

FISH for the PEOPLE

A Special Publication for the Promotion of Sustainable Fisheries for Food Security in the ASEAN Region

Volume 11 Number 2: 2013

Bangkok, Thailand, ISSN: 1685-6546



Socio-economic valuation of small-scale fisheries: Southeast Asian perspective



Southeast Asian Fisheries Development Center

Advisory Board

Chumnarn Pongsri, Secretary-General
Hajime Kawamura, Deputy Secretary-General
Magnus Torell, Senior Advisor
Nualanong Tongdee, Information Program Coordinator, *a.i.*
Somboon Siriraksophon, Policy & Program Coordinator

Editorial Team

Editor in Chief

Chumnarn Pongsri

Co-editor in Chief

Hajime Kawamura

Managing Editor

Virgilia T. Sulit, Fishery Technical Officer

Contributing Editors

Yuttana Theparoonrat, SEAFDEC/TD

Yeap Soon Eong, SEAFDEC/MFRD

Mila Castaños/Belen Acosta, SEAFDEC/AQD

Mazalina Ali, SEAFDEC/MFRDMD

Leng Sam Ath, RFPN Member for Cambodia

Hotmaida Purba, RFPN Member for Indonesia

Vankham Keophimphone, RFPN Member for Lao PDR

Imelda Riti Anak Rantty, RFPN Member for Malaysia

Aung Toe, RFPN Member for Myanmar

Ronaldo R. Libunao, RFPN Member for Philippines

Sarayoot Boonkumjad, RFPN Member for Thailand

Tran Van Hao, RFPN Member for Vietnam

Publication Team

Virgilia T. Sulit

Nualanong Tongdee

Notice of Copyrights



FISH for the PEOPLE is a free publication which cannot be sold or traded in any way. This publication may be reproduced, in whole or in part, without written permission from the copyright holder, as long as proper reference is given to the authors and publication. For further information on the publication, consult the homepage hosted on www.seafdec.org or write to:

Editor in Chief (Fish for the People)



SEAFDEC Secretariat
Kasetsart University Campus
P.O. Box 1046, Kasetsart Post Office,
Bangkok 10903, THAILAND
fish@seafdec.org

Copyright©2013 by SEAFDEC

Editorial

Small-scale fisheries have seemingly been the most neglected sub-sector in terms of economic development goals notwithstanding the major and significant contribution of small-scale fisheries not only to the world's total fisheries production but also to the overall efforts of addressing concerns on nutrition and food security. In spite of such circumstances however, most initiatives have pathetically overlooked their implications to the sustainable development of global, regional and national fisheries.

In Southeast Asia, fish which constitutes more than 50% of the people's total animal protein intake is the same fish produced mostly by small-scale fishers operating in the region's coastal marine waters as well as inland water bodies. As reported in the SEAFDEC Fishery Statistical Bulletin of Southeast Asia, out of the region's total fisheries production of 31.5 million metric tons (mt) in 2010, about 17.3 million mt were derived from marine and inland capture fisheries, while 14.2 million mt came from aquaculture. Of the total capture fisheries production, about 14 million mt or 44% of the region's total fisheries production have been delivered by the small-scale fisheries sub-sector.

While putting the region's average consumption of fish at about 27 kg/person/year and the region's total population at 600 million (*e.g.* in 2010), the total fish consumption of the region could be easily about 16.0 million mt annually. Since about 80% of this total is contributed by small-scale fisheries, therefore 13.0 million mt of fish consumed annually in Southeast Asia must have come from small-scale fisheries, demonstrating the significant contribution of small-scale fisheries to the region's food security.

In spite of such a promising scenario, small-scale fishers are still considered the poorest of the poor, and the most disadvantaged and most vulnerable among the socio-economic groups. In order to help the small-scale fishers get out from the vicious cycle of poverty, efforts should be made at regional and global levels to come up with solutions that are more people-oriented. It is true that the ecosystem approach to fisheries could be a solution as it considers the socio-economic as well as environmental aspects in the overall management of fisheries to ensure food security of future generations, but the problem is how to get this message across the small-scale fisheries sub-sector that embraces the least privileged in society with the



Production of this publication is supported by the Japanese Trust Fund.

C O N T E N T S

most inadequate educational preparations. Nevertheless, the plight of small-scale fishers in Southeast Asia should never be overlooked and should not remain unattended, if they are to continue delivering the amount of fish that could nail the gap between fish supply and demand.

The right time therefore, to put more focus on the socio-economic development of small-scale fisheries in Southeast Asia, is now! Although considerable attention is now being given to this sub-sector at the global level, *e.g.* the vision developed by FAO for achieving sustainable development of small-scale fisheries, it is also necessary that a parallel insight be unfolded for the Southeast Asian region. In fact, in an effort to achieve its vision, FAO during the 29th Session of the Committee on Fisheries (COFI) in 2011, agreed to develop the international guidelines on small-scale fisheries that would bring together responsible small-scale fisheries and social development in coastal and inland fishing communities. Being complementary to the global Code of Conduct for Responsible Fisheries, the Guidelines could lead national and international efforts in securing the sustainable development of small-scale fisheries and in recognizing the important role that small-scale fisheries play in the overall efforts of eradicating hunger and poverty.

While the final draft of the said guidelines were considered during the Technical Consultation on International Guidelines for Securing Sustainable Small-scale Fisheries convened by FAO in May 2013, SEAFDEC and its Member Countries remain hopeful that the final Guidelines would spell out the need to promote increased awareness and enhanced consideration of the socio-economic conditions as well as the social and economic development needs of the small-scale fisheries sub-sector. Nonetheless, once the Guidelines are adopted by FAO member states, SEAFDEC will consider promoting the implementation of the said Guidelines in the Southeast Asian countries possibly after a process of regionalization. In the course of implementation, SEAFDEC anticipates that the regionalized Guidelines could provide the opportunity for the region's small-scale fishers to find a way out from the quagmire of extreme poverty. More importantly, SEAFDEC also desires to make use of the regionalized Guidelines in crafting the course of action to assess the socio-economic value of small-scale fisheries in Southeast Asia for sustainable development and management.

Special Feature

- Revealing the Socio-economic Features of Small-scale Fisheries in Southeast Asia 2

Regional Initiative

- Improving Fisheries and Habitat Management, Climate Change Adaptation and Social Well-being in Southeast Asia: the SEAFDEC-Sida Project in Focus 16

Country Reports

- Relevant International and Regional Instruments for Sustainable Development of Small-scale Marine Fisheries: Significance to Cambodia 24
- Managing Overcapacity of Small-scale Fisheries in Vietnam 32

Special Report

- Reducing Rural Poverty and Improving Lives through Sustainable Aquaculture: AQD's 40-year Saga of Mustering Strength and Expertise for Technology Development 42

Calendar of Events

48

is a special publication produced by the Southeast Asian Fisheries Development Center (SEAFDEC) to promote sustainable fisheries for food security in the ASEAN region.

The contents of this publication does not necessarily reflect the views or policies of SEAFDEC or the editors, nor are they an official record. The designations employed and the presentation do not imply the expression of opinion whatsoever on the part of SEAFDEC concerning the legal status of any country, territory, city, or area of its authorities, or concerning the legal status of fisheries, marine and aquatic resource uses and the delimitation of boundaries.

Revealing the Socio-economic Features of Small-scale Fisheries in Southeast Asia

Sumitra Ruangshivakul, Jariya Sornkliang and Thanyalak Suasi

Millions of people around the world are directly engaged in small-scale fisheries, and many millions more are working part- or full-time in up- and down-stream fishing industries. Despite the various aquatic species caught, the different types of fishing vessels and methods used, and an array of management approaches adopted all over the world, resource utilization, impacts, and policy implications are almost the same. Generally, small-scale fishing is known to be a last recourse and is largely left to disadvantaged communities and the poor as their main source of employment and income. As a result, a large number of the poor are into small-scale fisheries, exploiting a large volume of low-value aquatic species mainly for subsistence. Small-scale fishers endlessly struggle to make their ends meet in the midst of the progressively degrading fisheries resources, using outdated gears and outmoded methods, notwithstanding the absence of public facilities. They also have to constantly deal with superior commercial fishing fleets that encroach and damage their inshore fishing grounds. When fishing becomes unproductive, small-scale fishers are forced to seek other alternative jobs as their ultimate means of livelihood even with inadequate relevant skills.

The Southeast Asian region embraces ten countries, namely: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, and is bordered by the Andaman Sea and the Indian Ocean on the west, and its eastern border is adjacent to the Pacific Ocean. Fisheries of the region are tropical, multi-species and multi-gear with a great majority of fishers traditionally operate at small-scale level to exploit the natural fisheries resources in whatever means available to them. For such reason, a logical definition of small-scale fisheries for the Southeast Asian region has been difficult to craft. In the absence of an actual definition, SEAFDEC (2000) featured the basic characteristics of the region's small-scale fisheries and the zones exploited by small-scale fishers, while the characteristics of the region's small-scale fisheries were compared with those of commercial fisheries (SEAFDEC, 2003), as means of visualizing the absolute situation of small-scale fisheries in Southeast Asia. Moreover, in order to validate the status of the region's small-scale fisheries, SEAFDEC conducted a socio-economic survey in 2011-2012 in seven (7) of the ten Southeast Asian countries.

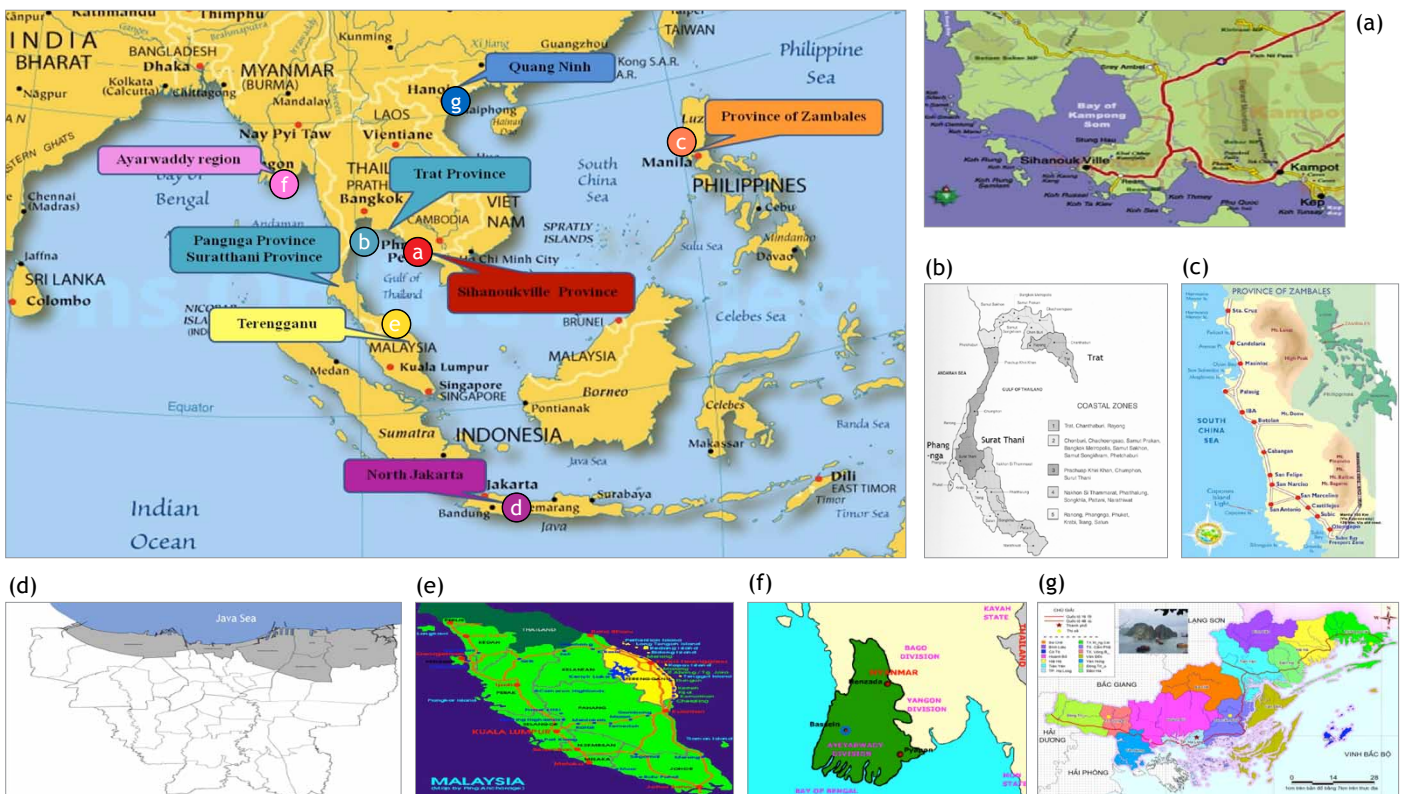


Fig. 1. Approximate locations of the survey's sample sites in: (a) Cambodia; (b) Thailand; (c) Philippines; (d) Indonesia; (e) Malaysia; (f) Myanmar; and (g) Vietnam

Table 1. Number of samples for the socio-economic survey of coastal small-scale fisheries in Southeast Asia

Country	Province	District/ Sub-District	Municipal/ Village	No. of samples
Cambodia	Sihanouk ville	Pre Nup Pre Nup II	Chumpou Khmoa Be Krang Chrolong Prey Pross	50
Indonesia	North of Jakarta	Kalibaru	Kelompok Nelayan Punching KUB Kelompok Raja Baca Kelompok Nelayan Lentera Bahari	55
Malaysia	Kuala Terengganu	Marang	Kuala Marang Jambu Bangkok Gong Bali Merchang	54
Myanmar	Ayarwaddy region	Phar Phone	Oauk Kuyin Kala Htike Kan Chaung	50
Philippines	Zambales		Santa Cruz Municipality Candelaria Municipality Masinloc Municipality Botolan Municipality Subic Municipality	49
Thailand	Trad Surat Thani Phang-nga	Mai Root Paknam Thakachai Klong Kien	5 villages of Mai Root 5 villages of Paknam Thakachai 4 villages of Klong Kien	152
Vietnam	Quang Ninh	Van Don	Ha Long village No. 1 Ha Long village No. 2 Ha Long village No. 8 Ha Long village No. 9	52
Total number of samples				462

Socio-economic Survey of Small-scale Fisheries in Southeast Asia

With financial support from the Japanese Trust Fund through the project on *Promotion of Right-based Fisheries and Co-management towards Institutional Building and Participatory Mechanism for Coastal Fisheries Management*, the socio-economic survey was carried out in 2011-2012 in Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. Specifically, the survey

sites were located in areas known to host extensive small-scale fisheries operations as identified by the countries' respective national fisheries authorities (SEAFDEC/TD, 2012). The locations and sample sizes of the survey are indicated in **Fig. 1** and **Table 1**, respectively.

The survey aimed to gather information on three main aspects as indicated in the questionnaire devised for such purpose. These aspects include: General Information in Part I; the Fisheries Sector in Part II, and Part III which covers a number of issues such as the attitude of fishers towards IUU fishing, their participation in enforcement activities, job opportunities available, climate change and adaptation, and safety at sea and energy saving schemes.

Socio-economic Situation of Small-scale Fishers in Southeast Asia

Providing a background of small-scale fisheries in Southeast Asia is the initial information on the number of fishers and fishing boats as well as on fish production which were compiled through secondary sources. A summary of the information is shown in **Table 2**. The results of the survey manifesting the real socio-economic situation of small-scale fishers in the region are discussed in this paper.

Age of small-scale fishers

Across the Southeast Asian region, small-scale fisheries have been dominated by fishers in the 41-60 year-old bracket. However, Cambodia and Indonesia have members of the younger generation joining the fishing industry while Malaysia has the most number of fishers belonging to the older generations (**Table 3, Fig. 2**). Specifically, the youngest small-scale fisher in Cambodia is 18 years old while the oldest is 67 years old, and the average age of small-scale fishers is 37 years old. In Indonesia, the 52% of fishers belonging to the 21-40 year-old bracket implies that a considerable number of the country's younger

Table 2. Number of fishers, vessels and production from small-scale fisheries of Southeast Asia

Country	Number of fishers (x1000)	Number of Vessels (x1000)	Production (x1000 mt)	No of small-scale vessels as percent of total	Small-scale fisheries production as percent of total fisheries production
Indonesia (Priyono, 2003; Purwanto, 2003)	2,088.0	362.0		90.0	
Malaysia (Abu Talib <i>et al.</i> , 2003)	24.2	15.0	335.0	56.0	29.0
Philippines (Barut <i>et al.</i> , 2003; Cruz-Trinidad, 2003)	743.0	500.0	~500.0	99.0	
Thailand (Boonchuwongse and Dechboon, 2003; Janetkitkosol <i>et al.</i> , 2003)	235.0	43.0		79.0	
Vietnam (Son and Thuoc, 2003)	411.0	9.5	709.0	95.0	63.0

Source: Adapted from Stobutzki *et al.* (2006)

Table 3. Age groups of small-scale fishers in Southeast Asia (%)

Age group	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
< 20 years	17.0	12.9	0.0	0.0	0.0	1.0	2.0	5.3
21-40	56.0	51.9	15.1	37.0	30.6	36.0	40.0	38.2
41-60	23.0	35.2	56.6	57.0	67.4	59.0	54.0	49.8
> 60 years	4.0	0.0	28.3	6.0	2.0	4.0	4.0	6.7

Table 4. Educational levels attained by Southeast Asian small-scale fishers (%)

Educational Levels	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
None	35.0	14.5	5.5	-	-	10.3	-	9.3
Primary school	58.0	67.3	51.9	40.5	34.0	71.3	62.5	55.1
Senior high school	7.0	18.2	40.7	59.5	57.5	17.2	37.5	33.9
College	-	-	1.9	-	6.4	0.6	-	1.3
Academic degree	-	-	-	-	2.1	0.6	-	0.4

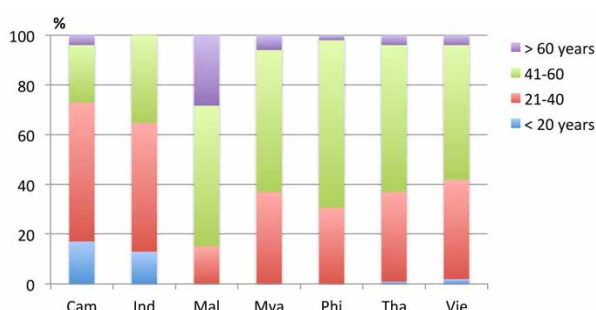


Fig. 2. Age levels of Southeast Asian small-scale fishers

generation has joined the fishing industry. Meanwhile, the high percentage of fishers belonging to the 40-60 year-old bracket, *i.e.* in Malaysia, Myanmar, Philippines, Thailand, and Vietnam, implies that fishers in most countries in the region are already in their late ages.

Educational attainment of small-scale fishers

Literacy rate which could be measured through formal educational attainment is considered a crucial gauge for enhancing human resource capital based on the grounds that literate people can be trained less expensively, and generally having higher socio-economic status and enjoying better health and employment prospects. Literacy rate is also used as yardstick for creating job opportunities and accessing higher education. In the socio-economic dynamism, the educational level of people currently employed in a particular job, such as in small-scale fisheries could be seen as both a consequence and an attribute. Results of the survey indicated that the highest proportion of non-educated workers in small-scale fisheries comes from Cambodia (Table 4), which could be seen as a consequence as this suggests the inability of the incumbents to get other jobs with better pay or to pursue higher education. Fishing is often seen as the occupation of last recourse and in some countries, this is treated as the job for desperate people. In order to prosper in jobs such as in small-scale fisheries,

governments should be aware that education facilitates efficient communication, and one way of enhancing the knowledge of fishers through training programs is by overcoming the shortcomings of illiteracy. Nevertheless, since most small-scale fishers in the Southeast Asian region have attended primary and secondary schools as indicated in Fig. 3, this indicates that the region's small-scale fishers have the capability to undergo training in the future.

While most of the small-scale fishers of the region have received primary education with a few of them having attended the secondary school level, fishers from Cambodia

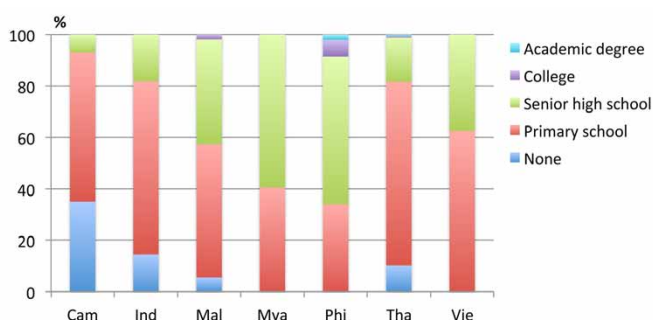


Fig. 3. Educational attainment of Southeast Asian small-scale fishers



In Cambodia, family members including children help in cleaning the swimming crab gill net

have the highest illiteracy rate. In this connection, it is crucial for the governments concerned to devise appropriate communication strategies that would promote maximum comprehension among small-scale fishers during technical information transfer and dissemination.

Occupation of small-scale fishers

Fishing is almost an exclusive job and could be highly rewarding as many job holders have stayed with small-scale fisheries although this could be due to their inability to get better-paying jobs. The former scenario reflects the relatively assumed profitability of fishing which in reality is not always the case. For the latter case, majority of job holders in small-scale fisheries in Cambodia are also working in agriculture (Table 5) which could be associated with their perceptions about the bleak prospects of job security in small-scale fisheries. Nonetheless, most small-scale fishers in the region are dependent on fishing alone for their livelihoods (Fig. 4), and during the survey most small-scale fishers cited that when fishing becomes difficult especially during monsoon seasons and when the sea gets

very rough, they devote more time in other occupations in order to earn some incomes.

Income levels of small-scale fishers

Results of the survey revealed that the monthly income of small-scale fishers in the region is less than USD 150.00 (Table 6). Although many fishers consider this amount sufficient for their daily subsistence, they also cited that very little amount is left for their savings, investments, and payment for depreciation costs of their fishing boats and gear.

