

Improving Better Understanding and Knowledge of Fisheries for Planning and Management in Southeast Asia: Experience and Challenges¹

By

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I. Introduction

The Southeast Asian region covers a large expanse of marine coastal water areas, and covering the countries of Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste and Vietnam. The region is geographically advantaged by the richness and productivity of the various waters resources, of which consists of sea waters area such as the South China Sea Area, Malacca Straits, the Java, Flores, Banda, Ceram, Molluca, Celebas and Sulu seas including some parts of India Ocean, and inland waters area including some of the Mekong river area and other big water river bodies that can be found through the Countries.

Contribution of fisheries in Southeast Asia is well recognized across the countries, as it does not only provides a source of fish consumption but also provide employment and income opportunities as well as generating trade that provide benefits to the economic wealth of countries in the region. The majority of fisheries in Southeast Asia is small-scale in nature and operated in coastal areas. As being one of the most abundant tropical marine areas, fisheries

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resources in Southeast Asia are typically multi-species. Most fishers rely on the harvest of different species for their livelihood and only rarely on one particular target species.

The same as many regions in the world, fisheries in Southeast Asia is generally conducted in an open-access regime. Currently excessive fishing capacity coupled with over exploitation of limited fisheries resources, use of destructive fishing gears and practices, conflicts of various users' interests and lack of appropriate regulatory system for fisheries are key contributors to drastic deterioration of fisheries resources. These situations have also provided impacts on the aggravation of poverty for the small-scale fisheries both in inland and inshore waters. Government officers including policy makers have, over the years, been concerned on manners and extent of the current utilization of fisheries resources and have called for urgent actions to rectify fisheries practices toward sustainable development goals and the improvement of management practices.

To achieve sustainable fisheries objectives due to the multi-functionality and importance of fisheries in Southeast Asia, the need for better understanding and knowledge of fisheries industries particularly their status, trend and prospectus has been well accepted and regarded as a priority issue that require greater attention and need to be enhanced. This is obtained through analysis of fishery statistics, data and information in fisheries which generally also include registration, records, reporting, census and surveys, and other data and information including indicators; use of advanced information technology and databases that are derived either from routine and non-routine system.

II. Review of the recent regional policies related to improvement of data and information for fisheries

As mentioned in the previous section, under the unique characteristic of tropical multi-species and multi-gear nature of fisheries in the region, the regional policies related to improvement of data and information for fisheries had been developed. The policies underline the importance of utilizing best scientific evidence for fisheries development and management that are in line with the principles of sustainable development and responsible fisheries, which can be obtained through routine data (i.e. statistics, licensing data and records) and non-routine data (i.e. research/surveys).

Improvement of fishery statistics is an area for consideration by the ASEAN countries to support the sustainable fisheries and food security in the region. It has been also recognized that improvement of fishery statistics in the ASEAN Region is substantially important for the promotion of sustainable fisheries and eventually the contribution of fisheries to food security. However, fishery policy and management objectives need to be based upon collecting, analysis and interpretation of available, timely and reliable data. In addition, to obtain national food security due to the increase in human population and the declining of fishery resources, it is also important that fishery statistics to support the analysis on the status and future prospectus of fish supply and demand need to be taken into consideration in each ASEAN country. The improvement of fishery statistics should therefore accommodate this requirement.

The objective of this section is to review the recent regional policies related to improvement of data and information for fisheries highlighting the importance of utilizing best scientific evidence for fisheries development and management.

2.1 Review of Recent Movement in Fishery Statistics and related Information in ASEAN Region

At the regional level, the Southeast Asian Fisheries Development Center (SEAFDEC) has been formulating and implementing various activities under the programs/projects relating to fishery statistics; data and information; and indicators to support planning and management of fisheries of the Member Countries for many years.

a. Regional Fishery Statistics in Southeast Asia

During the 1960s and 1970s there was some progress in the development of fishery statistics for Southeast Asian Region. However, during the past 15 years, fishery statistics for the ASEAN countries have made little progress.

