power and utility of the FiRST for current and future partner countries;

Table 3
Illustrative examples of the declines in demersal fish density from scientific trawl surveys in Asian countries (adapted from Garces et al., 2001; Silvestre et al., 2003b)

Country/area	Year	Stock density (t km^{-2})	Relative density (%)	Source
Philippines				
Various fishing areas	1947–49	7.88	100.0	Barut et al. (2003)
	1993–95	1.39	17.6	
Malaysia				
West Coast	1971/72	2.31	100.0	Abu Talib et al. (2003)
	1997	0.36	15.6	
East Coast	1972	5.09	100.0	Abu Talib et al. (2003)
	1998	0.20	3.9	
Sarawak	1972	3.90	100.0	Abu Talib et al. (2003)
	1998	1.11	28.5	
Sabah	1986	1.52	100.0	Abu Talib et al. (2003)
	1998	0.87	57.2	
Thailand				
Gulf of Thailand	1961	0.70[a]	100.0	Kongprom et al. (2003)
	1991	0.10[a]	14.2	

[a] Units in metric tons $\times 10^6$.

(ii) expand the coverage of the database geographically, temporally and the range of anthropogenic impacts;
(iii) examine key scientific questions at a range of management scales for input into management decision support; and
(iv) increase awareness of available trawl survey data, and their utility for management, and facilitate greater sharing and collaborative analyses.

3.1. Increasing the power and utility of the FiRST

Based on consultations with partners, it would be of value to increase the power and utility of the FiRST, particularly in terms of the storage of other resource survey types and linkages to statistical software. The trawl surveys are valuable for documenting the state of demersal resources but for some countries other resources, such as pelagic fishes in India (Vivekanandan et al., 2003), are more important. It would therefore be useful to store research surveys that sample these resources. This would also facilitate ecosystem-level analyses as information would be available on more parts of the ecosystem. Closer links with the key analytical software and decision support software should also be examined to increase access to this software for analyses.

3.2. Expanding geographic coverage of the database

To assist in understanding the response of fisheries resources and ecosystems to human impacts we will continue to expand the data coverage in terms of geography, time scales and range of human impacts. As shown in Table 1, there are still more than 20,000 stations/hauls that have not been encoded from the trawl survey inventory in the Asian region. Hence, there is a need to continue to input data and increase the number of partner countries. Inclusion of northern Australian and Brunei data in 2003 will expand the range of levels of human impacts covered by the data.

3.3. Key scientific questions for retrospective analyses

Further development of FiRST will continue to assist partner countries in the analysis of the survey data and the 'translation' to management implications at a range of geographic scales. A key question for countries is the state of their resources. The analysis of trawl data has provided broad estimates of biomass declines in the various countries. However, management of specific fisheries may require sub-national level analyses, and analyses for particular target species groups. The data can also be used to examine changes in species composition through time, and to model past ecosystems (see for example Christensen, 1998; Jukic-Peladic et al., 2001).

The key research questions that could also be addressed include:

(i) the effects of fishing on stocks, assemblages and ecosystems, at a range of spatial and temporal scales;
(ii) the effects of previous management strategies on resources;
(iii) testing of indicators of resource status—FiRST can provide a historical dataset that can be used to test indicators for fisheries and coastal systems.

3.4. Increasing awareness about the database

There is a need to continue to increase awareness regarding the data, to facilitate their sharing, and to encourage collaboration within and between countries. We need to ensure that institutions within countries are aware of what has been collected historically, to maximize its use. This is particularly important for developing countries where resources are scarce. To increase awareness and to prevent 'shifting baselines' (Pauly, 1995), summaries of the surveys and geographic locations are available on the web (http://www.worldfishcenter.org/trawl), along with the contact details of the organizations who are responsible for the data.

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