As illustrated in Fig. 5, Philippines showed the highest percentage of fishers earning less than USD 150.00 per month followed by Indonesia. This could be due to the high number of fishers (Table 2) sharing the bounties of the sea and the total number of days that they could go fishing considering the frequency of typhoons that occur throughout the year. While the average monthly income of small-scale fishers in the Philippines was USD 138, fishers from Vietnam had the highest average monthly income of

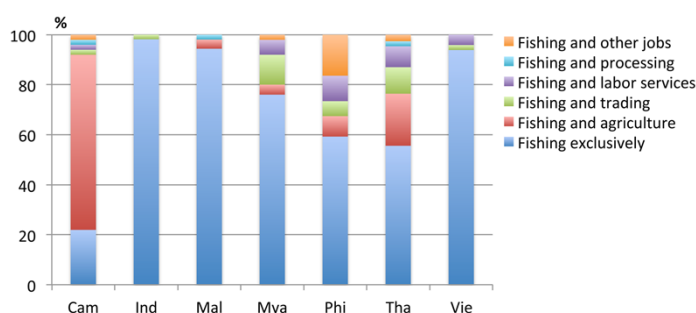


Fig. 4. Dependence of Southeast Asian small-scale fishers in fishing

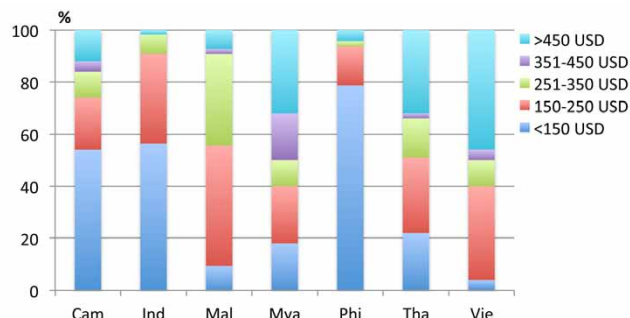


Fig. 5. Income levels of Southeast Asian small-scale fishers

Table 5. Major occupations of Southeast Asian small-scale fishers (%)

Occupation	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Fishing exclusively	22.0	98.2	94.4	76.0	59.2	55.5	93.9	71.3
Fishing and agriculture	70.0	-	3.7	4.0	8.2	20.9	-	15.3
Fishing and trading	2.0	1.8	-	12.0	6.0	10.6	2.0	4.8
Fishing and labor services	2.0	-	-	6.0	10.2	8.4	4.1	4.4
Fishing and processing	2.0	-	1.9	-	-	2.0	-	0.8
Fishing and other jobs (tourism and government services)	2.0	-	-	2.0	16.4	2.6	-	3.4

Table 6. Monthly income earnings of Southeast Asian small-scale fishers (%)

Income	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
<150 USD	54.0	56.4	9.3	18.0	78.7	22.0	4.0	34.2
150-250 USD	20.0	34.5	46.3	22.0	14.9	29.0	36.0	29.1
251-350 USD	10.0	7.3	35.2	10.0	2.1	15.0	10.0	12.8
351-450 USD	4.0	-	1.8	18.0	-	2.0	4.0	4.4
>450 USD	12.0	1.8	7.4	32.0	4.3	32.0	46.0	19.5

Table 7. Monthly expenditures of Southeast Asian small-scale fishers (%)

Expenditures	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
<150 USD	50.0	52.8	40.7	30.0	77.8	21.0	32.0	44.2
150-250 USD	40.0	35.9	38.9	26.0	17.8	35.0	40.0	32.6
251-350 USD	2.0	9.4	20.4	25.0	2.2	27.0	14.0	14.5
351-450 USD	2.0	1.9	-	5.0	2.2	1.0	6.0	2.5
>450 USD	6.0	-	-	14.0	-	16.0	8.0	6.2

Table 8. Loans of Southeast Asian small-scale fishers (%)

Loans	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
No loans	28.0	43.6	83.3	42.0	77.6	32.0	48.0	50.6
With loans	72.0	56.4	16.7	58.0	22.4	68.0	52.0	49.4



In Indonesia, family members including children help in post-harvest processing to earn additional incomes for their families

USD 597, followed by Myanmar at USD 503, and Thailand at USD 446. Results of the survey also indicated that small-scale fishers from Vietnam have the highest average savings (income less expenditures) at USD 296 per month followed by Thailand at USD 167 per fisher per month. Consequently, fishers from Indonesia and the Philippines have the lowest savings at USD 11 and USD 31 per fisher per month, respectively.

Level of expenditures of small-scale fishers

The small-scale fishers' low monthly incomes imply that their expenditures are also low at less than USD 150 (Table 7). While major portions of their incomes are spent mainly on items meant for household consumption as well as on the education of their children, very little amount is left from their earnings for other needs of one's better life.

While small-scale fishers from the Philippines have the lowest average monthly expenditure at USD 107, small-scale fishers from Indonesia spend an average of USD 137 per month (Fig. 6). In Malaysia, the average expenditure is USD 186 per fisher per month since the size of its fisheries households is 5.6 persons, which is higher than in any other countries.

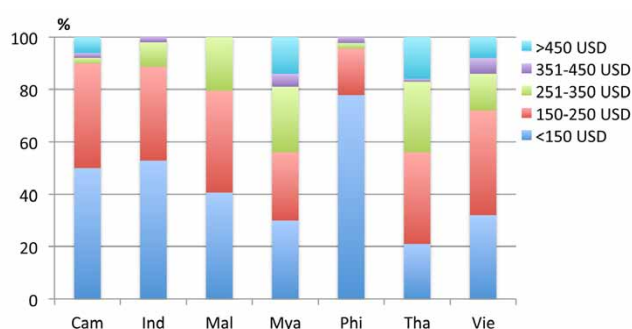


Fig. 6. Average monthly expenditures of Southeast Asian small-scale fishers

Debts and sources of loans of small-scale fishers

Although considered as conflicting paradigms in small-scale fisheries, “indebtedness” and “investment” normally reflect the need to take loans. A general concurrence to the notion that taking loans for good investments is favorable but borrowing money to meet someone's household needs is considered rather unfortunate. Results of the survey indicated that an almost equal number of small-scale fishers from the region are with loans and without loans (Table 8).

While Malaysia had the highest number of fishers without loans followed by the Philippines, Cambodia had the highest number of fishers with loans followed by Thailand (Fig. 7). In the case of Cambodia, loans are being obtained

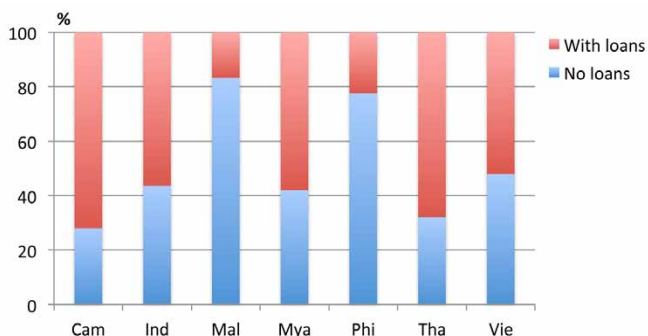


Fig. 7. Status of loans of Southeast Asian small-scale fishers

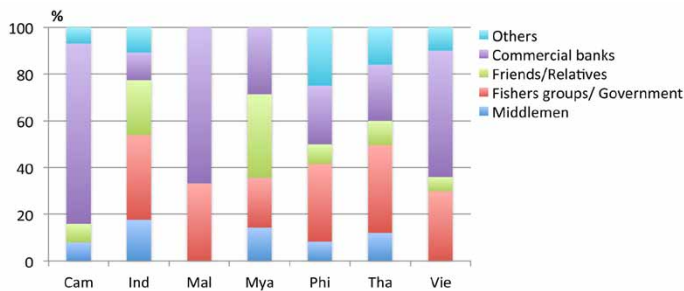


Fig. 8. Major sources of loans of Southeast Asian small-scale fishers

by fishers in order to increase their investments in fishing operations as well as in other economic activities.

The most important sources of loans of the region's small-scale fishers are commercial banks (Table 9, Fig. 8), specifically for Cambodia in view of the absence of micro-credit systems maintained by the government or fishers' groups like those available in other countries such as in Thailand. Although Malaysia had the lowest number of loan-takers, the loans they obtained are used mainly to increase investments in fishing boats and engines, boat repair, and other investments related to their fishing operations.

Fishing proficiency of small-scale fishers

In the absence of other measures or yardsticks to express fishing proficiency, the number of years of experience in fishing in 10-year intervals was used, as shown in Table 10 and Fig. 9. The results showed that fishers from Malaysia were the most experienced followed by those from the Philippines. Although the experience of fishers from Cambodia may be considered as among the lowest, it should be noted that Cambodia had the youngest fishers while Malaysia had the oldest. In some 40 coastal fishing villages of Cambodia, about 1.0 million people are active in fishing and processing.

Malaysia which has the highest fishing proficiency, small-scale fishers preferred to be called "seasoned fishers" for having been fishing for more than 30 years or an average of 30.1 years in fishing, a trend that could have been brought about by the progressive reduction of the number of small-scale fishers. In Indonesia, a little less than one-half of its fishers could be considered experienced for having been in fishing for 21-30 years but a little more than one fourth could still be considered as novices for having entered into fishing in less than 10 years time. This group comprises a considerable number of younger generation fishers who could enhance the country's strong workforce in the future. In the case of Vietnam, the considerably high number of experienced fishers is consistent with the average age of fishers at 43 years old, implying that most of the country's fishers belong to the adult generation. For Cambodia, although most fishers fish the whole year, some change their gears to match the seasonal variations of the fish stocks contributing to their fishing proficiency which is quite low.

Fishing boats used by small-scale fishers

Most fishing boats owned by the region's small-scale fishers are made of wood (Fig. 10), with outboard engine, and are licensed. To date, majority of small-scale fishers continue to

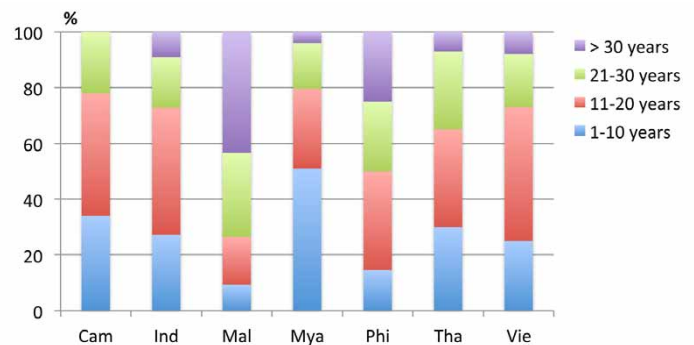


Fig. 9. Experience in fishing of Southeast Asian small-scale fishers

Table 9. Sources of loans of small-scale fishers in Southeast Asia (%)

Sources of loan	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Middlemen	8.0	17.6	0.0	14.3	8.3	12.0	0.0	8.5
Fishers groups/ Government	0.0	36.3	33.3	21.4	33.4	37.5	30.0	27.4
Friends/Relatives	8.0	23.5	0.0	35.7	8.3	10.5	6.0	13.1
Commercial banks	77.0	11.8	66.7	28.6	25.0	24.0	54.0	41.0
Others	7.0	10.8	0.0	0.0	25.0	16.0	10.0	10.0

Table 10. Fishing proficiency of Southeast Asian small-scale fishers (%)

Fishing proficiency	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
1-10 years	34.0	27.3	9.4	51.0	14.6	30.0	25.0	28.3
11-20 years	44.0	45.4	17.0	28.6	35.4	35.0	48.0	36.2
21-30 years	22.0	18.2	30.2	16.4	25.0	28.0	19.0	21.7
> 30 years	0.0	9.1	43.4	4.0	25.0	7.0	8.0	13.8

use wooden boats, except those in Malaysia where almost all small-scale fishing boats have been changed to fiberglass reinforced plastic (FRP) boats. Meanwhile, Cambodia had the highest number of fishers without boats with a small number also found in the Philippines (Table 11).

Approximately one-third of small-scale fishers in Philippines, Cambodia and Myanmar used non-motorized boats for their fishing operations. In Malaysia, although almost all fishing boats were motorized, about 13% of the respondents disclosed that their boats are not licensed although all its boats are registered. This is quite disturbing because Malaysia is the only country in Southeast Asia where boat registration and licensing are undertaken by one single agency, unlike in other countries where boat registration is done by their respective marine transportation agencies while licensing is the responsibility of fisheries agencies. In Vietnam, almost all boats are wooden but are propelled by outboard engines, measuring 11 m long and registered but most are not licensed. Licensing of small-scale fishing boats is not yet common in Cambodia while almost all small-scale fishing boats in Indonesia and Myanmar are licensed.

Fishing gear employed by small-scale fishers

The types and distribution of various fishing gears among small-scale fishers could be taken as a sign of progress in fishing gear development, or to certain extent paucity

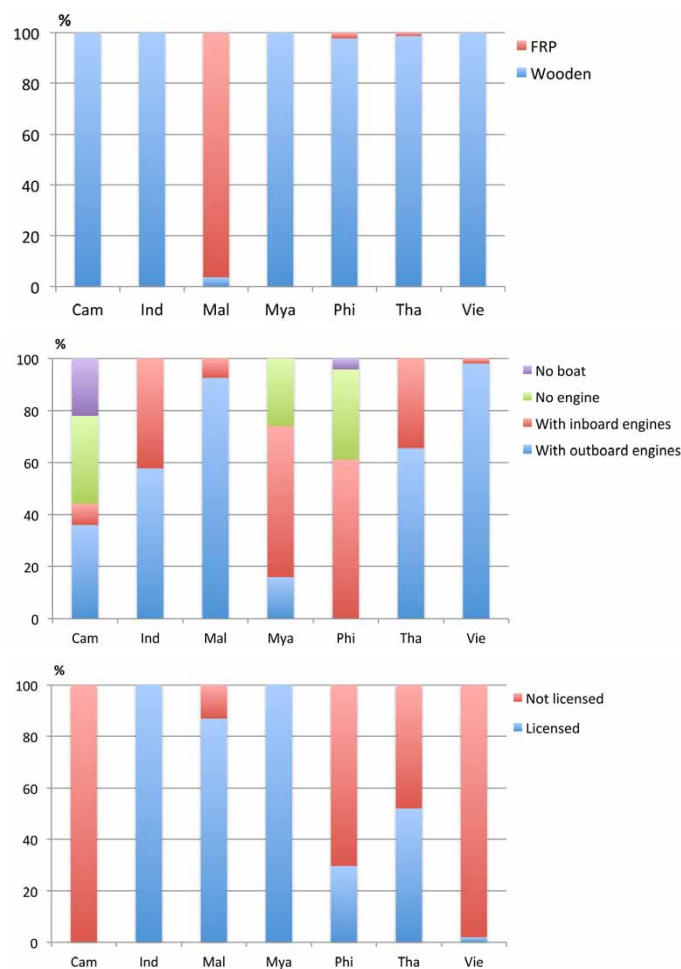


Fig. 10. Types of small-scale fishing boats in Southeast Asia

Table 11. Boats used by Southeast Asian small-scale fishers (%)

Types of fishing boats	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Wooden	100.0	100.0	3.7	100.0	97.7	98.7	100.0	85.6
FRP	0.0	0.0	96.3	0.0	2.3	1.3	0.0	14.4
With outboard engines	36.0	57.7	92.6	16.0	0.0	65.5	98.0	52.3
With inboard engines	8.0	42.3	7.4	58.0	61.2	34.5	2.0	30.6
No engine	34.0	0.0	0.0	26.0	34.7	0.0	0.0	13.5
No boat	22.0	0.0	0.0	0.0	4.1	0.0	0.0	3.6
Licensed	0.0	100.0	87.0	100.0	29.7	52.0	2.0	54.4
Not licensed	100.0	0.0	13.0	0.0	70.3	48.0	98.0	45.6

Table 12. Major fishing gears employed by Southeast Asian small-scale fishers (%)

Major fishing gear used	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Gill net	27.0	54.8	64.6	70.0	44.3	61.0	70.0	55.8
Hook & Line	5.0	45.2	29.2	24.0	42.6	1.5	11.0	22.7
Traps (fish and crab)	29.0	0.0	6.2	0.0	3.3	32.0	4.0	10.6
Collection by hand	15.0	0.0	0.0	0.0	0.0	0.0	1.0	2.3
Cast net	2.0	0.0	0.0	3.0	0.0	5.0	3.0	2.0
Others	22.0	0.0	0.0	3.0	9.8	0.5	11.0	6.6

Table 13. Major problems encountered by Southeast Asian small-scale fishers (%)

Major problems	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Degrading fisheries resources	12.0	4.0	16.0	48.6	18.4	28.0	17.0	20.7
High cost of fuel	0.0	13.0	2.0	0.0	7.9	9.6	10.0	6.1
Climate change	38.0	33.0	54.0	51.4	27.6	9.0	23.0	33.6
Low price of fisheries products	0.0	0.0	0.0	0.0	5.3	6.8	0.0	1.7
Illegal fishing	25.0	32.0	28.0	0.0	28.9	42.4	43.0	28.5
Others	25.0	18.0	0.0	0.0	11.9	4.2	7.0	9.4

Table 14. Information relevant to the needs of Southeast Asian small-scale fishers (%)

Important Needs	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Micro-credit	37.0	8.0	5.6	86.2	30.0	11.2	50.0	32.6
Subsidies from governments	30.0	85.0	86.0	13.8	41.7	63.7	31.0	50.2
Installation artificial reefs	0.0	0.0	5.6	0.0	0.0	4.7	15.0	3.6
Strengthening of enforcement units	0.0	0.0	2.8	0.0	6.7	17.4	0.0	3.8
Others	33.0	7.0	0.0	0.0	21.6	3.0	4.0	9.8

to accept and adapt advances in fishing technology at the grassroots level. Results of the survey indicated that a considerable portion of small-scale fishers in Cambodia still uses their hands to catch fish (Table 12). In addition, most of the country's fishers still consider fishing season and conditions of the sea as the most important factors that determine their fishing frequency and the type of gear to be used.

Fish and crab gill net are the most popular fishing gears used although most of the fishers are multiple-gear users. While gill net is very prominent in Myanmar, Vietnam, Malaysia, Thailand, and Indonesia, the use of stationary gears such as traps is quite noticeable in Thailand and Cambodia (Fig. 11). For small-scale fishers, different fishing gears are used for certain target species and for certain seasons in specific times of the year. Operations cost is also an important factor especially in Indonesia where hand-line fishing costs as much as USD 257 while the gill netting costs about USD 7-15.

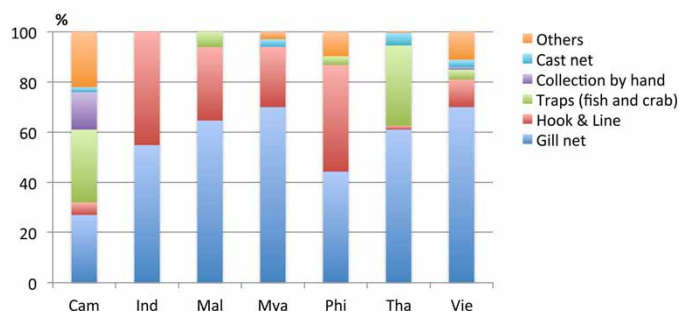


Fig. 11. Fishing gears used by small-scale fishers of Southeast Asia

Major problems encountered by small-scale fishers

The main constraints of the region's small-scale fishers are mostly related to social, economic and human rights aspects which according to fishers, have led them to poverty and resulted in their vulnerability. Respondent-fishers cited that the most serious problems include the impacts of climate change (strong winds, high waves, siltation of major waterways), and illegal fishing (Table 13 and Fig. 12). Another major concern raised was on the continuing conflict among fishers as results of the progressively dwindling fisheries resources that adds to increased fishing pressure.

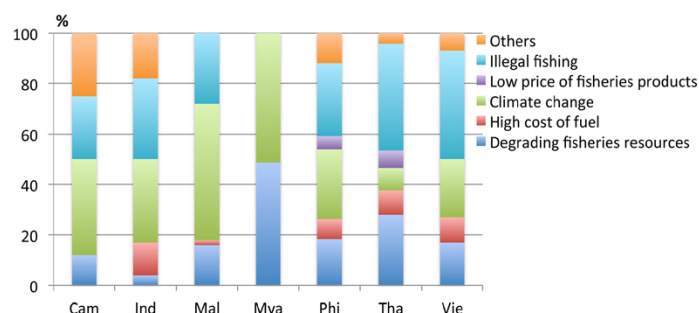


Fig. 12. Major concerns of small-scale fishers in Southeast Asia

In addition, limited access to credit for the maintenance of their fishing boats, gears and other equipment was also mentioned by the respondent-fishers, thus, assistance from the government in terms of establishing savings groups or micro-credit schemes was requested. Moreover, encroachment by trawlers to the inshore fishing grounds, and meager and unpredictable income from fishing was also among the concerns raised. In this connection, installation

of artificial reefs was suggested to keep trawlers away from inshore fishing grounds, and that governments should consider the promotion of more efficient boats and gears. Some fishers also considered dynamite fishing and fish trapping in coral reefs as among their major concerns. In this regard, Malaysia's exit-plan and buy-back programs could be considered as an example for addressing fishing capacity and conservation of fisheries resources (Shaupi *et al.*, 2011).

Important needs of small-scale fishers

Most small-scale fishers suggested that subsidies could help them get through, especially for their fishing gear and fuel requirements. In addition, natural resources should be restored through installations of more artificial reefs, and replanting of mangroves to enhance the fishing habitats (Table 14 and Fig. 13). Some fishers are also willing to diversify into other livelihoods such as in aquaculture perceiving it as an option that could offer them opportunities to improve their incomes.

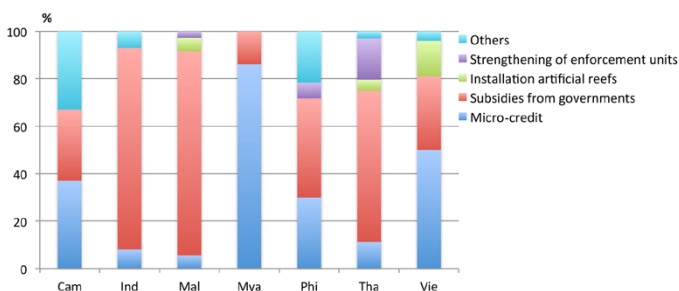


Fig. 13. Urgent needs of small-scale fishers in Southeast Asia



Small fishing boats in Indonesia

Awareness of small-scale fishers with regards to IUU fishing

Small-scale fishers in the region are not very much aware of the need to mitigate illegal, unreported and unregulated (IUU) fishing (Table 15 and Fig. 14). However, they acknowledged knowing some general concepts, e.g. illegal fishing and fisheries laws, while also being aware of the need to adopt certain fisheries management measures enforced under their respective fisheries laws and associated regulations, such as prohibition of fishing of undersize fish/shellfish, use of small mesh size nets and other irresponsible fishing practices, and banning the practice of dynamite fishing.

While recognizing the significance and impacts of such practices as no fishing during closed season and no operation of destructive fishing gears, some fishers also acknowledged the importance of registration of their fishing boats as this could help in regulating IUU fishing. Nevertheless, many fishers have not yet obtained fishing licenses and have remained unaware of the advantages of using logbooks.