SEAFDEC has initiated a fishery statistics program since 1976. The Fishery Statistical Bulletin for the South China Sea Area was then developed and being published annually by SEAFDEC since 1978 starting with the statistics for 1976. The Bulletin is aimed at providing reliable and comparable fishery statistics with standardized definitions and classifications to facilitate the exchange of information for the management of fishery resources and the planning of various

fishery development programs for countries bordering the South China Sea Area. The SEAFDEC Bulletin intended to covers not only fishery production data but also fishery inventory items such as fishery establishments, fishing boats, fishermen and fishing units, with a hope that the SEAFDEC Bulletin might be able clarify the dual structure of marine fishery in the Southeast Asian countries. The SEAFDEC Bulletin also intended to provide data needed for both biological analysis of fisheries resources and for economic analyses of the fisheries. SEAFDEC also compiled and published the Catch-effort statistics for the South China Sea Area and Tuna statistics in the Southeast Asian region indicated as FAO area 71 for many years.

For the period from 1976 to 1989, seven regional workshops were organized for the development of statistics program in the region to discuss the improvement of fishery statistics in the region as well as the Bulletin. The issues discussed were standard classifications and definitions, fishery statistics items/categories/sub-sectors, collection and compilation, adoption of the geographical basis for reporting data proposed by FAO, modification of species code, etc.

The Regional Workshop on Fishery Information and Statistics in Asia was convened in 1994, in collaboration with FAO/RAP, BOBP, APCAS, NACA and SIFR. The Workshop aimed to review the current status of fishery information and statistics programs and services available to users in Asia, discuss requirements for improvements of the collection, compilation and dissemination of fishery and aquaculture statistics in the region; and recommend ways and means for international cooperation and coordination in supporting and supplementing national efforts in information dissemination and exchanges.

SEAFDEC and FAO collaborated in organizing the FAO/SEAFDEC Regional Workshop on Fishery Statistics in Thailand in 1997, in order to review the current status of fishery and aquaculture statistics in Asia; recommend ways and means to improve the collection, compilation, and dissemination of fishery and aquaculture statistics; and discuss regional efforts in strengthening the application of statistics in the region.

Due to the need to strengthen national fishery statistical systems in Southeast Asia after the conclusions of the FAO/SEAFDEC Regional Workshop on Fishery Statistics and the First Session of the APFIC Joint Working Party on Fishery Statistics and Economics in 1997, SEAFDEC convened the Consultation of Senior Fishery Administrators and Managers on the Strengthening of National Fishery Statistical Systems in Southeast Asia in 1998. The Consultation concluded on the importance of statistics in sustainable fishery development and management; agreed on appropriate actions for strengthening the national fishery statistical systems; and to develop long-term regional cooperation for fishery statistics in the Southeast Asian region.

b. Minimum Requirements of a National Fishery Statistical System in ASEAN Region

At the FAO-SEAFDEC Regional Workshop on Fishery Statistics held in August 1997, the “Minimum Requirements of a National Fishery Statistical System in ASEAN Region” was agreed to be used as a basis for the establishment or improvement of a national fisheries statistical system to support the management of marine fishery. This includes the following statistical items:

- Fishing establishment (In ASEAN region, the majority of fishing establishments are fishing households)
- Fishing laborer's households
- Fishing boats
- Fishing manpower (fishermen)
- Fishing units
- Fishing effort
- Catch in quantity and value; and
- Catch per unit of fishing effort

c. Improvement of Aquaculture Statistics

With regards to improvement of aquaculture statistics, SEAFDEC and FAO jointly organized an Ad-hoc Expert Consultation on Variables and Terminology for Aquaculture Monitoring in Asia in 1999. The Consultation reviewed variables that are currently collected particularly in ASEAN region, discussed the definition of aquaculture and the terminology of variables used to monitor the production from aquaculture and its development as well as defined selected variables that could lead to a more harmonized approach for data collection at both national and international levels.

d. Development of Indicators for Fisheries Management

To support the approach of using indicators for fishery management, SEAFDEC in collaboration with FAO, Government of Vietnam and ALMRV³ organized a Regional Technical Consultation on Indicators for Sustainable Fisheries Management in ASEAN Region in May 2001. The Consultation discussed status of fisheries and their management in the ASEAN region, thereby providing a basis for the identification of practical indicators for management of sustainable fisheries in the region. The Consultation identified potential applicable indicators taking into consideration the experiences from participating organizations. The Consultation also preliminarily discussed how national fishery statistics could support the data collection to obtain indicators for fishery management.

As far as fishery statistics in support of the indicators is concerned, the Consultation made the following conclusion and recommendations which should be highlighted when a national fishery statistical system is to be improved.

- The selection of indicators should be based on criteria, including the availability of data and information, so that the indicators are practical, simple and applicable. In the case where the data are not available, the requirement of data should be identified.
- The indicators for fisheries management should be cost effective and considered valid for local stakeholders. The mechanisms for collecting data and information supporting indicators should be established and contained within the government structure and routine mechanism including fishery statistical system. Some information and data supporting

³ Refer to the Project on the Assessment of Living marine Resources in Vietnam, a DANIDA funded project in Vietnam.

indicators such as biological, socio-economic aspects will be supplemented by other programs including research, census as non-routine exercises.

- The establishment of a good working relationship with the fishermen and a good sampling program will ensure the successful collection of data to obtain reliable information. In addition, mutual cooperation with fisheries industry in the area of collection of information will enhance the compliance of the management action.

e. The Regional Plan of Action and Program for the Improvement of Fishery Statistics in ASEAN region

A series of recommendations during the 1998 Consultation of Senior Fishery Administrators and Managers on Fishery Statistical Systems in Southeast Asia, calls for the strengthening and greater usage of fishery statistics at national and regional levels. This was supported by the recommendations made during the 31st Meeting of the SEAFDEC Council which included the need to develop guidelines and plans of action for strengthening the fishery statistics in Southeast Asia. This requires SEAFDEC to play a coordinator's role in assisting member countries to improve their national fishery statistics, taking into consideration the fact that the transfer of expertise does not occur without a regional mechanism, and that such arrangement would make it possible to sustain the regional fishery resources through effective management.

This Regional Plan of Action and the Program for the Improvement of Fishery Statistics was developed based on the recommendations concluded at the 1998 Consultation of Senior Fishery Administrators and Managers on Fishery Statistical Systems in Southeast Asia, and was

endorsed at the 32nd Meeting of SEAFDEC Council and SOM-AMAF Meeting in 2000 respectively.

The Plan of Action for the Development of Fishery Statistics in Southeast Asia has the following purposes:

- a) To ensure an evolving and dynamic understanding of the role and importance of fishery statistics in sustainable fisheries development in Southeast Asia;
- b) To improve national fishery statistics in the region as well as their systems; and
- c) To enhance the benefits derived from the utilization of sustainable and comparable fishery statistical systems.

Based on recommendations made at various workshops and meetings, the following strategies were identified in order to effectively implement the Plan:

Strategy 1: Increasing the availability, accuracy and use of fishery statistical data and information for fishery development and management

Strategy 2: Developing and utilizing methodologies and tools as well as improving skills and capacities of statistical personnel to assist Member Countries in strengthening their national fishery statistical systems

Strategy 3: Promoting and supporting the formulation and application of sustainable and comparable fishery statistics in the region

2.2 Fishery Statistics and Sustainable Fisheries in the New Millennium

Based on the Code of Conduct for Responsible Fisheries (CCRF) adopted in 1995, efforts by countries in Southeast Asia have been made in rectifying their fisheries practices towards responsible/sustainable principles. However, due to uniqueness of fisheries in the region, implementation of the CCRF has to accommodate regional priorities and specificities. This was strongly supported by the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: “Fish for the People” held in 2001. The Conference adopted “Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region (RES&POA)”. The RES&POA is regarded as the regional fishery policy framework and priority actions to ensure sustainable development of fisheries in the region. The RES&POA concluded that there is a need to “Formulate regional guidelines to implement the Code of Conduct for Responsible Fisheries, taking into account the specific social, economics, cultural, ecological and institutional contexts and diversity of ASEAN fisheries.”

In line with this requirement, SEAFDEC has been promoting a regional collaborative program on “Regionalization of the Code of Conduct for Responsible Fisheries.” The program aims at translating the CCRF into actions accommodating regional priorities and uniqueness of fisheries. An important outcome of this program is the development of Regional Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fisheries Management, which has been endorsed by the high-level authorities of ASEAN and SEAFDEC for implementation.