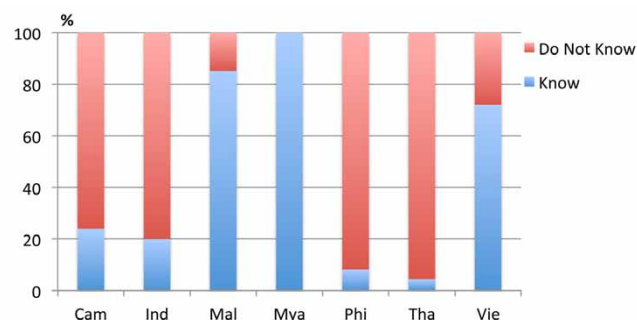


Fig. 14. Level of awareness of Southeast Asian small-scale fishers on IUU fishing

Participation of small-scale fishers in law enforcement

Most small-scale fishers do not participate in fisheries law enforcement (Table 16 and Fig. 15) or assist fisheries law enforcers in carrying out their duties, due to perceived inadequacy of government support. However, a few takes

Table 15. Awareness of Southeast Asian fishers about IUU fishing (%)

IUU Fishing	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Know	24.0	20.0	85.2	100.0	8.2	4.5	72.0	44.8
Do Not Know	76.0	80.0	14.8	0.0	91.8	95.5	28.0	55.2

Table 16. Participation of Southeast Asian small-scale fishers in law enforcement (%)

Participation in Enforcement	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
No	76.0	100.0	100.0	86.0	68.8	86.3	100.0	89.6
Yes	24.0	0.0	0.0	14.0	31.2	13.7	0.0	10.4

Table 17. Perceptions on the need for diversification of small-scale fishers' livelihoods (%)

Need for livelihood diversification	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Necessary	68.0	14.5	5.6	42.0	75.5	20.5	30.0	36.6
Not necessary	32.0	85.5	94.4	58.0	24.5	79.5	70.0	63.4

Table 18. Alternative livelihoods identified by Southeast Asian small-scale fishers for diversification (%)

Alternative livelihoods	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Agriculture	34.0	7.1	37.1	28.6	6.3	13.0	11.0	19.6
Trading	19.0	64.3	14.3	61.9	39.6	18.0	22.0	34.2
Aquaculture	16.0	0.0	11.4	0.0	10.4	30.0	50.0	16.8
Labor services	7.0	3.6	2.8	4.7	16.6	16.0	0.0	7.2
Handicraft making	0.0	17.9	2.9	0.0	2.1	5.0	0.0	4.0
Others (tourism, processing)	24.0	7.1	31.5	4.8	25.0	18.0	17.0	18.2

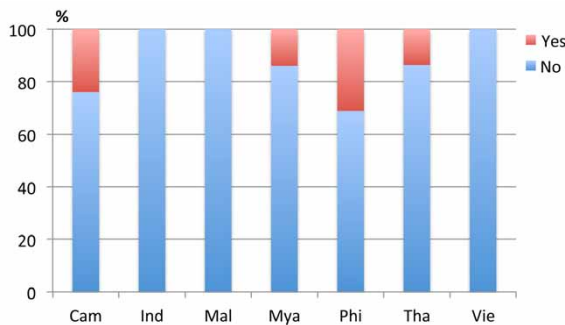


Fig. 15. Level of participation of Southeast Asian small-scale fishers in law enforcement

part in the enforcement by assisting relevant fisheries agencies' officials in patrolling the fishing grounds and in conducting relevant activities carried out by the governments' patrol boats.

Diversification of small-scale fishers' livelihoods

Almost all small-scale fishers indicated that they would continue fishing and do not want to look for other jobs (Table 17 and Fig. 16) owing to their deficiencies in terms of skills, insufficient capital such as land or funds for new investments, inadequate educational background and

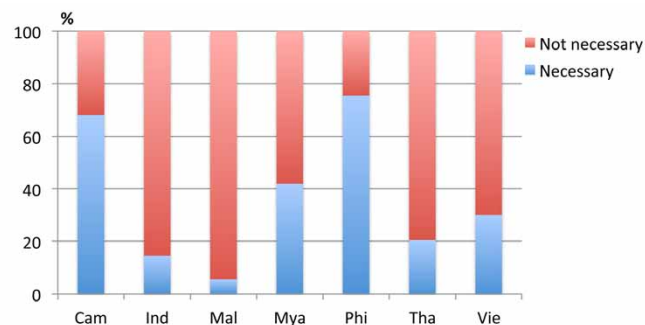


Fig. 16. Perceptions of Southeast Asian small-scale fishers with regards to diversification of livelihoods

training, and lack of pertinent skills necessary for other jobs. They are also not comfortable with changing new lifestyle having been in fishing activities almost all their lives, and have always considered fishing as an easy way to earn money with no limit of time.

Fishers who opted to look for some new jobs preferred to go into trading followed by agriculture and aquaculture (Table 18 and Fig. 17), which seems to imply that fishing can no longer be entirely depended on as main source of income. Their physical conditions also influenced some fishers to

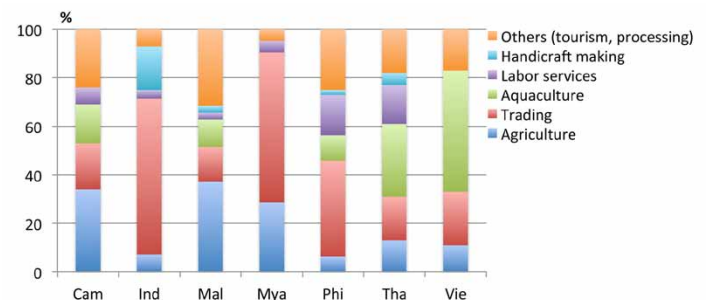


Fig. 17. Possible alternative livelihoods identified by Southeast Asian small-scale fishers for diversification



Small-scale fishing community in Thailand

Table 19. Awareness of small-scale fishers on climate change and adaptation measures (%)

Climate change awareness	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Know	76.0	87.0	100.0	98.0	82.0	98.0	84.0	89.3
Do not know	24.0	13.0	0.0	2.0	18.0	2.0	16.0	10.7

Table 20. Confidence of Southeast Asian small-scale fishers on their safety at sea (%)

Safety at sea	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
No	80.0	78.0	76.0	52.0	47.0	41.0	38.0	59.0
Yes	20.0	22.0	24.0	48.0	53.0	59.0	62.0	41.0

Table 21. Necessity to promote energy saving schemes for small-scale fishers in Southeast Asia (%)

Energy savings	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Thailand	Vietnam	Average
Need	96.0	58.0	33.0	12.0	59.0	38.0	26.0	46.0
No need	4.0	42.0	67.0	88.0	41.0	62.0	74.0	54.0

decide in diversifying into other livelihoods considering old age and unstable physique. Nevertheless, those who opted to find new jobs also recognized their apparent inadequacies in terms of knowledge and skills that made them less confident to work in other jobs, and cited that

prospects in fisheries are no longer bright as before owing to the dwindling fisheries resources.

Views of small-scale fishers on climate change and adaptation measures

Most of fishers know and understand the impacts of climate change in fisheries, although many are not aware of the adaptation measures (Table 19 and Fig. 18). Specifically, they are well aware of the changes in climatic conditions that bring about more severe winds and precipitations, rising air and water temperatures, inconsistent seasonal changes of fish stocks, more violent storms, among others. Many fishers attribute such climate changes to natural causes and thus will just have to adapt to such changes. However, other fishers cited that since changes in the climate are results of anthropogenic actions, therefore there is a need for governments to develop mitigation measures.



In Myanmar: Women mending nets (above) and small-scale fishers prepare to go fishing (below)

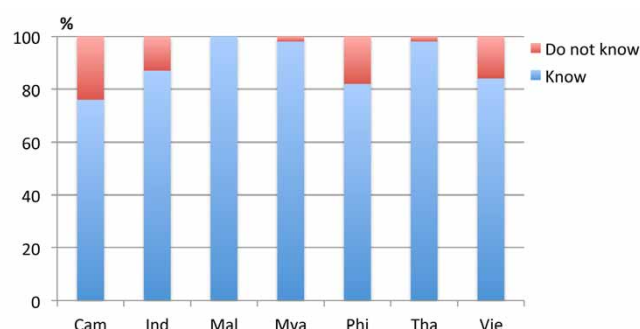


Fig. 18. Knowledge of Southeast Asian small-scale fishers on climate change

Awareness of small-scale fishers on the implications and concepts of safety at sea

Recommendations on safety at sea for small fishing boats in Southeast Asia raised by the ASEAN Technical Officers during the December 2003 Workshop in Bangkok,

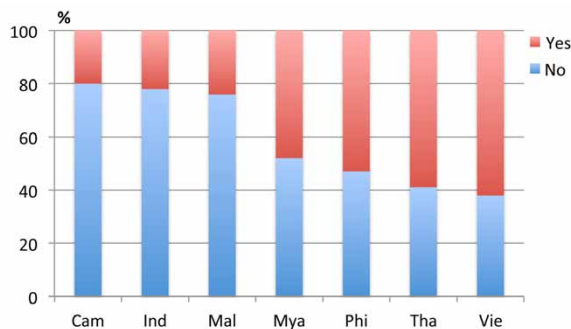


Fig. 19. Perceived safety of small-scale fishers while at sea

Thailand, promote the registration of small fishing boats. Although the definition and operational range of these boats are left to the discretion of individual countries, the recommendations include the basic requirements for safety at sea such as appropriate design and construction of small fishing boats, bringing safety equipment onboard including fire fighting and life-saving appliances, and complying with regular boat inspection systems.

During the survey, some fishers expressed confidence that their present gear and equipment could ensure their safety while fishing at sea (Table 20 and Fig. 19), although they also expressed some fears about their safety at sea due to the unpredictability of the weather conditions. The fishers therefore suggest that the government could



Most common safety gadget brought onboard small fishing boats in the Philippines

address their concern by providing life jackets and assisting them to improve their accessibility to weather forecasts through the development and promotion of top-of-line telecommunication facilities as well as improvement of search and rescue systems.

Energy savings as perceived by small-scale fishers

Fuel forms a large portion of the operating costs incurred by fishers while fishing, and saving on fuel and energy costs is a major concern of fishers who are conscious of maximizing profit from fishing operations. During the survey, some fishers expressed the need to have energy saving schemes,

especially fishers from Cambodia, Indonesia and the Philippines although some fishers did not consider this as much of a concern (Table 21 and Fig. 20). Most fishers feel that energy saving schemes could help them cut on operation costs and preserve the health of the ecosystem. Nevertheless, the fishers also have a vague idea on the form of energy saving schemes that would be promoted and on how such schemes would be adopted.

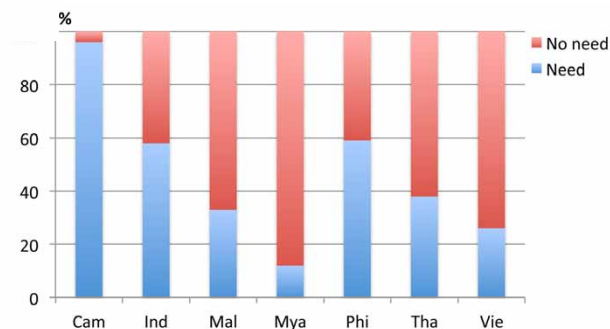


Fig. 20. Perceptions of small-scale fishers on the need for energy saving schemes

Discussion and Conclusion

From the information compiled through this socio-economic survey, the conditions of small-scale fisheries in Southeast Asia could be visualized. The basic characteristics of the region's small-scale fishers are also featured in this article to justify why small-scale fishers are among the least privileged and the poorest in our society. Nevertheless, the information on age and education of small-scale fishers in Southeast Asia seems very interesting.

Through such information, the manpower strength in the coming decades could be perceived as members of the younger generations of fishers in some countries are starting to take control of the fishing industry, especially in Cambodia and Indonesia although some fishers in other countries are already in the twilight period of their existence. Meanwhile, the compiled data on the



Small-scale fishing boats in the Philippines

educational attainment of fishers should enable the respective governments to craft appropriate training plans and programs for building human resources in fisheries.

The perceptions of fishers on the issues related to illegal fishing and climate change should provide governments with information that could be used in developing plans for coping with the environmental changes. Such plans could be introduced through training, especially in promoting the fisheries co-management approach as well as ecosystem approach to fisheries management. The small-scale fishers' expressed needs to improve their socio-economic conditions (*e.g.* accessibility to loans and establishment of micro-credit schemes) would provide the governments with possible means of addressing the fishers' concerns such as through the establishment and strengthening of fishers' groups.

The expressed need of small-scale fishers to look for optional jobs portrays not only the seasonality of fish stocks but also the need to adapt changes in their fishing gear, fish handling as well as in value-adding. For small-scale fishers, any other jobs that would help them earn additional incomes when fishing is difficult or impossible due to severe weather conditions, would mitigate their difficult situation. Dire needs for optional jobs as strongly expressed by fishers from Cambodia and the Philippines reflect the volatility of fishing operations, so that optional jobs in other fields could be a possible and essential way out from the fishing industry.

The reluctance of fishers to participate in law enforcement could provide the national authorities with means to ponder on the present fisheries management regime, together with its cost and effectiveness. The attitude of fishers to participate in law enforcement should be taken into consideration during the promotion of fisheries co-management. Awareness of small-scale fishers with regards to IUU fishing should be enhanced by intensifying the advocacy of the issue, considering that the term and scope of IUU fishing are largely applicable in small-scale fisheries, but are understood only by higher levels in fisheries management. Nevertheless, some of the practical mitigation measures, such as minimizing the encroachment of commercial fishing vessels to inshore areas, should be considered as these are well understood by the small-scale fishers.

On safety at sea, many fishers are confident with their present situation and the provisions onboard. However, they are more concerned about the frequent and severe changes in weather conditions that threaten their safety while fishing. Although not very willing to adopt energy

saving schemes, the fishers are satisfied with their current energy use as this contributes to smaller share in their fishing expenses. Small-scale fishers mostly operate in near-shore fishing grounds which usually takes them a shorter trip and less energy used.

References and Further Readings

- Abu Talib, A., T.G. Hong, A.H. Yasin. 2003. Overview of the national fisheries situation with emphasis on the demersal fisheries off the west coast of Peninsular Malaysia. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. World Fish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 833–884
- Barut, Noel C., M.D. Santos, L.L. Mijares, R. Subade, N.B. Armada, L.R. Garces. 2003. Philippine coastal fisheries situation. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 885–914
- Boonchuwongse, P. and W. Dechboon. 2003. Socioeconomic assessment of marine fisheries of Thailand. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 577–628
- Cruz-Trinidad, A. 2003. Socioeconomic and bioeconomic performance of Philippine fisheries in the recent decades. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 543–576
- Fisheries Administration. 2010. The Strategic Planning Framework for Fisheries: 2010-2019, Volume 2, Ministry of Agriculture, Forestry and Fisheries, Cambodia
- Fisheries Informatics Centre (FIC). 2008. Ministry of Agriculture and Rural Development, Hanoi, Vietnam: 2008 /<http://fistenet.gov.vn>
- Janetkitkosol, W., H. Somchanakij, M. Eiamsa-ard, M. Supongpan. 2003. Strategic review of the fishery situation in Thailand. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-

- Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, WorldFish Center, Penang, Malaysia; pp 915–956
- Long, Nguyen. 2001. Responsible management for marine fisheries in Vietnam. Research Institute for Marine Fisheries, Haiphong, Vietnam
- MOFI. 2006. Final report on status of implementing national work plan for 2005, direction and tasks for developing the social economics of fisheries sector in 2006. MOFI, Hanoi, January 2006 (in Vietnamese)
- Pomeroy, Robert, Kim Anh Thi Nguyen and Ha Xuan Thong. 2009. Small-scale marine fisheries policy in Vietnam. Sciencedirect. Marine Policy 33 (2009): 419–428
- Priyono, B.E. 2003. Socioeconomic and bioeconomic analysis of coastal resources in central and northern Java, Indonesia. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 479–516
- Purwanto. 2003. Status and management of the Java Sea fisheries. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. World Fish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 793–832
- Raakjær, Jesper, Dao Manh Son, Karl-Johan Stæhr, Holger Hovgård, Nguyen Thi Dieu Thuy, Kristine Ellegaard, Frank Riget, Dang Van Thi and Phung Giang Hai. 2007. Adaptive fisheries management in Vietnam. The use of indicators and the introduction of a multi-disciplinary Marine Fisheries Specialist Team to support implementation. Sciencedirect. Marine Policy 31 (2007): 143–152
- SEAFDEC. 2000. Regional Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fishing Operations. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 71 p
- SEAFDEC. 2003. Regional Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fisheries Management. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 69 p
- SEAFDEC/TD. 2006. Report of monitoring socio-economic survey in Kuala Teriang, Pulau Langkawi, Malaysia; August 2006
- SEAFDEC/TD. 2011. Official Trip Report on Socio-Economic Survey at Kalibaru village, Cilincing Sub-district, North Jakarta, Indonesia, 3-7 November 2011
- SEAFDEC/TD. 2012. Socio-economic Survey of Small-scale Fisheries in Southeast Asia. SEAFDEC Training Department, Samut Prakan, Thailand, March 2012
- Seilert, H. and Suchart Sangchan. 2001. Small-scale Fishery in Southeast Asia: Case study in Southern Thailand; Regional Office for Asia and Pacific, Bangkok Thailand, RAP Publication 2001/19, 63 p
- Shaupi, Mohamad, Abdul Khadil, Abu Talib Ahmad, Ahmad Saktian, Abdul Rahman, and Halimah Mohamed. 2011. Putting a Plug on Increasing Fishing Capacity: NPOA for the Management of Fishing Capacity in Malaysia. *In*: Fish for the People, Vol 9 Number 2 (2011). Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 86-90
- Son, D.M. and P. Thuoc. 2003. Management of coastal fisheries in Vietnam. *In*: Silvestre, G., Garces, L., Stobutzki, I., Ahmed, M., Valmonte-Santos, R.A., Luna, C., Lachica-Aliño, L., Munro, P., Christensen, V., Pauly, D. (Eds). Assessment, Management and Future Directions for Coastal Fisheries in Asian Countries. World Fish Center Conference Proceedings 67, World Fish Center, Penang, Malaysia; pp 957–986
- Stobutzki, Ilona C., G.T. Silvestre and L.R. Garces. 2006. Key issues in coastal fisheries in South and Southeast Asia, outcomes of a regional initiative. Fisheries Research 78(2006): 109-118
- Suseno. 2008. National synthesis on small-scale fisheries of Indonesia. Country paper presented during the ASEAN-SEAFDEC Regional Technical Consultation on Small-scale Fisheries in Southeast Asia
- Tun, Karenne, Loke Ming Chou, Annadel Cabanban, Vo Si Tuan, Philreefs, Amasak Yeemin, Suharsono, Kim Sour, and David Lane. 2004. Status of Coral Reefs, Coral Reef Monitoring and Management in Southeast Asia. *In*: Willkinson C. (ed). Status of Coral Reefs of the World; Volume 1 Australian Institute of Marine Science. Townsville, Australia
- Vera, Cesar Allan, Randee Cabaces and Leonard Reyes. 2010. Philippines Asserting Rights, Defining Responsibilities Perspectives from Small-scale Fishing Communities on Coastal and Fisheries Management in the Philippines. International Collective in Support of Fish Workers, Chennai, Tamil Nadu, India

About the Authors

Sumitra Ruangsvakul is the Head of the Socio-economic Section, Coastal and Small-scale Fisheries Management Division, SEAFDEC Training Department, Samut Prakan, Thailand.

Jariya Sornkliang and **Thanyalak Suasi** are Socio-economists of the SEAFDEC Training Department in Samut Prakan, Thailand.

Improving Fisheries and Habitat Management, Climate Change Adaptation and Social Well-being in Southeast Asia: the SEAFDEC-Sida Project in Focus

Leng Sam Ath, Hotmuida Purba, Vankham Keophimphone, Imelda Riti Anak Rantty, Aung Toe, Ronaldo R. Libunao, Sarayoot Boonkumjad, and Tran Van Hao

Hope is on the rise for millions of fisherfolk households whose livelihoods continue to be threatened by environmental degradation, overcapacity and climate change. Thanks to the new phase of the SEAFDEC-Sida cooperation which is geared on supporting the regional momentum for the development of policies and mechanisms towards formal ASEAN fisheries management arrangements which were initiated earlier under the first phase of the cooperation. The second phase of the cooperation which will run from 2013 to 2017 will concentrate on four sub-regions, namely: Sulu-Sulawesi Sea and Mekong River Basin in addition to the Gulf of Thailand and Andaman Sea, which were also the target sub-regions during the first phase. Known as the SEAFDEC-Sida Project Phase II, this phase of the cooperation is expected to benefit the poor coastal and inland communities in Southeast Asia that continue to face increased exposure to natural hazards, climate variability, competition and conflict on natural resource use. Improved fisheries policies and sub-regional plans would be designed to ensure the sustainability of livelihoods in the coastal and inland waters. Through regional consultative processes, capacity-building would be enhanced to promote the establishment of wider fisheries and habitat management mechanisms, address climate change vulnerability issues, and improve the social well-being of fisherfolk households in Southeast Asia.

Success stories are in plenty as the SEAFDEC-Sida Project sustains the need to promote the integration of fisheries and habitat management. For example, the Southeast Asian countries bordering the Andaman Sea and Gulf of Thailand now support the establishment of larger fisheries resources conservation areas. Particularly, transboundary species like the mackerels which are important to many local economies, are considered to serve as potential focus for sub-regional cooperation. Moreover, the Project has united the participating countries in making a stand against a common adversary, *viz*: fishing overcapacity coupled with illegal and destructive fishing. Having recognized the need for common approaches that can only be effectively implemented through sub-regional and regional cooperation, the participating countries through the Project, took major steps to address familiar problems by strengthening MCS Networks as well as port

monitoring which are co-requisites to improve fishing vessel registration, fishing licensing systems and overall control of large and small-scale fishing operations.

Meanwhile, as the poor continues to be the most vulnerable to climate change, the Project also aims to build up community resilience and adaptive capacity of the fisherfolk households by going through the basics of poverty alleviation. The various consultations conducted through the first phase of the Project viewed that incomes of families dependent on mangrove ecosystems could be increased based on how these areas are managed, which in turn could offer greater protection against natural hazards. Nevertheless, the integration of local knowledge in the management aspect and strengthened local organizations are expected to result in the development of adaptive capacity to the challenges of climate change. While social well-being, better observed on working conditions, safety, labor welfare, and treatment of migratory workers, remains low in the fishing industry of the Southeast Asian region, activities have been designed which could draw support from the Project, to meet the standards defined in the ASEAN Socio-cultural Community Blueprint and to recognize the role and capacity of women and youth in the economy. Improved information gathering along this line is seen as the key step in addressing the milieu of related issues.

A clear policy at national, sub-regional or regional levels holds the sustainability of the aquatic resources in the long run. Thus, the SEAFDEC-Sida Project keeps an eye on capacity building and improving policy development processes to come up with and implement fisheries management arrangements for the Southeast Asian countries. The way forward comes with the need to shift from traditional singular focus on fisheries and give equal weights to social, governance and biodiversity aspects. Ecosystems approach to fisheries management will be applied as an overall strategy to cover social, governance and resources/environment aspects (SEAFDEC, 2013). Fisheries agencies should therefore work with environment as well as other related agencies, and in the process involve coastal communities, fisherfolks and local authorities in order to come up with a unified approach to address

the important areas identified by stakeholders during the consultations organized through the Project.