Within the scope of fisheries management in the CCRF, the importance of quality statistics was stressed as a tool to facilitate development planning and management of fisheries. This has been echoed with a number of regional collaborative works in fisheries management in general and in fishery statistics and information in particular.

Fishery statistics is widely accepted as a tool to provide a basis and being crucial to the determination of national fisheries policies, the formulation of national management frameworks and actions or even as a basis for understanding the status and condition of fisheries resources. However, current national fishery statistical systems of ASEAN Member Countries are not effectively implemented. More accurate and timely statistics should result in a better informed public that supports efforts to manage fisheries in a responsible manner. The need for timely and reliable statistical data for the formulation and evaluation of fishery programs and policies has inevitable expanded manifold for development and management purpose.

It has been recognized that improvement of fishery statistics in the Southeast Asia is substantially important for the promotion of sustainable fisheries and eventually the contribution of fisheries to food security. Fishery statistics maintained at national levels should be regarded as the main source of information for the long-term and sustainable development and management of fisheries. Along this line, strengthening of national fishery statistical systems and promotion of sustainable and comparable data collection systems should be given a first priority to fulfill the purpose.

Although, there have been attempts to improve fishery statistics in the region, however, the improvement has been in little progress. One of the major constraints to the improvement of fishery statistics is that statistical data is collected for the record purpose. This has caused a lack of feedback and control in checking the quality of data due to lack of involvement of local fishery managers for doing so. Consequently, the quality – availability, reliability and timeliness – of data compiled at national level is not at the satisfactory level. This eventually leads to insufficient recognition and support to fishery statistics by the policy makers and managers.

As mentioned earlier, during the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: “Fish for the People” in 2001, ‘strengthening of national fishery statistical systems and maximizing their use for fisheries planning and management’ has been identified as the priority goals; and this was reflected in the Resolution and Plan of Action adopted at the Conference. These are Resolutions 3, 4 and 7, the Plan of Action A9, A10 and A11 as well as relevant conclusions and recommendations endorsed by the Conference, which highlighted important issues in the improvement of fishery statistics.

“Acknowledge the need for enhanced human resource capabilities at all levels and encourage greater involvement by stakeholders to facilitate consensus and compliance in achieving sustainable fisheries (Conference Resolution No. 3)”.

“Mobilize regional technical cooperation to reduce disparities and promote solidarity among ASEAN Member Countries (Conference Resolution No. 4)”.

“Strengthen national fishery statistical systems and maximize their use for fisheries planning and management and develop standard definitions and classifications to facilitate regional fishery statistics and information exchanges (Conference Resolution No. 7)”.

“Coordinate and decentralize the collection and use of fisheries related statistical data between the national fisheries and other authorities including those responsible for food security, trade, vessel registration, aquaculture and rural development (Conference Plan of Action No. 9)”.

“Maximize the use of national fisheries statistical systems by focusing on clear objectives and timely results directly related to fishery management decision-making and planning processes (Conference Plan of Action No. 10)”.

“Apply, where appropriate, regionally standardized definitions and classifications for statistical data to facilitate regional compilation, analysis and data exchange (Plan of Action No. 11)”.

2.3. The Special 5-year Program on Sustainable Fisheries for Food Security in the New Millennium “Improvement of Fishery Statistical Systems and Mechanisms”

To assist the ASEAN Member Countries in the implementation of the Resolution and Plan of Action, SEAFDEC in close collaboration with the Member Countries has developed a 5-year

follow-up program on Contribution of Fisheries to Food Security in the ASEAN Region (2002-2005), which aims at supporting the ASEAN Member Countries to implement the RES&POA and regional guidelines for responsible fisheries, composes of projects on various issues related to fishery development and management. Considered as a priority issue in achieving sustainable fisheries, fishery statistics was highlighted and incorporated as an integral part of the follow-up program to ensure sustainable development of fisheries and food security in the ASEAN region. As an important element, the project entitled “Improvement of Fishery Statistical Systems and Mechanisms” was initiated under the Special 5-year program.

This project aims primarily at improving the national fishery statistical systems of the ASEAN Member Countries. The project focuses on the development of regional references for human resource development on fishery statistics at all levels, which could be promoted through mobilizing relevant expertise and experience existent within and outside the Region. In addition, the project also targets at promoting a fishery statistical system using harmonized definitions and terminology, as well as statistical classification, to facilitate compilation of fishery statistics both at regional and global level. The project comprises 2 sub-projects, Sub-project I - *Capacity Building for the Improvement of Fishery Statistical System in the ASEAN Region*, and Sub-project II - *Improvement of Fishery Statistical Systems and Mechanisms*. This project was developed based upon policy directives that *improving of understanding/knowledge of fisheries and aquaculture through harmonization of standards and capacity building, better presentation of statistics and information for various user groups taking into consideration of reduction of disparity among countries* as stipulated in the Resolution 4 and 7, the Plan of Action A9, A10

and A11 as well as relevant conclusions and recommendations endorsed by the Conference, which highlighted important issues in the improvement of fishery statistics.

III. Experience and lessons learned in Southeast Asia in improving data and information for fisheries

Through a series of initiatives, project activities and regional/national consultations on fishery statistics and related information to support planning and management of fisheries of the Member Countries in Southeast Asian Region, experience and lessons learned in improving data and information for fisheries could be summarized as follows:

a. In-country coordination and regional cooperation to identify sources of data and information

Within fisheries sector, there exists a separate fishery statistics system in a country. Fishery statistical works are carried out various agencies. In addition, there are fishery statistical activities taken by projects, programs and initiatives in the sector. However, many reasons such as unclear identification of roles, objectives and modalities and target users of statistical works, lack of cooperation among agencies concerned in the development of indicators, lack of a firm legal framework for fishery statistics, and limited resources, etc., have resulted in low efficiency of fishery statistics, limited usage of statistics, and declining support to fishery statistics. Under several activities implemented, it was able to enhance in country coordination and regional cooperation to identify sources of data and information. Considering the various initiatives on collection of data and information on fisheries,

coordination among routine and non-routine data collection is considered important strategy to improve fishery statistics recognizing the existing system situation.

b. Mechanisms for sharing and maximizing utilization of existing available data and information as well as indicators for planning and management

In line with enhancing in country coordination and regional cooperation to identify sources of data and information based on experience in some countries in the region to promoting sustainable system for national fishery statistics and information, it was recommended to establish a national taskforce for fishery statistics from different groups of producers and users of statistics. The taskforce could be the mechanisms for sharing and maximizing utilization of existing available data and information as well as indicators for planning and management. This is meant to clarify a unified system for fishery statistics of the country and ensure sustainable coordination among agencies concerned to define objectives, definitions, standards, and methodologies; determine an institutional framework for fishery statistics with clear function of each organization at the national and local levels as well as the ways of collaboration with each other; determine real data needs (users' needs), modalities of data collection involving stakeholders, efficient data processing and dissemination methods using IT which ensure information will be available and useful to interested public; review existing data and lessons learned from research initiatives for further development of national fishery statistics; and advocate and communicate with government on the issues of funding and legal framework for statistics.

c. Capacity building both in terms of institutional and human aspects for data collection, processing, analysis and presentation to ensure their quality and timeliness in user-friendly fashion

With the aim to strengthen capacity for improving fishery statistical systems in the ASEAN region, capacity building both in terms of institutional and human aspects for data collection, processing, analysis and presentation to ensure their quality and timeliness in user-friendly fashion for the improvement of national fishery statistical systems was conducted within the region through mobilization of existing regional experience and expertise.

Under the project implementation, the Standard Training Package on Fishery Statistics and the Regional Handbook on Collecting Fishery Statistics for Inland and Coastal Fisheries were developed, and had been used during the on-site training in the Member Countries. These two documents were finalized and will be used in future activities to promote capacity building for the improvement of the fishery statistical system in the ASEAN-SEAFDEC Member Countries.