SEAFDEC-Sida Collaborative Arrangements: Past and Present

In the early 2000s, the Government of Sweden through the Swedish International Development Cooperation Agency (Sida) entered into an agreement with the Southeast Asian Fisheries Development Center (SEAFDEC) for the development of sustainable fisheries in the Southeast Asian countries. Specifically, Sida through technical cooperation of the Swedish Board of Fisheries and SEAFDEC inked a four-year agreement (2003-2006) which principally focused on human resource development (HRD) for fisheries management in the ASEAN member states. Such arrangement was mainly aimed at promoting and supporting the implementation of the FAO Code of Conduct for Responsible Fisheries (CCRF), which was correspondingly regionalized by SEAFDEC starting in 2000 for the benefit of stakeholders in the Southeast Asian countries. Through awareness building and training activities, the Project succeeded in promoting the Regional Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fisheries Management (SEAFDEC, 2003) and as a result, three thematic priorities were identified and developed after a series of consultations in the project sites of participating countries, *i.e.* Cambodia, Indonesia, Thailand, and Vietnam, taking into account the need to integrate social, legal and environmental aspects in fisheries management. The priorities included management of fishing capacity, strengthening local fisheries management, and integrating fisheries management into habitat management. Recognizing that achieving the goal to carry out changes in the region's fisheries arena would take some time, the Project fostered the so-called process-oriented results approach that paved the way for fostering a regional cooperation in terms of fisheries management and management of fishing capacity (Wanchana, 2007).

While foreseeing the need to intensify HRD activities in the participating countries, the Project implementation was extended for another two years from 2007 to 2008 with continued support from Sida. As a result, sustained efforts were prescribed to develop and manage the fisheries potentials of the region for food security and safety of the people through regional and sub-regional cooperation in sustainable fisheries and habitat management. This also led to the understanding among the ASEAN member states and coming to terms of the implications of sustainable fisheries development in a closer and more integrated ASEAN Economic Community by 2015.

Subsequently, SEAFDEC and Sida agreed to enter into another collaborative arrangement in order to find the ways and means of managing fishing capacity in the Southeast Asian region through sub-regional cooperation initially focusing on the Gulf of Thailand and the Andaman Sea. Under the auspices of the ASEAN-SEAFDEC Strategic Partnership (ASSP), focus of the regional collaborative arrangement was placed in clarifying regional policies and priorities in support of national efforts in addressing habitat and fisheries management as well as management of fishing capacity. These were based on recommendations from the ASEAN member states through regular, broad regional consultations, and decisions of the SEAFDEC Council, taking into consideration the priorities identified by the ASEAN Fisheries Consultative Forum (AFCF), other regional partners, *i.e.* FAO/APFIC, BOBLME, RPOA and the Blueprints developed for the establishment of the ASEAN Community.

Thus, the first phase of the SEAFDEC-Sida Collaborative Project (2008-2012) initiated the process of promoting regional and sub-regional arrangements with the main objective of advancing sustainable management of fishing capacity (Shaupi *et al.*, 2011) and to some extent the fishing effort, in order to combat illegal, unregulated and unreported (IUU) fishing in the region (Awwaluddin *et al.*, 2011). The series of consultations culminated in the development of regional and sub-regional coordination for sustainable fisheries management which had been eventually strengthened, *e.g.* the establishment of regional and sub-regional Monitoring, Control and Surveillance (MCS) Networks as part of the overall efforts in combating IUU fishing (Yleaña and Velasco, 2012). Finally, through such regional and sub-regional episodes, the SEAFDEC-Sida cooperation obtained a regional momentum for crafting new policies and mechanisms necessary for the development of formal ASEAN fisheries management arrangements for the Southeast Asian region (Kaewnuratchadasorn, 2013).

Through continued support from Sida, SEAFDEC facilitated the conduct of regional and sub-regional consultations aimed at achieving consensus for addressing important fisheries issues being encountered by the Southeast Asian countries. Considering that other regional projects and organizations, especially the Bay of Bengal Large Marine Ecosystem (BOBLME) Project, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), and the Regional Plan of Action to Combat IUU Fishing (RPOA-IUU) are also taking the role as facilitators for the development of regional, bi-lateral or tri-lateral agreements in Southeast Asia and in order to

promote of sharing of responsibilities, the SEAFDEC-Sida Project established initial collaborative arrangements with these initiatives.

Furthermore, since a continuation of the process was deemed essential as called for by concerned parties at regional, national and local levels, and together with the recommendations raised during the earlier sub-regional meetings for the Gulf of Thailand and the Andaman Sea which highlighted on the need to strengthen collaborative efforts with other related international organizations and initiatives (e.g. Wetlands Alliance/CORIN Asia and Mangroves for the Future/IUCN), the SEAFDEC-Sida Project strived to take part in and organize regional events in concert with regional organizations, projects and initiatives, i.e. the ASEAN, FAO, UNEP, RPOA-IUU, MRC, BOBLME, Mangroves for the Future, Wetlands Alliance, CTI-CFF, among others. This has allowed the Project to enhance its regional influence and at the same time achieve significant cost savings. The importance of promoting sub-regional dialogues and cooperation is a

reflection of the diversity in management needs including resources availability and utilization, cross-boundary cooperation, and social and economic information exchange.

In addition, priority interventions and strategies addressing various fisheries and social-related issues in the sub-region were fashioned for a more action-oriented Project. Aspects such as the integration of habitat management into fisheries management, e.g. ecosystem approach to fisheries or EAF has been given more emphasis and consideration to generate efforts for better management of coastal environments and resources. Management of transboundary fish species, e.g. *Rastrelliger* spp. which is of great importance not only for the countries around the Andaman Sea but also those bordering the Gulf of Thailand, was given priority attention. This approach had served as basis for undertaking further actions in support of sub-regional fisheries management and social sustainability by addressing critical issues such as habitat and fisheries, migratory fish stocks (e.g. mackerels), rights of local indigenous groups (such as the

Box 1. Consultations under the SEAFDEC-Sida Collaborative Project (2008-2012)

Date	Title	Venue
28-29 March 2008	First Meeting of the Gulf of Thailand Sub-region	Bangkok, Thailand
24-26 February 2009	Second Meeting of the Gulf of Thailand Sub-region	Bangkok, Thailand
26-27 May 2009	Preparatory Meeting of ASEAN Fisheries Consultative Forum (AFCF)	Bangkok, Thailand
27-29 July 2009	Workshop on Fishing Vessel Record and Inventory	Satun Province, Thailand
20-22 October 2009	First Meeting of the Andaman Sea Sub-region	Phuket, Thailand
20-23 April 2010	Second Regional Technical Workshop on Safety at Sea for Small Fishing Boats	Samut Prakan, Thailand
13-14 July 2010	National Workshop on the Bay of Bengal Large Marine Ecosystem of Mergui Archipelago	Ranong Province, Thailand
19-22 July 2010	On-site Training/Workshop on the Integration of Fisheries and Habitat Management and Management of Fishing Capacity	Medan, Indonesia
15-17 September 2010	Expert Consultation on Managing Fishing Capacity to Combat IUU Fishing in Southeast Asia	Bangkok, Thailand
1-4 November 2010	Regional Technical Consultation on Adaptation to a Changing Environment	Bangkok, Thailand
23-26 November 2010	On-site Training/Workshop on the Integration of Fisheries and Habitat Management and Management of Fishing Capacity	Langkawi, Malaysia
3-5 March 2011	On-site Training/Workshop on the Integration of Fisheries and Habitat Management and the Management of Fishing Capacity	Myeik, Myanmar
24-25 March 2011	On-site Training/Workshop on the Integration of Fisheries and Habitat Management and the Management of Fishing Capacity	Satun Province, Thailand
26-27 July 2011	On-site Training/Workshop on the Integration of Fisheries and Habitat Management and the Management of Fishing Capacity	Ranong Province, Thailand
20-22 September 2011	Third Meeting of the Gulf of Thailand Sub-region	Siem Reap, Cambodia
11-13 October 2011	Sub-sub-region Meeting between Indonesia, Malaysia and Thailand	Phuket, Thailand
13-14 March 2012	Sub-regional Consultative Workshop of the Northern Andaman Sea	Bangkok, Thailand
28-29 August 2012	Second Meeting of Andaman Sea Sub-region	Phang-Nga Province, Thailand
10-14 September 2012	1 st Workshop on Fish Sampling Survey for Myanmar Officer	Ranong Province, Thailand
1-4 October 2012	2 nd Workshop on Fish Sampling Survey for Myanmar Officers	Yangon, Myanmar

moken), and management of fishing capacity including vessel record, MCS and port monitoring (e.g. landings across boundaries).

In order to exchange ideas and experiences that would clarify and address the challenges confronting the region, the Project conducted a series of technical meetings/consultations and on-site workshops in selected sites from 2008 to 2012, *i.e.* in Cambodia, Indonesia, Malaysia, Myanmar, and Thailand (**Box 1**). These fora provided the platform to discuss, explore and agree on the strategies for the development of common approaches to deal with the identified challenges. Thus, the SEAFDEC-Sida cooperation has evolved into a regional momentum for the development of new policies and mechanisms, and establishment of fisheries management arrangements to address the key issues that impede the sustainable development of fisheries in the Southeast Asian region.

SEAFDEC-Sida Collaborative Project: Looking at the Future and the Way Forward

Previous approaches to fisheries management have been focused on the fisheries with little concern given to biodiversity or habitats. Through the SEAFDEC-Sida project, a paradigm shift was achieved where research on ecosystem approaches for more effective fisheries management gives equal weight to the social and governance aspects taking into account the status of resources and the environment. In simple terms, the integration of fisheries and habitat management became a new buzzword, but requires that fisheries and environmental agencies should work together more closely. In the process of integration, the involvement of coastal communities, fisherfolks (including women) and local authorities is ensured to address local poverty issues and the need for diversified income opportunities.

In reality, the absence of clear policies at national, sub-regional or at the ASEAN levels jeopardizes all efforts to achieve the long-term sustainability of marine and freshwater resources. Specifically at the regional level, it is crucial that fisheries sector-related working conditions including those of migrant workers, meet the standards set out in the ASEAN Socio-Cultural Community Blueprint. Based on the results of consultations convened through the past and present SEAFDEC-Sida collaborative arrangements and communications made with other related projects, a number of important issues and concerns have been identified which could be addressed in the second phase of the SEAFDEC-Sida cooperation.

Problems, Challenges and Opportunities

The vulnerability of poor coastal communities to natural hazards and the risk of being further marginalized during the rehabilitation processes should not be ignored, but could be addressed by strengthening the participation of coastal communities in the planning and management of projects related to preserving the health of natural resources as well as in coastal development, and by creating alternative livelihoods. This could be achieved by giving due recognition and strengthening the role and capacity of women and youth, especially in generating income from fisheries-related activities and creating alternative employment, and supporting their aspirations in seeking job opportunities outside the fisheries sector.

In Southeast Asia, overcapacity in the fishing industry is the largest single fisheries management problem that threatens the sustainability of small-scale coastal fisheries as well as large-scale fishing ventures. Management of fishing capacity as well as combating illegal and destructive fishing could be dealt with in conjunction with the management of available resources and important habitats. Priority should therefore be given to sustaining the regional fisheries resources, combating illegal and destructive fishing operations, enhancing trade within and outside the region, and complying with regional requirements and international binding agreements to ensure the sustainable development of fisheries in the Southeast Asian region. Moreover, providing incentives or rewards for fishers, fishing crews and/or fishing villages as a whole, that are conducting environmentally-sound and sustainable fisheries practices, could also be initiated and sustained.

Enhanced regional understanding of fisheries and aquatic/coastal environmental management, transboundary agreements on fisheries and aquatic/coastal environmental management could be promoted through the conduct of regional, sub-regional and sub-sub-regional consultations. One of the concerns to be addressed during such fora could include the need for better fisheries/environmental management and finding a balance between promoting large- and small-scale fisheries operations and managing fishing capacity, taking into account the vulnerability of poorer coastal and inland communities that often cannot compete against those possessing the economic and political power, whether they are owners of larger fishing fleets or investors in coastal and inland infrastructures. More importantly, access to available aquatic resources and working opportunities inside and outside the fisheries sector, should also be secured.

In the present state of fisheries development, it is imperative that traditional knowledge and expertise of local organizations should be incorporated in the planning processes for the integration of fisheries management into habitat management, management of active fishing capacity and building up the systems for protection against natural hazards. Thus, the adaptive capacity of people dependent and involved in activities related to fisheries and aquatic resource utilization should be instituted to enable them to cope with the changing environments and effects of climate change. Since, well organized groups with strong social structures are reported to be more resilient than other groups with respect to the changes in the environment; therefore, there is a strong need to strengthen local organizations through enhanced capacity building.

Sub-regional Areas for Phase II of the Project

The second phase of the SEAFDEC-Sida Collaborative Project (2013-2017) will continue to focus on the ASEAN member states, and together with the earlier sub-regional focus of the Andaman Sea and the Gulf of Thailand, the second phase now includes additional two new sub-regions, the Sulu-Sulawesi Seas and the Mekong River Basin (Box 2). This second phase of the Project will build upon the outcomes of the earlier SEAFDEC-Sida cooperation,

with the people in poor coastal and inland communities in Southeast Asia that as the main stakeholders since they continue to be confronted with declining catches, and increased competition and conflict over natural resource use and space in coastal and inland waters. Considering the distinct differences among the identified sub-regions, the Project would develop sub-regional approaches and management solutions to impending problems in



Map indicating the project areas in: (a) the Gulf of Thailand; (b) the Andaman Sea; (c) the Sulu-Sulawesi Sea; and (d) the Mekong River Basin

Box 2. Sub-regional areas under Phase II of the SEAFDEC-Sida Collaborative Project (2013-2017)

The Gulf of Thailand used to have one of the highest resource potentials in the Southeast Asian region due to its shallow topographic bottom features that form a large basin less than 85 meters deep. Fisheries in the Gulf focused on shellfish, multi-type demersal species and small pelagic species, such as the Indo-Pacific mackerel and round scads. At present however, due to failures in fisheries management and the continuing practice of open-access fisheries, the fisheries resources especially demersal resources, are greatly depleted. Records have shown that the catch per unit effort (CPUE) for example, from trawling about 20 years ago was 300 kg/hr while currently it is only 20 kg/hour. Due to the depleted fisheries resources, other problems become more acute resulting in conflicts between groups of fishers, increased illegal and destructive fishing with large amount of unregulated catch being landed in neighboring countries, and illegal fishing in trans-boundary waters.

The Andaman Sea includes a large continental shelf in the northern part of Myanmar waters, and a deep basin down to 2,000 m in the central part of the Andaman Sea. Many rip currents occur where two water masses meet, producing an abundance of small pelagic fishes in the offshore waters. Many commercial fish species thrive on the continental slopes where the depth varies between 150 and 300 m, and there is an abundance of fish and other aquatic species in the Ayerwaddy Delta of Myanmar. Further offshore, larger pelagic species are under-exploited, such as yellow fin and big eye tuna, swordfish, marlin, and sailfishes. Seasonal changes such as the northwest monsoon and the southeast monsoon are natural checks to over-exploitation of the fisheries resources as many fishing activities are stopped especially during the northwest monsoon. As with the Gulf of Thailand, there is also a need to combat illegal and destructive fishing in the Andaman Sea as well as the need to address the unregulated and illegal landing of large amount of catch in neighboring countries.

The Sulu-Sulawesi Seas have great biodiversity in terms of coastal and offshore resources and embrace many important habitats such as marine turtle habitats and tuna spawning grounds. In the coastal areas, most of the bottom areas are not suitable for trawling and as a result demersal resources are relatively under-exploited. Many fishing gears such as purse seines and ring-nets are in use in the area, targeting small pelagic fishes, namely neritic tuna, round scads and mackerel. Opportunities include deep-sea fisheries where oceanic squid may have potentials for future fisheries development. Problems of the sub-region include: illegal and destructive fishing especially by foreign vessels targeting marine turtles. Destructive fishing practices, and the use of fish aggregating devices (FADs) for small pelagic fish species which also catch juvenile yellow fin and big eye tunas are also among the problems in this sub-region.

The Mekong River Basin is one of the world's most productive freshwater bodies, with an estimated fish production of 2.5-3.0 million metric tons each year. Its main characteristics feature floodplain and river fisheries, where the resources are being exploited using a great variety of fishing gear. Many of the most important fish species are highly migratory where their migration routes take them across national boundaries. Seasonal changes in the monsoon and annual floods are critical for the life cycles of most fish species. Threats to the sustainability of the fisheries resources come from infrastructure development across the Mekong River, which affects the annual flooding patterns and the interconnectivity within the areas of the River system, rather than from heavy fishing. Degraded floodplain habitats, in particular the flooded forests around Tonle Sap could reduce wetland productivity and fisheries potentials. In addition, there are conflicts within the fisheries as well as over land for different uses. Opportunities for sustaining or improving productivity lie in securing the seasonal flood pulse, maintaining fish migration paths, wetland management and habitat restoration, and dry season management of broodstock in refuges.

sustainable development of fisheries in the sub-regions. Focusing therefore on these four sub-regions, the Project is aimed at promoting regional cooperation and development, and implementing sub-regional agreements on fisheries and environmental management.

Since many of these communities are increasingly exposed to natural hazards, and often subjected to climate variability

and the impacts of climate change, these communities are expected to benefit more from improved policies and sub-regional plans developed through the Project that pursues the sustainability of coastal and inland small-scale fisheries. In a broader context, the beneficiaries would also include the government (local and central), NGOs, international and regional organizations. Through capacity building, the beneficiaries will be provided support and guidance in the

Box 3. Focus points of the SEAFDEC-Sida Collaborative Project - Phase II

Integration of habitat and fisheries management: Linking fisheries and habitat management has been increasingly recognized as an important element in promoting sub-regional cooperation. Phase II of the Project will continue to look at shared ecosystems/habitats, shared (groups) of species and related fishing activities, based on the success of Phase I of the Project especially in raising the awareness of fishers on the need to view fisheries as an integrated part of broader natural resources and environmental management. Furthermore, placing emphasis on various social concerns, especially in terms of the working/labor conditions, has also led to increased awareness on the part of fishers on the need to address social aspects which is fundamental in terms of natural resources utilization and management of fishing capacity including the need to combat illegal and destructive fishing. Through regional and sub-regional consultations, and onsite events, a common understanding of the importance of critical habitats and ecosystems for sustainable fisheries, migratory fish stocks, the role of local organizations in fisheries management, and vessel registration and licensing processes, could be attained while awareness could be raised on the need to manage fishing capacity and reduce illegal and destructive fishing activities. As a result of Phase I of the Project, countries bordering the Andaman Sea and Gulf of Thailand became supportive of the establishment of larger fisheries resources conservation areas building upon existing management areas (e.g. MPAs, heritage sites) introduced to the countries in the Andaman Sea based on experiences in the Gulf of Thailand, as means of strengthening existing management efforts. In view of the nature of multi-species fisheries, assessing the transboundary movements of fish stocks (e.g. mackerels that migrate across national water boundaries) led to the identification of areas for potential sub-regional cooperation, which will be pursued in Phase II of the Project. Recognizing that local knowledge is an important factor in developing adaptive capacity, especially in the monitoring and control aspects, the experiences gained from Phase I of the Project including success stories highlighting community involvement in fisheries management using traditional practices, would be referred to in the implementation of Phase II.

Monitoring, Record and Control. One of the common problems identified in Phase I of the Project was the encroachment of larger vessels into coastal waters and destructive fishing operations in critical habitats. Phase II would attempt to reverse this trend by encouraging concerned countries to gather together and agree on joint management approaches. The experiences obtained from the series of sub-regional and regional meetings led to the identification of important management areas, i.e. MCS, vessel records and inventory, and port monitoring, where efforts to address the management of fishing capacity could be focused on. While the status of fisheries in the Gulf of Thailand, Andaman Sea and the region as a whole, had been monitored, assessed and recorded, countries in the Gulf of Thailand sub-region, i.e. Cambodia, Malaysia, Thailand and Vietnam, agreed to establish an MCS network which centers on information sharing of key issues, i.e. number and types of boats, people involved in fishing operations, and quantity of landings. Moreover, a process was also initiated to develop a fishing vessel record and inventory for the Gulf of Thailand while a draft institutional matrix for key elements of MCS was developed by the countries in the Andaman Sea. Furthermore, the need to have better port monitoring, in light of emerging requirements such as the FAO Agreement on Port State Measures (PSM), and to monitor landings across boundaries by vessels from neighboring countries, would be specifically highlighted in Phase II. The approach is to look “beyond” the PSM Agreement and the EC Regulations, by focusing on the actions needed for the region, such as improved fishing vessel registration and systems to grant licenses to fish, more reliable documentation of catches, port monitoring, validation/certification, among others. Efforts to establish a standardized Regional Vessel Record and Inventory, including the conduct of survey on larger fishing vessels and coastal fishing boats would be pursued.

Climate Change. The Project will continue to highlight on the issues related to climate change and adaptive responses of fisheries stakeholders. The experience from Phase I indicated that improved resources and environmental management are linked to the process of building up community resilience and adaptive capacity. Through improved resources and environmental management, including development of strategies towards climate change resilience and adaptive capacity, some of the basic elements to address poverty alleviation could be put in place. Regional and sub-regional consultations under Phase I had identified specific actions, e.g. mud crab conservation/culture and mangrove re-establishment have the potentials to build responses and adaptive capacity to the impacts of climate change, considering that mangrove crabs rely on healthy mangroves while mangroves themselves protect against natural hazards, and through management of the natural resources in mangrove areas, increased incomes from sale of mud crabs, are the tangible benefits. This would be dealt with more intensively in Phase II of the Project.

Social Well-being. Livelihoods in coastal and inland fishing communities, and working opportunities for fisherfolks and migrant work force in the fishing sector (including those in post-harvest and processing) are among the main focus points of the Project. Through consultative processes, relatively poor working conditions and standards, inadequate labor welfare, and unfair treatment of migrant workers in the region’s fishing industry were reviewed from the perspective of the integrated ASEAN Community. This is aimed to ensure that working conditions including those of migrant workers, meet the standards set out in the ASEAN Socio-cultural Community Blueprint. Regional and sub-regional consultations under Phase I reflected an understanding of the need to address the conditions of workers engaged in the fishing industry, their working environment and the importance of proper documentations for those working on fishing vessels as well as in improving safety standards including safety at sea. The development of enabling national policies and supporting financial mechanisms, social safety nets and protection from negative impacts of integration, globalization, and natural disasters, in support of sound and sustainable livelihood programs in coastal and inland communities dependent on and involved in fisheries-related activities, would be given focus in Phase II. Moreover, the importance of recognizing and supporting the role and capacity of women and youth in generating incomes from fisheries-related activities, alternative employment, including opportunities to work outside of the fisheries sector, would also be emphasized. Improving the estimates of the number of persons employed in fisheries and fisheries-related industries including the women work force and those in value-adding sectors such as processing, distribution and trading, would be pursued.

process of developing better management of fisheries and important habitats in the national and sub-regional contexts.

Project Focus Points

Phase II of the SEAFDEC-Sida collaborative project will give specific attention to the importance of integrating and coordinating fisheries management and habitat management, and management of fishing capacity to reduce overcapacity, minimize destructive and illegal fishing, reversing environmental degradation trends and biodiversity losses, and securing productive sustainable livelihoods for communities dependent on fisheries and aquatic resources (**Box 3**). The Project also aims to sustain the implementation of regional consultative processes for the Southeast Asian region as a whole, thereby promoting the establishment of wider regional fisheries management mechanisms and agreements.