In addition through the implementation of capacity building activities, needs and directions for improvement of fishery statistics in response to the country's fisheries situation and existing capacity, issues/problem areas as well as directions/approaches to strengthening the improvement of fishery statistics system were identified in the Member Countries. Moreover, lessons learned from the project activities, the project was able to identify future directions and ways to enhance capacity building in the ASEAN Countries in the better way.

d. Standardization/harmonization of statistical standards and classification

With the view to improve compilation and production of the Fishery Statistical Bulletin for the South China Sea Area implemented by SEAFDEC in terms of area coverage of the ASEAN region, scope and framework, statistical format, timeliness of statistics, and harmonization with FAO fishery statistics, the SEAFDEC Council and the ASEAN Sectoral Working Group on Fisheries (ASWGFi) approved the proposal on new geographical coverage of SEAFDEC Fishery Statistical Bulletin as the “Fishery Statistical Bulletin of Southeast Asia” in 2004. The areas of improvement focused on geographical coverage of all ASEAN Member Countries and revised framework as well as classifications and definitions of fishery statistics to be consistent with international standard.

Directions and considerations of the establishment of the new Bulletin emphasized on clear objectives and reflect requirements for fishery statistics at regional level that will be included in the new framework. To improve future production of the new Fishery Statistical Bulletin in terms of statistical format, timeliness of statistics, area coverage of the ASEAN region, and harmonization with FAO fishery statistics, in 2006 the scope and framework of the new Regional Fishery Statistical Bulletin of Southeast Asia will be finalized and the new Bulletin will be published annually by SEAFDEC for fishery statistics of 2005. In addition, streamlining process of the reporting of fishery statistics by the Member Countries to both FAO and SEAFDEC will be simplified and harmonized.

Harmonizing standard definitions and classifications reflecting the multi-species/gear tropical fisheries nature to facilitate sharing of fishery statistics and information in the region as well as to contribute them to similar development at the global level, Improvement of framework, standard definitions and classification of fishery statistics in the Fishery Statistical Bulletin for Southeast Asia could very well support this activity.

e. Regional initiatives and partnerships to facilitate sharing of expertise, data and information

Regional initiatives and partnerships to facilitate sharing of expertise, data and information could be achieved through:

1) Elaborated Guidelines on Fishery Statistics for Overall Improvement of Management Practices

Within the scope of fisheries management in the Code of Conduct for Responsible Fisheries, the importance of quality statistics and information was stressed as a tool to facilitate development planning and management of fisheries. However, due to a large number of issues covered in the regional guidelines for responsible fisheries management in Southeast Asia, the guidelines that address the issue related to fishery statistics were still broad and needed more elaboration. In view of improvement of fishery statistical systems and mechanism, the project implemented has further raised issues to fill the gap of the current Guidelines and actual implementation to facilitate the countries in the region to clarify a clear direction for actions to improve fishery statistics.

The Regional Guidelines for Fisheries Statistics in Southeast Asia was finalized in early 2006 to substantiate issues related to fishery statistics as included in the regional guidelines for responsible fisheries management. The regional guidelines for fishery statistics are envisaged to provide an important framework for formulation of ASEAN-SEAFDEC collaborative programs on fishery statistics and information as well as for supporting cooperation among the countries in Southeast Asia and international/regional organizations.

With the view to further improve fishery statistics in the ASEAN region, disseminating this Regional Guidelines to agencies concerned of countries in the region and raising awareness on the role of fishery statistics in planning and management of fisheries to high-level authorities to ensure their understanding and support to fishery statistics is the priority area to be enhanced.

2) Improve Regional Networking on Fishery Statistics

The proposed establishment of the ASEAN Network of Fishery Statistics was endorsed by the Council of SEAFDEC and the ASEAN Sectoral Working Group on Fisheries (ASWGFi) in 2005. The Network will be mobilized as a collaborative working mechanism among the Member Countries, SEAFDEC, FAO, ASEAN Secretariat as well as other organizations concerned so as to enhance cooperation in the development and improvement of fishery statistics and information in the region. Their role and responsibility include supporting compilation of regional and international fishery statistics as well as involve in providing technical inputs to initiatives/program/ project/activities on fishery statistics and information. These will contributed to better collection and utilization of data and information for fisheries over the recent years

IV. Future Challenges

Knowledge of the status and trends of fisheries, not only in terms of fishery resources but socio-economic aspects, is a key to sound policy-making and responsible fisheries management. Information on the status and trends of fisheries, obtained through routine data collection (fishery statistics) and non-routine data collection (research), is therefore essential for assessing the validity of fisheries policy and for tracking the performance of fisheries management.