Project Framework

The Project framework would still be based on the conduct of consultations with the participating countries, organizations and stakeholders at regional, sub-regional and local levels. The outcomes are expected to be directed towards the need for sustainable resource use, and increased resilience to climate variability and capacity to adapt to climate change for communities dependent on coastal and inland fisheries and aquatic resources. Therefore, plans and agreements on habitat and fisheries management including better management of fishing capacity and combating IUU and destructive fishing, will be implemented in the three sub-sub-regions, namely: the Andaman Sea, Gulf of Thailand, and Sulu-Sulawesi Seas. In addition, the two bridging objectives developed under the Project framework that encompass the establishment and implementation of regional and sub-regional agreements including social, environmental and/or fisheries sustainability, and the ways and means to combat illegal fishing, will be established under the ASEAN policy-making mechanism, in support of the development of the ASEAN Community. Moreover, the SEAFDEC Member Countries especially those bordering the targeted four sub-regions, are expected to reach a consensus on the joint approaches for conserving and protecting habitats and important fisheries resources, improving fishing capacity management, and crafting the directions that would be considered in order to improve fishing vessel registration, the processes of licensing, and working conditions onboard fishing vessels and in the fishing industry as a whole.

Project Implementation Strategy

The basic strategy of the Project is to build upon the expressed needs of the stakeholders to upgrade their social well-being and the health of the environment through improved management of fisheries, fishing

capacity and better management of aquatic environments and habitats of economically-important aquatic species. In order to incorporate the relevant aspects, *i.e.* social, governance, and aquatic resources and environment, the ecosystems approach to fisheries management will be applied especially in the management aspects of larger fish resources conservation areas (*e.g.* MPAs, fish *refugia*), fishing capacity (IUU Fishing) management, social mobility and conflicts resolutions. The perspectives would include the establishment of sub-regional agreements or other arrangements of relevance to fisheries and habitat management in the Gulf of Thailand and Andaman Sea, and to support the processes for developing cooperation among the countries in the Sulu-Sulawesi Seas and the Mekong River Basin.

The Project will not be implemented in isolation by SEAFDEC alone, but will rely on cooperation with other regional/international and national bodies (Kaewnuratchadasorn, 2013a). Specifically, in addressing the issues related to management of important habitats for fisheries, fishing capacity and socio-cultural aspects, SEAFDEC will work closely with relevant institutions and organizations, *e.g.* the Learning Institute in Cambodia and the Wetland Alliance to support provincial and district capacity of monitoring and recording active fishing capacity. During the implementation, a series of training sessions or learning-by-doing sessions based on information sharing will be organized at regional, sub-regional and on-site levels to generate a wider coverage and impact. The strategy also involves capacity building for better management, including the capacity to engage more effectively the communities in the ASEAN member states (plus Timor-Leste), to maximize the involvement and participation of wider stakeholders at organized events. To augment the capacity of SEAFDEC in working at field level, strong and experienced locally-based organizations and NGOs will be tapped to facilitate local capacity-building, strengthen local organizations and restore important local habitats, based on sub-contracts or other arrangements for co-sharing of resources in support of community development, improved livelihood opportunities and poverty alleviation. A new approach put up with the SEAFDEC-Sida collaborative project, would be pursued by selecting and identifying suitable partners for local sub-contract development in consultation with national and local institutions. Another important pillar of the Project strategy is enhanced coordination among regional, international and local organizations, especially those that are concerned with environment and conservation issues, as well as those mandated to consider the production and sustainable use of the natural resources and fisheries. The Project does not intend to build up new structures, but rather, work with and build up the capacities

of already existing units and projects. Therefore, linking the Project to other organizations and ongoing projects is another factor so that adequate support is assured for enhanced capacity and sustainability of the Project. The establishment of cross-boundary management areas will be pursued by organizing sub-sub-regional consultations involving key institutions and other stakeholders. This is another important piece in the jigsaw puzzle that could maximize the impacts to stretch across boundaries in areas of the Andaman Sea and Gulf of Thailand as well as in the Sulu-Sulawesi Seas and the Mekong River Basin. This is an important strategy that would promote coordination, dialogue and agreements at various levels.

More importantly, it has become imperative to strengthen the ASEAN-SEAFDEC Strategic Partnership (ASSP), which does not only aim to promote regional collaborative programs but also regional policy dialogues with high-level authorities, e.g. ASEAN Sectoral Working Group on Fisheries (ASWGFi) and the Senior Officials Meeting of the ASEAN Ministers on Agriculture and Forestry (SOM-AMAF and AMAF), on fisheries issues as well as coordination with other sectors. Exchanging experiences with other regions will be sustained, including the EU while tapping into the existing expertise and knowledge of a wide range of organizations at regional and international levels and promoting partnerships and collaboration with organizations and initiatives including the FAO, WorldFish Center, FAO Asia-Pacific Fishery Commission (APFIC), BOBLME Project, RPOA-IUU, Mekong River Commission (MRC) Fisheries Programme, International Maritime Organization (IMO), International Labor Organization (ILO), Mangroves for the Future, Wetlands Alliance, UN Environmental Programme (UNEP), among others. For an ASEAN-wide focus, attention will be given to the identified sub-regions, i.e. the Andaman Sea, Gulf of Thailand, Sulu-Sulawesi Seas, and the Mekong River Basin, which necessitates the establishment of sub-regional agreements or other arrangements relevant to fisheries and habitat management in the whole Southeast Asian region.

References

- Awwaluddin, Piyawan Hussadee, Aung Naing Oo, and Pierre L. Velasco. 2011. Consolidating Regional and Sub-regional Cooperation to Combat IUU Fishing in Southeast Asia: Initiative of SEAFDEC-Sida Project. *In: Fish for the People Vol. 9 No. 1 (2011)*. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 40-47
- Joeren Yleaña and Pierre Easter L. Velasco. 2012. Monitoring, Control and Surveillance (MCS) in Southeast Asia: Review of the Establishment of Regional MCS Network. *In: Fish for the People Vol. 10 No. 1 (2012)*. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 7-12
- Kaewnuratchadasorn, Pattaratjit. 2013. Consultative regional, sub-regional and on-site processes leading up to the

development of the present Program Framework for Swedish support to SEAFDEC. Paper presented during the Seminar on the Introduction of SEAFDEC-Sida Cooperation in 2013-2017, Bangkok, Thailand, 12 March 2013

- Kaewnuratchadasorn, Pattaratjit. 2013a. New SEAFDEC-Sida Cooperation for 2013-2017: *Fisheries and habitat management, climate change and social well-being in Southeast Asia*. Paper presented during the Seminar on the Introduction of SEAFDEC-Sida Cooperation in 2013-2017, Bangkok, Thailand, 12 March 2013
- SEAFDEC. 2003. Regional Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fisheries Management. Southeast Asia Fisheries Development Center, Bangkok, Thailand; 69 p
- SEAFDEC. 2013. Report of the Seminar on the Introduction of SEAFDEC-Sida Cooperation in 2013-2017, Bangkok, Thailand, 12 March 2013
- Shaupi, Mohamad, Abdul Khalil, Abu Talib Ahmad, Ahmad Saktian, Abdul Rahman, and Halimah Mohamed. 2011. Putting a Plug on Increasing Fishing Capacity: NPOA for the Management of Fishing Capacity in Malaysia. *In: Fish for the People Vol. 9 No. 2 (2011)*. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 86-90
- Wanchana, Worawit. 2007. Beyond Regionalizing the Code of Conduct for Responsible Fisheries: ASEAN-SEAFDEC Human Resource Development Initiative. *In: Fish for the People Vol. 5 No. 3 (2007)*. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 5-9

About the Authors

Mr. Leng Sam Ath (Cambodia), Ms. Hotmaida Purba (Indonesia), Mr. Vankham Keophimphone (Lao PDR), Ms. Imelda Riti Anak Rantty (Malaysia), Mr. Aung Toe (Myanmar), Dr. Ronaldo R. Libunao (Philippines), Mr. Sarayoot Boonkumjad (Thailand), and Mr. Tran Van Hao (Vietnam) are members of the 2013 Regional Fisheries Policy Network (RFPN) based at the SEAFDEC Secretariat in Bangkok, Thailand.

For more information about the SEAFDEC-Sida Project, please contact SEAFDEC Program Manager, Ms. Pattaratjit Kaewnuratchadasorn (Email: pattaratjit@seafdec.org).



Relevant International and Regional Instruments for Sustainable Development of Small-scale Marine Fisheries: Significance to Cambodia

Nao Thuok, Ing Try and Kathe R. Jensen

The Fisheries Administration of the Kingdom of Cambodia has compiled a handbook to assist stakeholders at the academic, scientific and management levels, in obtaining an overview of instruments relevant to the conservation and management of fisheries resources. Over the years, a number of international legal instruments (conventions, protocols, agreements, action plans, memoranda of understanding, and the like) have been adopted by international organizations and their member states. Notwithstanding such numerous instruments, it has remained very difficult to obtain relevant information about those instruments that were signed and ratified by individual countries such as Cambodia, for example. Thus, the said handbook also aims to provide significant details such as membership of Cambodia and data about ratification, accession, and other relevant information. The corresponding website addresses of the relevant instruments and agreements are also provided in the handbook for easy reference.

At the end of World War II all nations saw the need for international cooperation in all areas of human enterprise across national borders. With the establishment in 1945 of the United Nations (UN), a forum was generated for such cooperation, and in the following years several programs, organizations and conventions were established under the auspices of the UN, e.g. the Food and Agriculture Organization of the United Nations (FAO) also in 1945, the United Nations Children's Fund (UNICEF) in 1946, and the World Health Organization (WHO) in 1948. From the beginning, it was made clear that for many issues there should be regional rather than global solutions and that developing countries in the regions around the world would be provided the necessary assistance, in terms of financial and human resources.

Three global UN conferences, *i.e.* in 1972, 1992 and 2002, have impacted the way international collaboration on environmental issues is being conducted. The 1972 Conference on the Human Environment in Stockholm, Sweden spelled out in 26 Principles, the rights and responsibilities of mankind towards the environment and natural resources. This was the first global-scale acknowledgement that resources are no longer unlimited and that human activities are negatively impacting on the environment to an unacceptable degree. Specifically,

protection of marine life and resources is mentioned in Principle 7 of the Declaration. An important outcome of the Stockholm Conference was the establishment of the UN Environmental Programme better known as UNEP.

In 1992 the World Summit in Rio de Janeiro, Brazil facilitated the adoption of several conventions, notably the Convention on Biological Diversity and also the UN Framework Convention on Climate Change. During this Conference, such words as “*biodiversity*”, “*sustainability*” and “*precautionary approach*” became “buzz-words” for conservationists, governments and the press. Furthermore, Agenda 21 which is a global program of action for sustainable development was adopted during the said Conference. Most recently, the Earth Summit in Johannesburg, South Africa in 2002 established a number of goals for sustainable development to be implemented by 2015.

In the aspect of biodiversity, a target was set to reduce the loss of biodiversity by 2010. Although politicians worldwide are taking these goals rather seriously, this is not reflected in the allotment of appropriate funding, and the recent Global Biodiversity Outlook-3 Report clearly demonstrated that the 2010 goal has not been reached (CBD Secretariat, 2010). During the same period, civil societies became increasingly involved in conservation and protection of the environment and living resources, where much of the practical works and funding comes from volunteers and local fund-raising campaigns. It is therefore difficult to estimate how much conservation would have been successful in developing countries without the efforts of NGOs.

International conventions undergo metamorphosis as new management approaches and government attitudes change. More particularly, work programs and action plans are modified to reflect current approaches to regional and global problems. In the early days, international collaboration comprised the implementation of regulations and restrictions to address specific problems, e.g. overfishing or pollution. Assistance to developing countries was mostly given as bilateral support, *i.e.* country-to-country or country-to-NGO. Later, attempts were made to transfer ownership to the developing countries involved, and most recently, establishment of partnerships seems to be the

favourite approach. At the national level, a shift could be seen from strictly sector-based legislation and management towards more integrated and holistic approaches, often including stakeholder participation.

International Instruments and Global Conventions

It is well recognized that major threats to marine biodiversity include habitat destruction, over-exploitation, pollution including eutrophication (which covers

increased nutrient levels, especially N (nitrogen) and P (phosphorus), caused by land-based human activities, *e.g.* excessive use of fertilizers in agriculture), introduction of invasive alien species and climate change. Since pollution was the first threat to marine life to be recognized internationally, international conventions were established that cover marine pollution (**Box 1**). These include: the Marine Pollution (MARPOL) Convention, Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (London Convention), Basel Convention on the Control of Transboundary Movements

Box 1. International Instruments and Conventions with Information on Participation of Cambodia

The earliest international convention for the protection of marine biodiversity is the **International Convention for the Regulation of Whaling (ICRW)**, which was signed in 1946 in Washington, D.C. by 15 major whaling countries. The Convention called for the establishment of the International Whaling Commission (IWC) to regulate the commercial capture of whales. Each year, IWC determines the quotas for commercial capture of most species of whales based on scientific stock assessment, and decides that no commercial whaling is permitted in a particular year. As of 31 December 2011, the Convention had 89 member countries with Cambodia becoming a full member on 1 June 2006.

The Convention on Wetlands of International Importance (Ramsar Convention) considers the “conservation and sustainable utilization of wetlands which are habitats of water-birds”. First prepared in 1962, the Convention was adopted only in February 1971 and entered into force in December 1975. The Ramsar Convention introduced the concept of “wise use”, which was later developed into “sustainable use”. The Convention has broadened its scope to cover all aspects of wetlands conservation, recognizing that wetlands are ecosystems of high importance for biodiversity conservation and human well-being. Although UNESCO acts as the depositary organization, the Ramsar Convention is not part of the UN system. As of 31 December 2011, the Convention had 160 member countries, and Cambodia became a member on 23 June 1999. Three protected areas in Cambodia which are considered as Ramsar sites cover a total area of 54,600 ha. Only one of these sites, *i.e.* Koh Kapik in Koh Kong Province, is in the coastal area.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments, also referred to as the Washington Convention because it was adopted and signed in that city in 1973 and entered into force on 1 July 1975. This Convention aims to ensure that international trade in wild animals and plants does not threaten survival of the species. Covering only international trade, this agreement does not deal with capture or trade within countries. The agreement specifies that countries (parties to the Convention) have the responsibility to protect endangered species, and that “international cooperation is essential for the protection of certain species of wild fauna and flora against over-exploitation through international trade” (Wijnstekers, 2011). Species protected under the CITES are placed correspondingly in three “appendices” depending on their status. Trade is regulated by issuing import and export permits, while listing of species in the appendices is determined after detailed expert evaluations and recommendations. For species introduced from the sea, CITES coordinates with UNCLOS (Wijnstekers, 2011). Cambodia became a party to the Convention in 1997.

The Convention on Migratory Species (CMS) or Bonn Convention was adopted in 1979 and came into force on 1 November 1983. The Convention aims to protect migratory species, terrestrial and aquatic, over the whole of their ranges as well as their habitats. Migratory species are listed in one of two appendices although marine migratory fish species are covered by an agreement with UNCLOS. There is a Memorandum of Understanding (MoU) for the conservation of marine turtles and an agreement for the conservation of small cetaceans in the Baltic and North Seas (ASCOBANS). Cambodia has not yet signed this Convention and as a matter of fact, among the Southeast Asian countries only the Philippines is a member. Nevertheless, Cambodia signed the MoU on the conservation and management of marine turtles in the Indian Ocean and Southeast Asia (IOSEA Marine Turtles MoU) in 2002, which has been lodged within the CMS and deposited in Bonn, Germany.

The most important convention relating to conservation of marine biodiversity is the **Convention on Biological Diversity (CBD)** adopted during the Rio Summit in 1992. This Convention focuses on the conservation and sustainable use of biodiversity, and the fair and equitable sharing of benefits derived from genetic resources. One of the decisions of this Convention, the Jakarta Mandate on Marine and Coastal Biological Diversity was adopted in 1995 as a global consensus on the importance of marine and coastal biological diversity. Under this Convention, developing countries can get funding as well as international expert assistance through the Global Environmental Facility (GEF). Cambodia became a party to the Convention in 1995, where the implementation of Biodiversity Enabling Activity resulted in the publication of a biodiversity status report (Smith, 2001). Cambodia received assistance for the development of its National Biodiversity Strategy and Action Plan (MoE, 2002) as well as for the production of its first national report to the CBD, in collaboration with UNDP and FAO, and funded through GEF.

The first **UN Conference on the Law of the Sea (UNCLOS I)** was held in 1958 in Geneva, Switzerland where the first convention was adopted containing definitions of territorial seas, continental shelf and the high seas, as well as provisions for conservation of living resources in the high seas. Over the following 14 years, the UN Convention on the Law of the Sea was developed further and the third version was adopted in 1982 known as UNCLOS III which is probably the largest and most comprehensive convention covering the marine environment and resources. It contains 320 articles and 9 annexes including topics as diverse as establishment of Exclusive Economic Zones (EEZs), mining the ocean bottom, international collaboration on research and technology transfer, right of access and navigation in international waters, protection of living resources, piracy, and regulations for financial support and settling of disputes, and is often referred to as the “Constitution of the Oceans”. With respect to the conservation of marine biodiversity, certain provisions indicate that member states have exclusive rights to utilize living resources within their EEZs, as well as provisions to deal with highly migratory and straddling stocks. In this connection, the UN adopted the United Nations Agreement on straddling and highly migratory fish stocks (UN Fish Stocks Agreement or UNFSA) in 1995, which applies to management of fisheries for straddling and highly migratory stocks in EEZs and the high seas. Cambodia signed this Convention in 1983 but has not yet ratified it.

Box 1. International Instruments and Conventions with Information on Participation of Cambodia (Cont'd)

The first steps towards the establishment of the **World Heritage Convention** were taken by UNESCO in 1959 to save ancient temples in the Nile Valley of Egypt from flooding after the construction of a huge dam (UNESCO World Heritage Centre, 2008). The World Heritage Convention (WHC) was adopted in 1972 with the main objectives of protecting cultural and natural sites that are of Outstanding Universal Value as defined in the convention text, where heritage is defined as “a gift from the past to the future” and there are 10 criteria for the selection of WHC sites. Presently, the Convention has 189 member states and Cambodia accepted the convention in 1991 where there are two WHC sites, namely: the temple complex at Angkor (since 1992) and the Temple of Preah Vihear (since 2008) near Thailand, both of which are cultural heritage sites.

Oil pollution was the first kind of pollution that was recognized in the marine environment, and the **International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL)** was the first international marine pollution convention, which was adopted in 1954 and went into force in 1958. In 1967, a catastrophe occurred in the English Channel (wrecking of oil-tanker Torrey Canyon that discharged crude oil), which indicated that existing regulations and legislations were inadequate for accidents of such magnitude. Thus, the International Maritime Organization (IMO) drafted a plan of action which resulted in the International Convention for the Prevention of Pollution from Ships in 1973 (MARPOL 73/78). This Convention includes protocols, annexes and amendments added over the years as new problems had to be addressed. It was first adopted on 2 Nov. 1973 and a protocol was added on 17 February 1978 and entered into force on 2 October 1983, including Annex I (oil pollution). Annex II (noxious liquid substances) was entered into force on 6 April 1987, Annex V (garbage) on 31 December 1988, Annex III (harmful substances) on 1 July 1992, and Annex IV (sewage) on 27 September 2003. Annex VI (air pollution) was adopted in September 1997 and entered into force on 19 May 2005. The Convention indicates that it is the responsibility of flag states to ensure that vessels flying their flags do not discharge wastes or toxic substances into the sea, while it is the responsibility of port states to provide facilities for safe disposal of wastes. Cambodia has signed MARPOL 73/78 Annexes I-V but not Annex VI. Annex I, which has recently been amended (adopted 15 October 2004) and entered into force on 1 January 2007, includes amendments such as the phasing out of single-hull tankers. Meanwhile, revised Annex IV was adopted on 1 April 2004 and entered into force on 1 August 2005. Contrary to other conventions, MARPOL does not only depend on certain number of states signing it, but also requires that mercantile fleet of these states covers at least 50% of the world's total fleet by tonnage.

The **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter** or the so-called London Convention was adopted in 1972 and entered into force in 1975. Like MARPOL, this convention is housed with the IMO and has the objectives of controlling the sources of marine pollution and preventing pollution of the sea by dumping materials at sea. Prior to this convention, it was customary to transport and dump wastes at sea that were too dangerous to store on land (IMO Brochure in <http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx>). However, a protocol was adopted in 1996 and entered into force in 2006, which prohibits all dumping with the exception of a few substances that are considered “safe”. The Convention also provides guidelines for evaluating various wastes and analyzing materials intended to be dumped at sea. Cambodia has not yet signed this Convention.

The **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** was adopted in 1989 and entered into force in 1992. This developed due to an increasing trend in the shipping of hazardous wastes to developing countries where improper handling caused severe problems to human health as well as the environment. Under the Convention, any transboundary transport without “prior informed consent” is illegal, and parties are required to prevent and punish illegal transport as a criminal act. Parties are also required, as far as possible, to dispose of hazardous substances within the country, or as close to the country as possible. Cambodia has acceded to this convention in 2001.

The **Convention on Persistent Organic Pollutants (POPs)** or Stockholm Convention, which was adopted in 2001 aims to protect human health and the environment from the effects of POPs, considering that these substances, such as dioxins, have strong negative effects on living organisms, and are known to bio-accumulate and bio-magnify in the aquatic ecosystems. The convention entered into force on 17 May 2004, and Cambodia signed the Convention on 23 May 2001, but has not yet ratified it.

The **International Convention on the Control of Harmful Anti-fouling Systems on Ships (HAFS)** is another Convention adopted by members of IMO on 5 October 2001. It entered into force on 17 September 2008 after the signing by 33 states representing over 50% of the total world mercantile fleet by tonnage. Under this Convention, the international collaboration on addressing the issue of Tributyltin (TBT) pollution from anti-fouling paints started in 1988, and the first resolution was adopted by the Marine Environment Protection Committee (MEPC) of the IMO in November 1990. This resolution which banned the use of TBT in anti-fouling paints for vessels smaller than 25 m in length, was followed by another resolution in 1999, which calls on the MEPC to develop a global legally binding instrument to address the harmful effects of anti-fouling system. The Convention stipulates the phasing-out of the use of TBT from 2003 through 2008, but since the Convention had just entered into force, this time-frame was extended. Cambodia has not yet signed this Convention.

The **International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM)** is another Convention under IMO, which was adopted in 2004 and will enter into force only after 30 states representing 35% of the world's mercantile tonnage have signed. Its main objective is to prevent or minimize the transfer of harmful aquatic organisms and pathogens through the ships' ballast water and sediments. So far 28 countries, representing 25% of the world's tonnage have already signed the Convention.

The **United Nations Framework Convention on Climate Change (UNFCCC)** was launched at the Earth Summit in 1992, for the purpose of controlling human impacts on global climate changes. It entered into force on 17 March 1996, and Cambodia has ratified (acceded) this convention on 18 December 1995. This Convention recognizes that global climate change may affect marine ecosystems in a number of ways, most importantly through: (1) increased sea temperatures, (2) changes in sea level caused by melting of polar ice caps, precipitation and surface evaporation, (3) changes in annual current patterns (e.g. El Niño), and (4) increased acidity of sea water which makes it difficult for corals and other organisms to produce calcareous shells or skeletons. Coral bleaching is one of the major threats caused by increased sea temperature. Cambodia signed this Convention on 22 August 2002 including the Kyoto Protocol to minimize the emission of greenhouse gasses (GHG).

of Hazardous Wastes and Their Disposal, Convention on Persistent Organic Pollutants (Stockholm Convention), the International Convention on the Control of Harmful Anti-

fouling Systems on Ships (HAFS Convention), and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention).