Experiences in the region show that the multi-species and multi-gear composition of most fisheries makes assessment of the resources difficult. Best scientific evidence available should be used in the evaluation of the status and trend of fisheries, which should not be limited to fishery statistics, but also should comprise other available data, information and potential indicators. Fishery statistics can provide basic data to support indicators. This linkage should be made explicit to maximize the use of fishery statistics and their support to management of fisheries.

Fishery statistics should not be developed in an isolated manner but rather be part of a broader fishery data and information system, which is supported by fishery statistics through registration, records, reporting, census and surveys on one hand, and ad-hoc/specific data and information collection including the use of indicators on the other. The fishery data and information system should be developed through consultation with wider stakeholders including policy makers and researchers in order to meet the requirements of national planning and sound management, as well as the need to strengthen linkage and coordination of the stakeholders in the collection of routine and non-routine data.

By using the fishery data and information as a basis, simple fisheries indicators can be considered to be used as a ready tool for describing the state of fishery resource and fishery activities and for assessing trends regarding sustainable development objectives. Furthermore, the fisheries indicators open the possibility to enhance accountability as well as to assure the communication, transparency and effectiveness in fisheries management.

Through the outcomes and achievement based initiatives and activities implemented in the region, there are still rooms for improvement in the manner data and information is collected and utilized. These imply the near future challenges that need to be addressed and better tackled as follows:

a. High-level policy recognition on the importance of and required support for better data and information for planning and management

Awareness building on importance and usage of fishery statistics as a tool to support policy-makers and contribution of fishery statistics for the national planning and fisheries management requirements is equally important that need to be promoted at the national level. For policy and planning level, review of the national fishery statistical system can by itself is a capacity building to raise awareness on the importance, usage and areas of improvement of fishery statistics. It covers provision of common understanding on fishery statistics and its system to the officials at national and local levels. This will eventually obtain support for better data and information for planning and management.

b. The sectoral approach proves to provide little progress towards sustainable resource utilization and thus data and information is needed for integrated planning and development of multiple water resource use

The sectoral approach in management of water resource use implemented in the country for fishery and others proves to provide little progress towards sustainable resource utilization. Data and information resulted from sectoral approach is needed for integrated planning and development of multiple water resource use.

c. Collaboration and networking among agencies concerned in aquatic resource utilization and management need to be intensified

Collaboration and networking among agencies concerned in aquatic resource utilization and management explores sharing mechanism for expertise, data and information as well as collaboration towards issues of common concern so as to improve quality of fishery statistics and information. Coordination mechanism within the fishery agencies at various levels as well as inter-agency coordination mechanism among agencies concerned to identify sources of fishery statistical data and information as well as mechanism for data and information sharing need to be developed.

d. Involvement and cooperation with stakeholders under co-management approach

Possible use of co-management approach for management of fisheries with emphasis on its role

to support data and information collection should be developed to facilitate collection of reliable and quality data and information for planning and management. Close coordination and cooperation among stakeholders, including suppliers, producers and users of fishery statistics, should be enhanced through consultation as a process to ensure the availability and effective use of statistical data and information for the sustainable management of fisheries. In this connection, the stakeholders analysis could help identify the strengths and weaknesses of the major data producers and the expectations of the users of fishery statistics. Wider involvement of government agencies and industry is essential for the improvement of fishery statistics in response to the increasing demand for fishery information. The co-management approach was recognized as a strategy that could facilitate the improvement of data and information collection as well as management of small-scale coastal fisheries.

e. Usage of information for data and information collection, integration and sharing, and institutional and human capacity building

Application of Information Technology (IT) in fishery statistics as well as data and information activities aimed at improving efficiency of exploring and utilizing statistics, data and information for management and planning of the sector. The use of information technology should be developed to support data and information collection, processing, analysis, presentation, dissemination, integration and sharing, institutional and human capacity building, as well as data exchange. Development of database and application system at the national level as well as review and development of common regional database and application system should be made.

Use of IT will not only result in error reduction from data processing and analysis but also help to disseminate the results faster to wider audience.

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