Table 1. Conventions related to conservation of marine biodiversity

Convention	Depositary organization	Year adopted	Year entered into force	Cambodia signed/ratified/acceded	Web-site
IWC	Government of the USA	1946	1948	2006	http://www.iwcoffice.org/commission/convention.htm
Ramsar	UNESCO	1971	1975	1999	http://www.ramsar.org/
WHC	UNESCO	1972	1975	1991	http://whc.unesco.org/
London Convention	IMO	1972/1996	1975/2006	-	http://www.imo.org/
CITES	Government of Switzerland (Secretariat under UNEP)	1973	1975	1997	http://www.cites.org/
MARPOL	IMO	1973/1978/1997	1983-2005	1994	http://www.imo.org/
CMS or Bonn Convention	UN Secretary General	1979	1983	-	http://www.cms.int/
UNCLOS	UN Secretary General	1982	1994	1983	http://www.un.org/Depts/los/index.htm
Basel Convention	UN Secretary General (Secretariat with UNEP)	1989	1992	2001	http://www.basel.int/
CBD	UN Secretary General	1992	1993	1995	http://www.cbd.int/
UNFCCC	UN Secretary General	1992	1996	1995	http://unfccc.int/2860.php
HAFS	IMO	2001	2008	-	http://www.imo.org/
Stockholm Convention	UN Secretary General (Secretariat with UNEP)	2001	2004	2001/ 2006	http://chm.pops.int/ http://www.pops.int/old_default.htm
BWM Convention	IMO	2004	-	-	http://www.imo.org/

Meanwhile, over-exploitation of marine living resources is covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Wetlands of International Importance (Ramsar), Convention on Migratory Species (CMS) or the Bonn Convention, International Convention for the Regulation of Whaling (ICRW) that set up the International Whaling Commission (IWC), Biodiversity Convention (CBD), and parts of the United Nations Convention on the Law of the Sea (UNCLOS), which date back before the Rio Summit in 1992. While habitat destruction is covered by the World Heritage Convention (WHC), Ramsar Convention and the UNCLOS, introduction of alien aquatic species is the concern of CBD and the Ballast Water Convention, with climate change being under a specific convention, the United Nations Framework Convention on Climate Change (UNFCCC). An overview of the status of ratification and/or accession by Cambodia to various international conventions relating to the protection of marine environment and the conservation of marine biodiversity is given in **Table 1**.

Other Instruments

Furthermore, 16 conventions and agreements have been lodged with the Food and Agriculture Organization of the

United Nations (FAO). Several of these are concerned with marine resources, such as the Agreement for the Establishment of the Asia-Pacific Fishery Commission (APFIC) in 1948, Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (FAO Compliance Agreement) in 1993, and Agreement for the Establishment of the Indian Ocean Tuna Commission (IOTC) in 1993. In addition, a number of conventions and agreements are deposited with the Office of the Director-General of FAO, such as: the Agreement for the Establishment of the Intergovernmental Organization for Marketing Information and Technical Advisory Services for Fishery Products in the Asia and Pacific Region (INFOFISH) in 1986; and the Agreement on the Establishment of the Network of Aquaculture Centres in Asia-Pacific (NACA) in 1988.

The FAO Fisheries and Aquaculture Department and its principal authority, the Committee on Fisheries (COFI) is a global intergovernmental forum for examining fisheries issues and providing recommendations for governments, NGOs, and other stakeholders. COFI was established in 1965 and has now two sub-committees, one on Fish Trade and another on Aquaculture. Some of its important outputs are the Code of Conduct for Responsible Fisheries and

several International Action Plans such as the International Plan of Action on Conservation and Management of Sharks (IPOA-Sharks); International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fisheries (IPOA-IUU); International Plan of Action on Management of Fishing Capacity (IPOA-Capacity); and International Plan of Action on Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds).

Moreover, Agenda 21 which was adopted in 1992 during the Rio Summit is a global program of action for sustainable development. Comprising 40 chapters in 4 sections (I - Social and Economic Dimensions, II - Conservation and Management of Resources for Development, III - Strengthening the Role of Major Groups, and IV - Means of Implementation), several chapters are relevant to the conservation of marine biodiversity, particularly Chapter 17 on the protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources. An action agenda for the UN, other multilateral organizations and individual governments, Agenda 21 should be implemented at local, national, regional and global levels. Cambodia does not yet have an official National Agenda 21, but several steps have been taken to integrate sustainability in the country's future development plans.

International Non-governmental Organizations (INGOs)

The afore-mentioned conventions and organizations have national governments as their parties. However, there are few global-scale non-government organizations (NGOs) that have very important roles for the conservation of marine biodiversity. For example, the World Conservation Union or IUCN (<http://www.iucn.org/>) and the World Wide Fund for Nature or WWF (<http://www.panda.org>) provide expert knowledge and also practical field assistance to conservation projects at local or transboundary scales. The production of Red Lists assessing the threat-status of individual species is a major contribution of the IUCN Species Survival Commission. These lists as well as the Protected Areas Categories defined by the World Commission on Protected Areas are among the tools used by conservation practitioners in many countries.

IUCN and WWF both work in collaboration with local conservation managers and NGOs on the implementation of protected areas and other conservation measures. Both IUCN and WWF have their headquarters in Switzerland. In 1998, WWF produced the first Living Planet Report and since 2006 these reports have included both the Living

Planet Index and the Ecological Footprint, which can be used as indicators for the state of ecosystems and human impacts. TRAFFIC (<http://www.traffic.org/>) is a wildlife trade monitoring network, which was established in 1976 with WWF and IUCN as its partner organizations and also collaborates closely with CITES. Its headquarters are in Cambridge in the UK.

Regional Instruments

UNEP launched a Regional Seas Program in 1974 in 18 Regional Seas, and the East Asian Seas Action Plan was initiated in 1981 with five member states, namely: Indonesia, Philippines, Malaysia, Thailand, and Singapore. The main objective of the East Asian Seas (EAS) program is focused on the development and protection of marine environment and coastal areas for the health and well-being of present and future generations. Emphasizing on the assessment of the state of the marine environment including assessment of activities (land- or sea-based) that impact on environmental quality as well as on the environmental impact assessment for marine and coastal development activities for the protection and use of renewable resources in a sustainable manner, the EAS program was expanded in 1994 to comprise ten countries: namely: Australia, Cambodia, China, Indonesia, Malaysia, Philippines, Republic of Korea, Singapore, Thailand, and Vietnam.

In 1999, the Coordinating Body on the Seas of East Asia (COBSEA), which until recently was funded by UNEP, launched a comprehensive project on Reversing Environmental Degradation Trends in the South China Sea (SCS). The project started with a comprehensive analysis of existing environmental issues (Talaue-McManus, 2000), and over the succeeding years working groups were established in each of the participating countries to cover the various problems that had been identified. As a result, numerous data have been collected while reports have been published (<http://www.unepscs.org/>), the results of which are now being incorporated in national and regional biodiversity conservation and environmental management legislations. All data are stored at the Southeast Asia System for Analysis, Research and Training, Regional Center (SEA START RC) in Bangkok, Thailand (<http://www.start.or.th/>). Recently, COBSEA in collaboration with the ASEAN initiated a working group on Coastal and Marine Environment (AWGCME). The Global International Waters Assessment (GIWA) is another UNEP-associated project which is based on results of regional assessments. For the South China Sea, which is one of the regional marine areas, the resulting assessment report (UNEP, 2005) is available at <http://www.unep.org/dewa/giwa/publications/>. In addition, a number of regional

Box 2. International/Regional organizations working for the sustainable development of fisheries

WorldFish Center began in 1977 as the International Center for Living Aquatic Resources Management (ICLARM) based in the Philippines. In 2000, the name was changed and its headquarters were moved to Malaysia. WorldFish Center is an international, non-profit, non-government organization working in the developing world. It is supported by the Consultative Group on International Agricultural Research (CGIAR) which comprises a group of investors including development banks, governments, and philanthropic organizations, among others. WorldFish Center works for the development of sustainable small-scale fisheries and aquaculture for poverty reduction, including socio-economic as well as natural resource management issues. In 1999, a series of working papers on fisheries and coastal resources in several Asian countries including Cambodia was produced (ICLARM, 1999). Several reports have been published on various aspects of aquatic resources and fisheries in Cambodia (e.g. Kosal, 2004; Sverdrup-Jensen *et al.*, 2006). The WorldFish Center also houses a number of databases including the very useful FishBase (<http://www.fishbase.org/>) with information on identification and distribution of more than 30,000 species of fish from all over the world.

The Southeast Asian Fisheries Development Center (SEAFDEC) is an intergovernmental organization established in 1967 for the promotion of sustainable fisheries development in Southeast Asia. SEAFDEC has 11 Member Countries, namely: Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. One of its activities is on marine resources conservation including sharks, sea turtles, sea horses, abalone, giant clams, and sea cucumbers. Other activities include developing hatcheries/nurseries, implementing Turtle Excluding Devices (TEDs) and other by-catch reduction devices. SEAFDEC also works with governments in the ASEAN especially in implementing the Regional Code of Conduct for Responsible Fisheries as well as National Plans of Action in collaboration with FAO. SEAFDEC organizes training courses and workshops on various aspects of fisheries management, as well as works closely with CITES and WTO.

The Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) was started in 1994 as a program to prevent marine pollution in the East Asian region, and expanded later to include integrated coastal management. Staff from Cambodia participated in training courses and workshops from the pilot phase of PEMSEA. In 2003, PEMSEA developed the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), with 12 countries including Cambodia signing the Putrajaya Declaration to implement this strategy. PEMSEA now works towards attaining the Millennium Development Goals of the countries in the region. In 2009, eleven member countries signed the Manila Declaration to implement the Integrated Coastal Management for Sustainable Development and Climate Change Adaptation in the Seas of East Asia Region. Unfortunately, most PEMSEA publications are not available for free download, while there seems to be some problems about overlapping of responsibilities and activities between PEMSEA and COBSEA (Kirkman, 2006).

The Asia-Pacific Fishery Commission (APFIC) is a regional body under the FAO. The Agreement dates back to 1948 when it was called the Indo-Pacific Fisheries Council (IPFC) and since then, several amendments have been added (*i.e.*, in 1958, 1961, 1977, 1994, 1996). In 1994, the name was changed to APFIC and its work now concentrates on the regional aspects of fisheries issues. APFIC organizes regional workshops and publishes guidelines and technical reports, which are available for download from its web-site (Table 2).

The Network of Aquaculture Centres in Asia-Pacific (NACA) was launched through an Agreement signed in Bangkok in January 1988. It entered into force in 1990 and was deposited with FAO. NACA is an intergovernmental organization concerned with sustainable aquaculture development, health of aquatic organisms, genetics and biodiversity and other issues of aquaculture. NACA supported the STREAM (Support to Regional Aquatic Resources Management) project, which had activities in Cambodia and Vietnam.

The Intergovernmental Organization for Marketing Information and Technical Advisory Services for Fisheries Products in the Asia and Pacific Region (INFOFISH) was originally established based on an Agreement of FAO, but is now an intergovernmental organization. INFOFISH provides information on trade, markets, prices and other post-harvest issues (Table 2). Cambodia has been a member of INFOFISH since 2006.

The Intergovernmental Oceanographic Commission (IOC) has the IOC-WESTPAC as a regional sub-commission for the West Pacific region (WESTPAC). As of the present, Cambodia is not a member of this sub-commission. Several projects are associated with the IOC-WESTPAC, e.g. the regional Harmful Algal Blooms (HAB) project, the Southeast Asian Global Ocean Observing System (SEAGOOS), and the Marine and Coastal Biodiversity and Its Management (WESTPAC-MCBM) project. The main objectives of these projects are in line with the implementation of global IOC programmes, e.g. HAB, and the development and implementation of regional ocean observations (e.g. SEAGOOS) and other marine scientific research projects and activities (e.g. WESTPAC-MCBM).

organizations are involved in the sustainable development of fisheries in Southeast Asia as shown in **Box 2**. The details of some important regional instruments and organizations associated with living marine resources are summarized in **Table 2**.

Conclusion and Way Forward

Cambodia is in the stage of implementing processes of decentralization and deconcentration of its fisheries. Considering that these courses of action require increased stakeholder participation, it is necessary that all stakeholders are appropriately informed to encourage them to participate in the various community management councils as well as in the subsequent activities. Cambodia has tried its best to access/ratify/sign the various conventions and instruments as their roles in the sustainable development of

small-scale marine fisheries in the country have been well recognized. Therefore, it has also become crucial for the Government of Cambodia to integrate and/or mainstream in its fisheries policies and national legislations, relevant provisions of international conventions and agreements for the sustainability of the country's marine fisheries industry.

The fisheries sector in Cambodia comprises extensive inland capture fisheries, a relatively small number of aquaculture activities, and marine capture fisheries that operate mainly in the country's EEZ of about 55,000 km² (Ing Try and Hort Sitha, 2011). Taking into account the country's marine features that embrace a coastline of only about 435 km along the Gulf of Thailand, production from marine capture fisheries in 2010 contributed only about 16% to the country's total fisheries production (**Table 3**). Marine fisheries in Cambodia could be classified into

Table 2. Regional instruments and organizations associated with living marine resources

Regional instruments/ organizations	Location of headquarters/depository organizations	Year adopted/ amended	Year entered into force	Cambodia signed/ ratified	Web-site
Action Plan for East Asian Seas	Part of UNEP Regional Seas program, with headquarters in Bangkok, Thailand	1981/ 1994	1983/ 1994	1994	http://www.unep.org/regionalseas/programmes/unpro/eastasian/instruments/default.asp
COBSEA	Associated with UNEP with headquarters in Bangkok, Thailand	1994		1995	http://www.cobsea.org/
PEMSEA	Associated with UNDP and IMO with headquarters in Quezon City, Philippines	1994/ 2003		1994	http://www.pemsea.org/
SEAFDEC	Secretariat as its headquarters in Bangkok, Thailand	1967		2001	http://www.seafdec.org/
WorldFish Center	Headquarters in Penang, Malaysia (since 2000)	1977/ 1993			http://www.worldfishcenter.org/
APFIC	Agreement associated with FAO with headquarters in Bangkok, Thailand	1948/ 1997		1951	http://www.apfic.org
INFOFISH	Headquarters in Kuala Lumpur, Malaysia	1986/ 1995	1987/ 1996	2006	http://www.infofish.org/
NACA	Agreement associated with FAO with headquarters in Bangkok, Thailand	1988	1990	1992	http://www.enaca.org/
IOC/WESTPAC	Associated with UNESCO with headquarters in Bangkok, Thailand	1989		-	http://www.unescobkk.org/wespac/

Table 3. Fisheries production of Cambodia (in metric tons: mt)

Year	Total Fisheries Production (mt)	Marine Fisheries Production		Inland Fisheries Production		Aquaculture Production	
		Production (mt)	% of Total Production	Production (mt)	% of Total Production	Production (mt)	% of Total Production
2006	661,542	60,500	9.1	559,642	84.6	41,400	6.3
2007	525,100	54,900	10.4	420,000	80.0	50,200	9.6
2008	536,320	66,000	12.3	430,600	80.3	39,720	7.4
2009	515,000	75,000	14.6	390,000	75.7	50,000	9.7
2010	550,000	85,000	15.5	405,000	73.6	60,000	10.9

Source: Fishery Statistical Bulletin of Southeast Asia 2010 (SEAFDEC, 2012)

coastal and commercial fisheries, where coastal fisheries are also known as family-scale fisheries operating from the coast to 20 m water depth, and using fishing boats without engines or with engines of less than 50 hp capacity. Commercial fisheries make use of large-scale fishing boats with engine capacity of more than 50 hp and operate in waters more than 20 m in depth to the limit of the country's EEZ.

The coastal waters of Cambodia support a diverse range of fish and invertebrate species, where the main commercially-important marine aquatic species include mackerels, scads, anchovies and snappers, penaeid shrimps, blue swimming crabs, cuttlefish, squid, green mussels, oysters and blood cockles. Recently, the country's marine fisheries have significantly expanded, especially in terms of the number of fishers and fishing boats that resulted in increased pressure on the fishery resources. Moreover, reports have also indicated that the country's habitats have been degraded due to unabated destructive fishing practices that continue

until the present, such as the use of dynamites and cyanide in fishing as well as illegal trawling in shallow coastal areas known to host the nursing stages of fish.

In addition, the uncontrolled destruction of mangrove areas for firewood and aquaculture as well as siltation and pollution from agriculture and industrialization activities aggravate the already dwindling status of the country's marine fisheries resources. In summary, Cambodia envisions to attain the sustainability of its marine fisheries resources to enable the country to uplift the socio-economic conditions of its people especially those living in coastal fishing communities.

The present handbook therefore would serve as useful reference for the country to attain its development goals, as it summarizes the most important information about international and regional conventions and instruments related to the sustainable development of small-scale marine fisheries as well as the conservation of marine resources and

biodiversity, especially catering to developing countries of the Southeast Asian region including Cambodia. The international and regional conventions and instruments that are tabulated in the handbook include links to their respective web-sites to permit easy access in case further information is required.

References

- CBD Secretariat. 2010. Global biodiversity outlook 3. Montreal, Canada; 94 p (Available at <http://www.cbd.int/GBO3>, accessed 2 June 2010)
- ICLARM. 1999. Management of fisheries, coastal resources and coastal environment in Cambodia: Institutional, legal and policy perspectives. The Cambodia Working Group. ICLARM Working Paper. Policy, Legal and Institutional Studies; 92 p
- Kirkman, H. 2006. The East Asian Seas UNEP Regional Seas Programme. International Environmental Agreements 6: 305-316
- Kosal, M. 2004. Existing institutional, legal and policy frameworks for wetlands management in Cambodia. *In*: Wetlands management in Cambodia: Socioeconomic, ecological, and policy perspectives (eds. M. Torell, A.M. Salamanca and B.D. Ratner). WorldFish Center Technical Report 64, Penang, Malaysia; pp. 25-26
- MoE. 2002. National Biodiversity Strategy and Action Plan. To use, protect and manage biodiversity for sustainable development in Cambodia. FAO/UNDP/GEF Project CMB/98/G33; 74 p
- SEAFDEC. 2012. Fishery Statistical Bulletin of Southeast Asia 2010. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 143 p
- Smith, J. 2001. Biodiversity, the life of Cambodia- Cambodian Biodiversity Status Report 2001. Cambodia Biodiversity Enabling Activity, Phnom Penh, Cambodia; 244 p
- Sverdrup-Jensen, S., P. Degnbol and M. Ahmed. 2006. Guide to fisheries policy research in Cambodia – the institutional and legal context. WorldFish Center Discussion Series No. 5. WorldFish Center, Penang, Malaysia; 44 p
- Talaue-McManus, L. 2000. Transboundary Diagnostic Analysis for the South China Sea. EAS/RCU Technical Report Series No. 14. UNEP, Bangkok, Thailand; 105 p
- Try, Ing and Hort Sitha. 2011. Promoting Effective Fisheries Co-management through the Community Fisheries in Cambodia. *In*: Fish for the People Vol. 9 No. 2 (2011). Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 73-78
- UNEP. 2005. Wilkinson, C., L. DeVantier, L. Talaue-McManus, D. Lawrence, and D. Souter. South China Sea, GIWA Regional Assessment 54. University of Kalmar, Kalmar, Sweden; 86 + xv p (Available at <http://www.unep.org/dewa/giwa/publications/>; accessed on 25 April 2008)
- UNESCO World Heritage Centre. 2008. World Heritage Information Kit. Paris, France; 32 p (Available at <http://whc.unesco.org/uploads/activities/documents/activity-567-1.pdf>, accessed on 17 April 2012)
- Wijnstekers, W. 2011. The evolution of CITES – 9th edition. International Council for Game and Wildlife Conservation; 941 p (Available at http://www.cites.org/common/resources/Evolution_of_CITES_9.pdf, accessed 17 April 2012)

About the Authors

H.E. Dr. Nao Thuok is the Director-General of the Fisheries Administration of Cambodia, and SEAFDEC Council Director for Cambodia, based at Preah Norodom Boulevard 186, P.O. Box 582 Phnom Penh, Cambodia (email: naothuok.fia@maff.gov.kh).

Mr. Ing Try is the Deputy Director-General of the Fisheries Administration of Cambodia and SEAFDEC National Coordinator for Cambodia, based at Preah Norodom Boulevard 186, P.O. Box 582 Phnom Penh, Cambodia (email: tmmp.cam@online.com.kh).

Dr. (Ms.) Kathe R. Jensen is from the Zoological Museum (Natural History Museum of Denmark), based at Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark (email: krjensen@snm.ku.dk).



Managing Overcapacity of Small-scale Fisheries in Vietnam

To Van Phuong and Tran Duc Phu

Fisheries in Vietnam are largely classified as small-scale where fishing activities are mostly conducted in near-shore waters. Specifically, marine fisheries in Vietnam have reached a state of over-exploitation with the fisheries resources already declining. As a consequence, small-scale fisheries in Vietnam have also experienced the repercussions of overcapacity. In an effort to address this concern, the Government of Vietnam promotes various measures and programs that focus on the management and reduction of fishing capacity, as discussed briefly in this article. However, the Government remains in quandary because in spite of the promulgated fisheries management measures, overcapacity of the country's small-scale fisheries has not been successfully addressed.

Small-scale fisheries play a crucial role as source of livelihood and income for millions of people in Vietnam. Reports have indicated that during the past two decades, the marine fisheries resources of Vietnam have been overfished and have since then been declining (DANIDA, 2010; Long and Dung, 2010; Pomeroy *et al.*, 2009), which could be attributed to the number of fishing vessels that has substantially increased. The country's fishery statistical reports indicated that the number of fishing vessels in Vietnam had risen to approximately 130,000 in 2010, which subsequently led to the rapidly decreasing catch per unit of effort (CPUE), for example from 1.1 mt per Hp in 1985 to 0.34 mt per Hp in 2005. As a consequence, small-scale fisheries are also confronted with the problem of overcapacity, since the capacity to capture fish is much larger than the quantity of the target to be captured. In view therefore of the country's eminent dwindling marine fisheries resources, the Government of Vietnam declared that overcapacity should be urgently addressed since it



A small-scale fisher's commune in Vietnam

has reached a point where the repercussions could severely affect the sustainable development of small-scale fisheries in the whole country.

Therefore, in an attempt to manage and reduce fishing capacity, the Government of Vietnam implemented various measures and programs including Decision No. 10/2006/QD-TTg and Decision No. 393/TTg. These two measures (**Box 1**) are aimed at reducing the number of fishing vessels in order to achieve sustainability in marine fisheries development. As a result however, the number of fishing vessels did not decrease over time, but has rapidly increased instead, an exact opposite of the goal due to the inability of fishers to comply with the requirements of such measures.

Box 1. Features of Decision No. 10/2006/QD-TTg and Decision No. 393/TTg of Vietnam

Decision No. 10/2006/QD-TTg: based on the new Master Plan for Fisheries Development 2010 and Orientations Toward 2020, the Decision calls for the fisheries sector to reduce the number of fishing vessels down to one-half by 2010 and the number of vessels with engines less than 45 Hp from 64,000 to 30,000 vessels by 2010. However, fishers have the option to upgrade their small vessels to larger vessels/larger-scale to be able to fish offshore or stop fishing and seek other jobs.

Decision No. 393/TTg: promulgated in July 1997, the Decision supports the construction by the government of fishing vessels to be sold to fishers at subsidized (reduced) prices.

Fisheries Sector of Vietnam

Vietnam has a coastline of 3260 km that crosses 13 latitudes from 8°23' N to 21°39' N, and embraces about 4000 islands. Its coast hosts more than 400,000 ha of mangrove stands, and envelops more than one million km² of EEZ (VASEP, 2011). Vietnam's 28 coastal provinces are being inhabited by over one-half of the total population of the country. Its fisheries sector is one of the most important sources of the country's economic growth, rural employment, household nutrition, and foreign exchange earnings. The sector, which comprises capture and aquaculture, has dramatically expanded over the last two decades. Specifically from 1998 to 2008, among all the development sectors of Vietnam, its fisheries sector gained the highest economic growth at an annual rate of 18% (DANIDA, 2010).

The total fisheries production of Vietnam was 5,127,600 mt in 2010, while its exports totaled 4.94 billion USD. Given such development, the country's fisheries sector accounted



million Hp (Long and Dung, 2010). Moreover, the average engine capacity (Hp) of fishing vessels has also become more powerful, increasing by over 21% per year, from 10.9 Hp to 52.1 Hp over a 20-year period (Fig. 2).

The official record of fishing vessels shown in Fig. 2, however, does not include small fishing vessels with engine capacity of less than 20 Hp, as these are not managed by provincial offices in accordance with Article 16.1 of the Fisheries Law of Vietnam. Thus, the available information could only be an indication but without showing the actual number of fishing vessels. The true amount of capacity, particularly in inshore waters, could therefore be underestimated considering that the number of unregistered vessels could comprise a significant portion of the country's total marine fishing capacity. The sudden rise in the number of vessels in 2008 could not only be attributed to new fishing capacity entering the fisheries sector but also to the conditions associated with the fuel price subsidy of 2008 based on Decision No. 298 which resulted in the registration of incumbent capacity of an estimated number of 30,000 fishing vessels (DANIDA, 2010). Moreover, the Directorate of Fisheries revealed that after Decision No. 298 was launched, the number of fishing vessels with engine capacity of less than 20 Hp suddenly increased from 31,949 in 2007 to 64,802 in 2010 (DoFi, 2011).

for 4.5% of its national GDP (Fistenet, 2010; Pomeroy *et al.*, 2009) as shown in Fig. 1. Consequently, the number of fishing vessels increased rapidly from 44,000 in 1991 to approximately 130,000 in 2010 at an average rate of 4.8% per year, with a total engine power capacity of 6.17

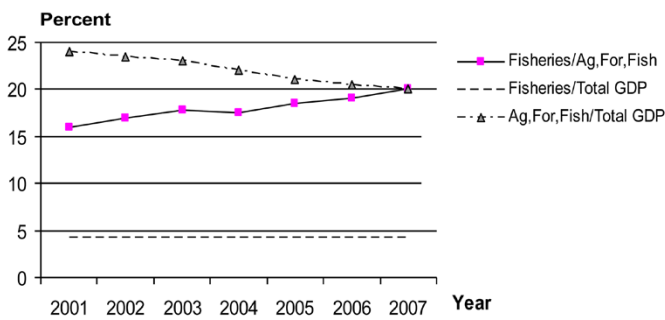


Fig. 1. Percent share of fisheries in the national GDP of Vietnam (Adapted from DANIDA (2010))

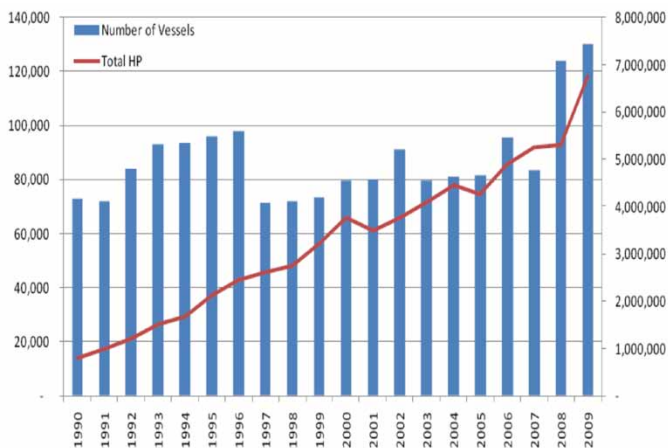


Fig. 2. Trend of marine capture capacity (number vessels and Hp) between 1990 and 2009 (DANIDA, 2010)

During the decade from 1990 to 2000, the number of small fishing vessels (with engines less than 45 Hp) operating in the country's inshore waters also increased by an average of 2,300 vessels per year. Moreover, approximately 50% of the vessels with less than 20 Hp engine capacity, about 72% of the total mechanized vessels of less than 45 Hp, and 86% of the overall fishing vessels have been operating in waters 4-5 nautical miles away from the coast and in waters less than 50 meters in depth (FAO, 2004; Pomeroy, 2010), thus, could be classified as near-shore fishing vessels. Furthermore, a government policy which has been promoted for several years since 1997 encourages the expansion of offshore fleet under the Government's subsidized-interest scheme, by financing the construction of 1,300 offshore vessels. Nevertheless, only 14% of these vessels are currently fishing offshore with the remaining 86% fishing mostly in inshore waters.

Meanwhile, the marine capture fisheries of Vietnam continued to develop rapidly from 1990 to 2008, but their catch gradually stagnated as reflected in the significantly declining growth rate to levels just above zero (Fig. 3). If such trend should continue, the growth rate of the marine catch could be predicted to get close to zero or even reach a negative growth rate in the coming decades.

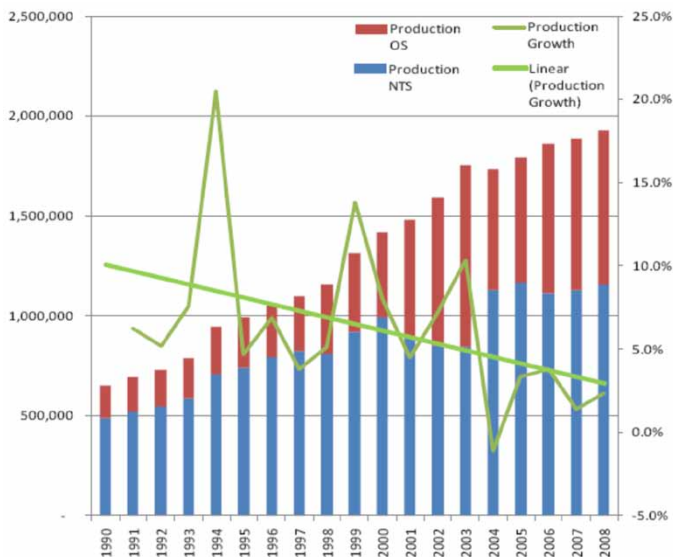


Fig. 3. Trend of Vietnam's marine capture fisheries production in tons and percent (DANIDA, 2010)

Note: OS denotes offshore and NTS is near-to-shore

Nonetheless, many scientists as well as industry insiders believe that the real level could be much higher in spite of the official statistics report that showed landings of less than 2.0 million metric tons (Fig. 3). In fact, DoFi (2011) and DANIDA (2010) had predicted the actual landings in 2004 to be about 2.5 million tons.

Furthermore, Pomeroy (2010) cited that approximately 82% of Vietnam's total catch is derived from waters less than 50 m in depth, which implies that such catch must have been derived from near-shore fishing activities. As a consequence, the coastal landings could be higher than the maximum sustainable yield as these continued to show increasing growth without stopping. This development reflects a situation where possible biological overfishing occurs in the country's marine waters, especially at depths of less than 50 m.

Case Study

There is an increasing concern worldwide about the negative impacts of overfishing as well as overcapacity from the aspect of fisheries sustainability, to the social and economic conditions of fishers and fishing communities. Overcapacity, according to Ward *et al.* (2004), "can be considered as generic term for excessive levels of capacity in the longer term and relates to some long-term desirable level of capacity (the target capacity), which may either come as long-term target sustainable yield or some long-term target level of capital employed in the fishery". Other researchers defined overcapacity as "the situation where the capacity to capture is much higher than the target to be captured" (Pascoe *et al.*, 2003). In simple

terms, overcapacity therefore refers to the fact that there are "too many fishers chasing too few fishes" (Pomeroy, 2011). Nevertheless, many indicators could now be used to pinpoint the existence of overcapacity in small-scale fisheries especially in developing countries including Vietnam.

A case study was therefore conducted to identify the problems and challenges encountered by fishers and fishery management authorities in Vietnam that could explain their inability to heed to the fishing capacity reduction policies of the Government. The study made use of a mix of descriptive statistical analysis and subjective assessment methods through theoretical and descriptive legal research utilizing compiled primary and secondary data. Secondary data were collected from fisheries agencies, international reports and papers, and proceedings of conferences, among others, and used to assess the status and dynamics of fishing vessels, the number of fishers, landings, CPUE, and status of marine resources over time. Primary data were compiled to identify the causes and impacts of overcapacity including the implications of the fishing capacity management policies in the small-scale fisheries sub-sector of Vietnam. Secondary data were also applied in the development of subjective assessment and quality indicators that could illustrate the state of overcapacity in the country's small-scale fisheries.

Specifically for the case study, possible indicators were determined by collecting necessary fishery information from knowledgeable individuals, such as fisheries experts, scientists, fishers, middlemen, and other fishery-related stakeholders who have been associated with the country's fisheries sector for several years. In addition, observations provided by key informants as well as those compiled through surveys and group interviews were analyzed using the Delphi technique and rapid appraisal methods, since these approaches are known to provide information on historical changes and trends in the fisheries (Pomeroy, 2011; Ward *et al.*, 2004). Moreover, results of the qualitative assessments of overcapacity have been considered as verifiable indicators as these are based on scientific methods (Pomeroy, 2011; Ward *et al.*, 2004), and thus, could be used to identify several indicators such as the biological status of the fisheries, harvest-target catch ratio, TAC/season, conflicts in fishing activities, CPUE, value per unit of effort, and age of fleet, among others.

Relationship between Landings and Number of Vessels

Since the nature of fisheries in Vietnam is multi-dimensional in terms of species, gears and fishing capacity, the most common measure used to analyze overcapacity is catch per horse power for motorized vessels. However, as shown

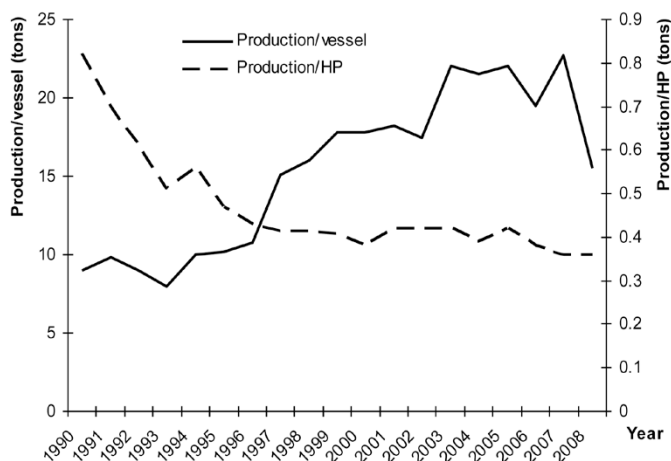


Fig. 4. CPUE of marine capture fisheries in Vietnam Modified after DANIDA (2010)

in Fig. 3, the total catch and catch per vessel increased continuously while the marine capture productivity (average CPUE) defined as production per aggregate horse power, has rapidly decreased (Fig. 4), which illustrates the falling harvesting productivity of the marine fisheries in Vietnam. The official report which showed that the productivity (CPUE) has dropped from 1.11 tons per Hp in 1985 to 0.89 ton per Hp in 1991, and to 0.34 ton per Hp in 2005, is indicative of a rapid decline in productivity in relation to the unit effort (Pomeroy, 2010).

Fisheries Policies related to Management of Overcapacity

Fisheries governance system of Vietnam

It should be noted that policies of the Government of Vietnam are defined in terms of Laws, Decrees, Decisions, Ordinances, Circulars, and Regulations, with the latter enforced at provincial level. The provinces are the lowest authorities at which policies and regulations are drafted consistent with corresponding national legislations. The country's fisheries sector is therefore in general, managed in a top-down manner.

Prior to the implementation of Vietnam Fisheries Law

By mid 1990s, most proclamations of the Government of Vietnam indicated full recognition of the state of overcapacity in the country's small-scale fisheries. Strategies were therefore crafted to address the issue, which included reducing coastal fishing pressure and developing offshore fisheries. However, the specific management measures that could address overfishing in coastal waters were not put in place, except those that aim to protect the fisheries resources and limit the operations of coastal/inshore fishing vessels with engine capacity of less than 30 Hp (Pomeroy *et al.*, 2009). Specifically, a state legislation was also introduced in 1997 which limits the construction

of fishing vessels with less than 20 Hp engines, which later on were eventually banned from operating after 1998.

In practice however, these same fishing vessels continue to operate in inshore waters, which together with larger fishing vessels and new small vessels, are trying to avoid registration. This situation entails the need for a thorough review and redefinition of such policy which could perhaps include a mandatory license-surrender policy. Nonetheless, many provincial officials expressed the view that implementing this law could only lead to disruptions in fishing operations which in turn could create hardships on the part of small-scale fishers considering that they do not have access to funds for building bigger vessels. Therefore, it could be perceived that only a gradual implementation of such policy could possibly work.

After the introduction of Vietnam Fisheries Law

Currently, various management policies have been introduced to address the problems in small-scale fisheries in general, and overcapacity in particular. The first and most important law is the Fisheries Law of 2003, which is currently still in effect. Under the Fisheries Law, one of the most important policies for reducing overcapacity is contained in **Decision No. 10/2006/QĐ-TTg** which was approved by the Prime Minister on 11 January 2006. Based on the new Master Plan for Fisheries Development up to 2010 and Orientations Towards 2020, such Decision stipulated that by 2010, the fisheries sector should have reduced the number of fishing vessels down to one-half of its present total number. Specifically, under the Master Plan, the present number of fishing vessels with engines less than 45 Hp, most of which are small-scale vessels operating in near-shore waters, should be reduced from 64,000 to only 30,000 by 2010.

Fisheries subsidies for small-scale fisheries of Vietnam

Although it is difficult to quantitatively measure the extent of the impacts of fisheries subsidies provided by the Government of Vietnam, detailed information and data on marine fisheries subsidies were compiled and an analysis was conducted through recent studies, to understand the status of overcapacity in small-scale fisheries of Vietnam (DANIDA, 2010). The information was also used to determine how such subsidies have impacted on the fisheries sector. In totality, the fisheries subsidies provided until 2009 were estimated to be about USD 316,633,000.00. In addition, the subsidies were classified in the aforementioned studies as "good subsidies" which amounted to USD 48,537,000.00, and "harmful subsidies" dubbed by some scientists as "bad and ugly subsidies" (Sumalia and Pauly, 2006) amounting to USD 268,096,000.00.

Box 2. Some forms of harmful (bad and ugly) fisheries subsidies in Vietnam

i) Natural resources tax

Before 2005, resources and revenue taxes from inshore and offshore fishing operations were collected, but since 2005 these had been discontinued. Nevertheless, a new law was introduced in 2009 that enforces the payment of fisheries resources tax.

ii) Reduced registration taxes

A 50% cut in the registration tax for offshore capital investments especially for constructing new vessels has been imposed, including taxes for purchase of new and more fuel-efficient machinery for offshore fishing. This policy has caused certain drawbacks for the marine resources, since fishing effort has increased which eventually led to increased number of fishing vessels for offshore and near-shore fishing activities. It is however dismal to note that some offshore fishing vessels have been going back to the coastal areas to fish because of difficulties in finding fish in offshore waters and the high costs entailed in offshore fishing operations.

iii) 2008 fuel price support

Fuel price subsidy was provided to fishing vessels operating in offshore and near-shore waters, but in order to be eligible for such subsidy, fishers should comply with various conditions, such as: (i) fishers should be at sea for at least six months every year, and (ii) should have in their possession all the required fishing vessel and gear registration. The latter condition had indirectly induced a sudden increase in the number of registered small fishing vessels by about 30,000 vessels in two years! The total cost of this subsidy has been estimated to reach about USD 91.0 million (DANIDA, 2010).

According to UNEP (2008), good subsidies on one hand, could help achieve responsible fishing practices as these usually come in the form of assistance in fisheries management, crafting of legislations, implementation of statistical information programs, development of MPAs, establishing insurance schemes for vessels and fishers, and promoting safety at sea measures, among others. On the other hand, harmful or the so-called bad and ugly subsidies are those which contribute to overfishing. In the case of Vietnam, harmful fisheries subsidies include the removal of resources tax and revenues, granting of short-term fuel subsidies which the Government provided in 2008-2009, and providing loans to fishers to enable them to engage in offshore fishing operations. It should also be noted that in the case of Vietnam, mechanisms have not been developed to ensure that such harmful subsidies do not violate the country's coastal fisheries plans. Some examples of harmful or bad and ugly fisheries subsidies in Vietnam are shown in **Box 2**.

In the case of Vietnam, such harmful fisheries subsidies have negatively impacted on the implementation of policies that primarily aimed to reduce fishing capacity in near-shore areas. Nonetheless, the promotion of such subsidies had unintentionally uncovered the truth about decommissioned vessels which continue to fish instead of plainly disappearing from fishing grounds. Usually, high fuel costs should have discouraged most offshore vessels from continued fishing but the fisheries subsidies in the

form of fuel price support had prompted more vessels to re-enter the fisheries sector.

Thus, many vessel owners opted to continue fishing operations in order to receive the subsidies. Otherwise their vessels should have just stayed in ports because of the observed decreasing fish stocks. As a result, more vessels continue operating in the coastal areas doing more harm to the already degraded resources. In reality, many subsidized offshore fishing vessels return to near-shore areas and compete with small-scale fishers. As a matter of fact, reports of the Directorate of Fisheries on the progress of the implementation of its fisheries development plans, showed that from 2006 to 2010, at least 14,000 fishing vessels have remained in ports before the fuel subsidy was implemented (DoFi, 2011), but later and in order to enjoy the subsidies, the same vessels have been known to continue fishing in the coastal waters.

Challenges in Small-scale Fisheries of Vietnam

From the perspective of the fishers, their current socio-economic conditions have contributed to their inability to comprehend and accept the rationale behind the policies of the Government of Vietnam that aim to address overcapacity in small-scale fisheries. More specifically, the small-scale fishers' educational preparation, where only 2.0% received higher education, out of which 39.1% attended primary school, 38.1% attended secondary school, and 16.5% completed high school, and in particular about 3.1% did not go to school (Hao, 2009), is not adequate enough for them to comprehensively perceive the issue of overcapacity in fisheries. When asked during the survey on *what they think about the proposed reduction of fishing capacity/fishing vessels by the Government* which comes with various options including limited entry to the fisheries through license limitation and limiting the number of fishers, most fishers expressed their opposition against the policy on reducing the number of fishers. They justified that fisheries have provided them with steady year-round incomes, and that they have always been dependent on fisheries for their livelihoods and stable living conditions over time.

Nevertheless, some respondents also suggested that the Government should create alternative livelihoods and promote credit schemes if they are to get out from the fisheries sector, considering that alternative sectors where they could find possible employment seem inadequate. Small-scale fisheries have therefore been considered by many fishers in coastal communities of Vietnam, as "*employer of last resort*". In spite of the attempts of the

Government to encourage small-scale fishers to go offshore to fish by providing various support schemes, especially in terms of capital, fishing technologies and upgrading of their vessels, their inadequacy in terms of educational level and training background, strongly challenged them in accessing new fishing technologies relevant to offshore fishing. As a consequence, many offshore fishing vessel operators reported that getting sufficient skilled crew members to operate offshore fishing and man their fishing vessels, has become extremely difficult. In fact, some offshore fishing operations had been cancelled or delayed in many instances, due to insufficient number of crew members.

Competition and Conflicts in Marine Capture Fisheries

Records have shown that in 2010, the number of fishing vessels less than 45 Hp and non-mechanized fishing vessels was 98,239, and being considered as small-scale, these vessels have been actively fishing in coastal seawaters. From the findings of the case study in three coastal provinces (Khanh Hoa Province, Binh Thuan Province and Binh Dinh Province) in central Vietnam, over-exploitation and exhaustion of the coastal resources have resulted in reduced earnings of small-scale fishers from fishing activities, *i.e.* a reduction of about 70% compared with their earnings 5 or 10 years earlier, while there were instances when their earnings were not even enough to defray their operating costs. It is in such a situation that conflict among stakeholders ensues and becomes unavoidable, worsening over time, as many fishers are competing for the same resources. Moreover, conflicts also occur between small-scale fishers and large-scale fishers, among fishing fleets, among fishing vessels, between local fishing vessels and foreign fishing vessels, and so on. Since fishing fleet with more than 45 Hp could no longer fish in their designated fishing grounds due to the declining resources, the same fleet are now fishing in coastal waters (near-shore) and compete with the authentic coastal fishing fleets of small-scale fishers. The competition becomes stiffer all over the coastal zones, resulting in heightened fishing pressure due to increased recruitments of hundreds of small fishing vessels every year (an average 2,300 vessels per year).

Moreover, the increasing number of fishing vessels in near-shore waters has led to decreasing mean catch per unit effort (CPUE), *i.e.* from 1.11 tons per Hp in 1985 to 0.34 ton per Hp in 2005, which implies that the high density of fishing vessels in near-shore waters delivered low capture yields. It should be noted that about 60% of the total allowable catch is exploited by 86% of the vessels operating in near-shore waters that represent about 25% of

the total EEZ of Vietnam. Therefore, as the mean CPUE decreases, fishers tend to increase their fishing intensity by: (i) increasing the number of hauls per fishing day or number of fishing days per year; (ii) reducing the mesh size, thereby contributing to increased ratio of juveniles caught; and (iii) applying various unsustainable fishing techniques such as high-powered lights, different kinds of fishing gear or other means that could create negative impacts on the environment. In fact, non-selective fishing gear like stow nets (in estuaries), fixed nets, and push nets are still being employed by fishers in Vietnam (Long, 2003). Severe competition for the degrading coastal resources would only bring the poor fishers to a worse situation where they are forced to use any kind of fishing technique just to survive. To mitigate such situation, it is necessary to devise appropriate management policies aiming to control the number of vessels that freely attach to coastal fishing fleets and subsequently reduce the fishing pressure in coastal waters. However, *the dilemma* is: reducing the number of fishing vessels will in turn strongly impact on the socio-economic conditions of poor fishers.

Poverty in Small-scale Fisheries

According to Béné (2003), a relationship exists between fisheries and poverty, *viz.* “*they are poor because they are fishermen*” and “*they are fishermen because they are poor*”. Small-scale fishers have been considered the poorest of the poor because of the endogenous and exogenous origin of poverty in fisheries. In Vietnam, 157 coastal communities



Fishing vessels anchored at Nha Trang Bay, Vietnam
Source: www.google.com.vn/tauthuyenngheca

have been identified by MoFi (2005) as special difficult communes. Although these coastal communities may not necessarily be the poorest, but these are among the most vulnerable socio-economic groups (Béné, 2008). In this case, vulnerability should be understood in terms of the people's exposure to risks, sensitivity of their livelihood systems to such risks and their capacity to use their assets and capabilities to cope with and to adapt to these risks (Pomeroy and Andrew, 2011). DANIDA (2010) reported that coastal vulnerability is relatively high in Vietnam, and an increasing part of the population which is relatively poor has relatively high levels of un- and under-employment. In the coastal small-scale fishing communities of Vietnam, about 25,000 people enter the fisheries sector annually where majority of the small-scale fishers is significantly dependent on the fisheries resources for their food and livelihoods, and operates close to or at subsistence level. Therefore given the current state of the fisheries resources, small-scale fishers found that their "bread and butter" today has become more expensive and difficult to obtain, much more so of their food for tomorrow which is being threatened.

While the number of fishers and vessels, and aggregate capacity in Vietnam's fisheries continue to increase, the new entrants are the underprivileged who are unable to invest in larger vessels, and lack the opportunities for seeking alternative livelihood possibilities. As such, it is inevitably almost certain that the poor children will follow their parents to the waters. While recognizing that future livelihood in fishing and stable income for their children become vague, fishers although in some (rare) cases, are encouraging their children to go to school to enable them to seek better livelihoods elsewhere in different sectors and in different regions of the country (DANIDA, 2010).

Nevertheless, children who could not go to school or who will receive lower level of education also become poor in the future like their parents, and would continue to live in a vicious cycle associated with poverty in fisheries (Kato, 2008). As a result, "they will become fishermen because they are poor" and "they will be poor because they are fishermen", which Béné (2003) aptly likened to "fisheries = poverty". It is dismal to note that in Vietnam, both paradigms seem to exist at the same time!

Problems Emanating from Current Management Policies

Results of the case study also indicated the difficulties in implementing the 2003 Fisheries Law of Vietnam, especially putting it into force in the fisheries sector of

the country. Many fishers do not seem to comply with the Law since this has not been comprehensively enforced by the local government units. In addition, the government at national, provincial and district levels still lacks the capacity and resources to plan for and implement fisheries management schemes, since most government fisheries projects in particular, are focused more on increasing production outputs including subsidies and improvements in processing, rather than on sustainable fisheries management. Moreover, government investments for offshore fisheries expansion have almost been ineffective in meeting the key targets for job diversification and poverty alleviation. Instead, these have likely contributed to greater serial depletion of near-shore resources and increased fishing capacity in near-shore waters as described in **Box 3**.

Various reasons were identified by many fishers in the provinces that could justify the unsuccessful implementation of the afore-mentioned policies. These include: (i) inadequate offshore technologies such as maritime machinery, fishing gears and conservation measures; (ii) insufficient experience of skippers and crew; (iii) fishing vessels of predefined and inappropriate specifications cost 20-50% more than counterpart private vessels; (iv) lack of follow-up and support by financial and fisheries institutions; (v) belief that non-payment of loans is a norm, and (vi) purposive delays in loan repayments by some of the more successful fishing vessel operators. These reasons were alleged to be influenced by various factors as shown in **Box 4**.

Box 3. Impacts of the current fisheries management policies of Vietnam
<p>Decision No. 393/TTg of July 1997 was meant to encourage small-scale fishers to exploit offshore waters, with the objective of increasing the number of fishing vessels of more than 90 Hp through a program that supports the construction of vessels to be sold to fishers at subsidized interest rates (low rate). However, there was high rate of failed repayment on the subsidized vessels with only about 14% of the 1,300 fishing vessels funded under the program, having complied with their scheduled repayment, despite a reduction of the interest rate in 2003 from 7.0% to 5.4%. In other words, only 14% of these fishing vessels are operating in offshore areas (MoFi, 2005) while the rest may be operating in inshore waters.</p>
<p>Decision No. 10/2006/QD-TTg encouraged the fisheries sector to reduce the number of fishing vessels down to one-half of its number in 2010, implying that by such time the whole fleet should comprise approximately 50,000 vessels, while the present number of 64,000 vessels with engines less than 45 Hp should be reduced to 30,000 vessels by 2010. However, since enforcement of the Plan was ineffective, the goal of reducing the number of vessels to 50,000 remained un-achievable. As a result, the number of fishing vessels did not only decrease but had rapidly increased over time. With about 2,300 new fishing vessels joining the fisheries sector each year, by 2010 there were approximately 130,000 fishing vessels in Vietnam.</p>

Box 4. Factors that contribute to the unsuccessful implementation of fisheries management policies in Vietnam

Guiding documents for local agencies (below provincial level) as well as control criteria to carry out Decisions at local levels have not been developed by the Government. Thus, local authorities are unable to reasonably restructure the number of fishing vessels and the kind and number of vessels to be reduced, and are not aware of any suitable alternatives to be carried out in order to best meet the management objectives. Provincial governments do not employ laws and regulations on reducing overcapacity for fear that these would cause severe disruptions and hardships to small-scale fishers. DoFi also cited that there are no particular regulations or guiding documents for reducing overcapacity since national focus is placed on enhancing production volumes in terms of marine capture and aquaculture, as well as on projects related to construction and upgrading of ports, processing sites, and other infrastructures.

Inconsistency, overlapping and lack of coordination between the strategic orientation of the national fisheries sector (e.g. 50% reduction in fishing vessels at modest output growth of 3-4% per year) and strategy at the provincial and district levels (e.g. setting of high growth targets for coastal fisheries landings). Results of the case study indicated that nearly 100% of fishers are not aware of such government policies, as local agencies have not advocated these to the people. Volume targets set out in development plans led by the provinces place heavy weight on economic growth. In other words, many coastal authorities are reluctant to implement any policies that could adversely impact on the local fishing communities, although provincial and district authorities expect that fishers should fish as much fish as possible to meet the increasing production goals without due consideration of any policies to reduce fishing capacity. This has even led to inter-provincial competition where control regimes based on agreements between adjacent provinces could be weakened. In addition, the promulgated consistent increase in annual harvest volumes for economic growth results in the misguided beliefs on the part of fishers (DANIDA, 2010). Notwithstanding the possible impacts, increase in annual outputs has been a major indicator for measuring the country's success in fisheries development and an important criterion for evaluating the performance of government officials in promoting fisheries-related activities.

A more valuable catch could be taken with less effort (fishing capacity) and less cost, and the excess inputs used to catch fish could in theory be used instead to produce other valuable goods and services. Indeed, there is a common misconception among fisheries management authorities that if production is still increasing (as is currently true for Vietnam), therefore, there is no immediate need to hit the panic button, an attitude that reflects a gross misunderstanding of the problem. The fact that even though production is increasing (albeit at a declining growth rate), economic losses are already being incurred in all probability (DANIDA, 2010). Subsidy programs for fishers to change to other employment have not been developed (*i.e.* financial considerations, technical aspects towards going to off-shore fishing activities or upgrading the vessel structures). Furthermore, most policies seem contradictory, *e.g.* Decision No. 298/2008 which provides gas/petrol support for fishing activities, gives incentives to expand fishing operations which is the exact opposite of Decision No. 10/2006 which aims to reduce the number of fishing vessels. Careful attention should be made in implementing Decision No. 10/2006, especially in terms of reducing fishing capacity. Indeed, it is assumed that when the number of fishing vessels is successfully controlled (although policies to reduce fishing efforts in certain situations, have seldom been effective in limiting overcapacity), it is normally the less efficient vessels that tend to exit, which, when coupled with a rise in technical efficiency, would lead to the reduction of fishing effort although this has not always been achieved proportionally (DANIDA, 2010).

Problems in Promoting the Concept of Monitoring, Control and Surveillance (MCS)

Results of the case study have also established that overcapacity in small-scale fisheries of Vietnam is closely related to the absence of a Monitoring, Control and Surveillance (MCS) system in the country. While it is recognized that MCS plays a very important role in mitigating illegal, unreported and unregulated (IUU) fishing activities, promotion of MCS in Vietnam poses a problem and results in increased number of unregistered fishing vessels without fishing licenses but still continue to

operate in its waters. Thus, fishing capacity has increased which is coupled with increased overfishing and severe environmental degradation as the natural consequences. Pramod (2011) made an evaluation of the implementation of MCS in marine fisheries of 41 countries, including Vietnam. In his case study, he evaluated the effectiveness of the patrolling agencies in monitoring and controlling fisheries within the 200 nm EEZs. The results showed that Vietnam's fisheries are among the worst fisheries in terms of implementing MCS (**Box 5**).

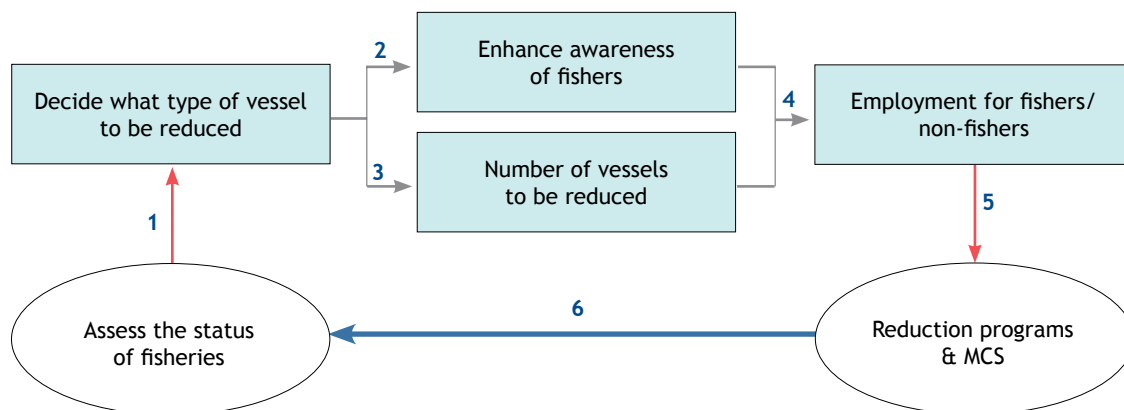


Fig. 5. Model of fishing capacity management plan for Vietnam's small-scale fisheries

Box 5. Factors affecting the effectiveness of patrolling agencies in monitoring and controlling fisheries

Surveillance infrastructure in Vietnam remains inadequate with respect to the country's EEZ area that should be patrolled, while existing legislations if any are poorly enforced. Enforcement is limited due to budgetary constraints of provincial governments in operating patrol vessels and other means. Patrols are generally limited to *ad hoc* beach and port patrols checking only such regulation as gear restrictions while fisheries law enforcement remains weak. Advanced MCS tools and management mechanisms such as dockside checks, having observers onboard fishing vessels, and installation of vessel monitoring systems (VMS), are not part of Vietnam's strategies as of this time.

Management plans to monitor Vietnam's fishing vessels are inadequate, especially because Vietnam is also not a signatory to the FAO Compliance Agreement. As a result, many Vietnamese fishing vessels have been caught illegally fishing not only in the high seas but also in EEZs of neighboring countries like in Malaysia, Indonesia and the Philippines. Adequately trained officers to conduct MCS operations are extremely insufficient while fishing vessels are seldom inspected at sea, as patrols' expenses (such as fuel costs and human expenditures) are artificially billed drawing a balance for State Auditing. In fact, fuel intended for patrol vessels are sold to fishers or others at sea. MCS operations have been corrupted and seemed to harass the fishers. In practice, fishers reported that when the patrols approach them to inspect their vessels, the patrols' first statement is to ask for *fish*. Normally, when fishing vessels have not been registered yet, or in case of engaging in IUU fishing, fishers sometimes bribe the patrols to avoid punishment or from being apprehended. Thus, enforcement of laws and regulations related to marine fisheries remains very ineffective. While the patrols appear to be not responsible for enforcement of the fisheries regulations, the fishers who do not care about the legislations also seem not to fear the patrols.

Discussion and Conclusion

Addressing and managing overcapacity in small-scale fisheries is much more complex than reducing overcapacity in industrial or commercial fishing fleets, because of the complexity in small-scale fisheries mixed with the fast growing populations, sluggish economies, fishers' high dependence on the resources for food and livelihood, lack of employment opportunities in non-fishery sectors, fast increasing numbers of part-time and seasonal fishers, limited transferability and rigidities in the movement of use-specific capital and labor, conflicting policies, and lack of precise data for management. Reducing overcapacity would imply the need to have increased focus on people-related solutions and on the communities.

Therefore, there is no single and simple solution that could address the overcapacity problem in small-scale fisheries because of their complexities, while the use of any single approach in isolation would be ineffective. Many countries have been successful in reducing overcapacity and the experiences of Asian countries like Taiwan, China, and Thailand could be appropriately referred to, especially in controlling and putting a limit to fishing capacity in the case of Vietnam's small-scale fisheries. Specific measures could be applied in the case of small-scale fisheries in

Vietnam but the country's socio-economic situation should be taken into consideration as could be gleaned from a management framework which has been suggested for the case of Vietnam (Fig. 5).

It is therefore, necessary to assess entirely and seriously the fisheries condition of Vietnam in general and its small-scale fisheries, in particular, as the result would provide certain justifications on the type of vessel that would be reduced. In the process, awareness of the fishers on the importance of sustainable fisheries development should be enhanced while their perceptions and plans to exit from the fisheries should be clearly understood and fully supported by fishery authorities in fishing communities. Plans to manage overcapacity, the number of fishing vessels to be cut down, and the ways and means to undertake such reduction should be established, considering the activities that could facilitate sustainable management of fishing capacity, e.g. establishment of MPAs, creation of alternative livelihoods, promotion of co-management approaches, and adoption of the concepts of ecosystem approach to fisheries, among others.

Therefore, the Government of Vietnam should consider exerting efforts to craft coordinated and integrated management approaches for addressing overcapacity in the country's small-scale fisheries. In summary, the case study has illustrated that small-scale fisheries in Vietnam are confronted with various problems such as over-fishing, environmental degradation, depletion of marine resources, and overcapacity. The latter of could be appropriately perceived from the common proverb "*elephant in the room*" because it is a very obvious problem that no one wants to discuss, thus it could remain unaddressed although it is something which is impossible to overlook in view of its magnitude. In other words, everyone knows about the overcapacity problem but is deliberately ignoring it.

Although several management policies for reducing fishing overcapacity had been promoted in Vietnam, particularly Decision No. 10/2006/QD-TTg by the Prime Minister, but such policies have not been successfully implemented in all their aspects. Various reasons have been established through the case study contributing to this great challenge, which could include: (i) small-scale fishing is considered as "*employment of last resort*" for the poor in coastal communities since alternative employment opportunities are limited or non-existent in coastal areas; (ii) desire to achieve increased production goals at all costs, not only at the provincial but also at national levels; (iii) apparent endless support programs for small-scale fisheries in the form of "*bad subsidies*"; and (iv) ineffective enforcement of fisheries' laws and regulations. In addition, some

concerns are just too gigantic to attain, especially the strong competition and conflicts in marine capture fisheries as well as those related to the implementation of MCS. From the results of the case study, it could be gleaned that although fisheries overcapacity is largely understood by management authorities and the fishers as well, the required hard decisions to deal with it are not being implemented and enforced. Clearly, there is no single “silver bullet” solution to the problem meaning that there is no direct and straightforward solution since any possible solution would have to cut across the complexity of the country’s small-scale fisheries.

References

- Béné, Christophe. 2003. When Fishery Rhymes with Poverty: A First Step Beyond the Old Paradigm on Poverty in Small-scale Fisheries. *World Development*; 31(6): 949-975
- Béné, Christophe. 2008. Assessing Vulnerability to Poverty in Fishing Communities. *In*: Proceedings of the International Institute of Fisheries Economics and Trade (IIFET) Meeting, Nha Trang, Vietnam, 22-25 July 2008
- DANIDA. 2010. The Fisheries Sector in Vietnam: A Strategy Economic Analysis. University of Copenhagen, Denmark and Ministry of Planning and Investment of Vietnam. Vietnam
- DoFi. 2011. Directorate of Fisheries. Vietnam: Fisheries and Aquaculture Sector Study: Final Report. Hanoi, Vietnam
- FAO/FishCode. 2004. Report of the National Conference on Responsible Fisheries in Vietnam, Hanoi, Vietnam, 29-30 September 2003, FAO/FishCode Review, No.9. UN Food and Agriculture Organization, Rome, Italy
- Fistenet. 2010. Available from www.fistenet.gov.vn/.../trung-tam-thong-tin-thong-ke.2010 Accessed on 26.09.2011
- Hao, T.V. 2009. Recommendations for policies systems of sustainable management in coastal fishing activities. Research Institute for Aquaculture No. 3 (RIA3). Nha Trang, Vietnam
- Kato, Yasuhisa. 2008. Considerations for Mitigating Poverty in Rural Communities of Southeast Asia through Fisheries Interventions. *In*: Fish for the People, Vol. 6 No. 3 (2008). Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 4-10
- Long, N. 2003. A Preliminary Analysis on the Socioeconomic Situation of Coastal Fishing Communities in Vietnam. *In*: Silvestre, G., L. Garces, I. Stobutzki, M. Ahmed, R.A. Valmonte- Santos, C. Luna, L. Lachica-Aliño, P. Munro, V. Christensen and D. Pauly (eds.); pp 657-688
- Long, N. and N. D. Dung. 2010. Review of Vietnam’s Legal, Policy and Institutional Arrangements in Light of WCPFC Requirements. Nha Trang, Vietnam
- MoFi. 2005. Vietnam Fisheries and Aquaculture Sector Study: Final report Ministry of Fisheries and World Bank; Hanoi, Vietnam
- Pascoe, S. and D. Gréboval (eds). 2003. Measuring Capacity in Fisheries: Selected Papers. FAO Fisheries Technical Paper, No. 445; Rome, Italy
- Pomeroy, R. 2010. Overcapacity in Southeast Asia. Presented at a Workshop in Vietnam; May 2010, Vietnam
- Pomeroy, R. and N. Andrew. 2011. Small-scale Fisheries Management: Frameworks and Approaches for the Developing World. The British Library, London, UK
- Pomeroy, R., N.T. Kim Anh and H.X. Thong. 2009. Small-scale Marine Fisheries Policy in Vietnam. *Marine Policy* 33: 419-428
- Pramod, G. 2011. Evaluations of Monitoring, Control and Surveillance in Marine Fisheries of 41 Countries. MCS Case Studies Report, Fisheries Centre, University of British Columbia, Canada, May 2011; 222 p
- Sumalia, U.R. and D. Pauly (eds). 2006. Catching more Bait: A Bottom-up Re-estimation of Global Fisheries Subsidies. Fisheries Centre Research Reports Vol. 14(6); 144 p
- UNEP. 2008. Fisheries Subsidies: A Critical Issue for Trade and Sustainable Development at WTO – An Introductory Guide. UNEP, Geneva, Switzerland, March 2008; 16 p
- VASEP. 2011. Available from <http://www.vasep.com.vn/vasep/Potentio.nsf/eVietNamSeafoodIndustry>: Accessed on 26.09.2011
- Ward, J.M., J.E. Kirkley, R. Metzner, and S. Pascoe. 2004. Measuring and Assessing Capacity in Fisheries. 1. Basic concepts and management options. FAO Fisheries Technical Paper, No. 433/1. FAO, Rome, Italy

About the Authors

To Van Phuong is from Nha Trang University (NTU), Nha Trang, Vietnam. Email: tovanphuong@gmail.com

Tran Duc Phu is from the Institute of Marine Science and Fishing Technology, Nha Trang University, (NTU), Nha Trang, Vietnam. Email: phudhnt@gmail.com



Reducing Rural Poverty and Improving Lives through Sustainable Aquaculture: AQD's 40-year Saga of Mustering Strength and Expertise for Technology Development

SEAFDEC Aquaculture Department

Recognizing the need to promote fisheries development for improving the economies of Southeast Asian countries, the Second Ministerial Conference for the Economic Development of Southeast Asia held in Manila, Philippines in April 1967, agreed to establish the Southeast Asian Fisheries Development Center (SEAFDEC) based on the recommendations from the First Ministerial Conference for the Economic Development of Southeast Asia in Tokyo, Japan in April 1966 and the subsequent Conference on Agricultural Development in Southeast Asia organized in Tokyo, Japan in December 1966.

As soon as the necessary documentations were completed, signing of the Agreement Establishing SEAFDEC took place in Bangkok, Thailand on 28 December 1967 by the Governments of Japan, Malaysia, Republic of the Philippines, Singapore, Thailand, and Republic of Vietnam, while the establishment of the Marine Fisheries Training Department in Thailand and Marine Fisheries Research Department in Singapore, under the SEAFDEC umbrella was also finalized.

Two years later during its Second Meeting in Singapore in March 1969, the SEAFDEC Council agreed in principle, to establish a new SEAFDEC department to carry out research and development in the field of aquaculture, and organized a study group to identify the appropriate site of the department as well as to draft its plan of operation and working program.

During the Fourth Meeting of the SEAFDEC Council in Manila, Philippines on 18-22 January 1971, then Philippine Secretary for Agriculture and Natural Resources Arturo R. Tanco, Jr. informed the SEAFDEC Council that the Philippines had entered into a bilateral agreement with the United States Agency for International Development (USAID) for the implementation of an aquaculture project in the Philippines.

It was also during that same Meeting that Secretary Tanco invited the Council to consider incorporating the said aquaculture project into the activities of the proposed new SEAFDEC department to avoid duplication of efforts, and requested the Council to also consider the establishment of such department in the Philippines. Therefore, having considered the position paper of the Philippine Government, the Council agreed in principle, to establish the SEAFDEC Aquaculture Department in the Philippines.

Based on results of the series of surveys conducted by a team of Japanese and Filipino aquaculture experts, and after securing the commitments of the Governments of Japan and the Philippines to support the operations of the new department, the SEAFDEC Council at its Sixth Meeting in Kuala Lumpur, Malaysia on 3-7 July 1973, agreed to formally establish the Aquaculture Department in Iloilo, Philippines, with the main function of carrying out research, training and extension activities in fish culture, and the rest is history.

Now, SEAFDEC has four existing Departments: (Marine Fisheries) Training Department (TD) in Thailand, Marine Fisheries Research Department (MFRD) in Singapore, Aquaculture Department (AQD) in the Philippines, and Marine Fishery Resources Development and Management Department (MFRDMD) in Malaysia. A new department, the Inland Fishery Resources Development and Management Department (IFRDMD) is expected to be formally established very soon in Indonesia.

Meanwhile, the Member Countries of SEAFDEC now include all the ASEAN member states, namely: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, plus Japan.

It is well recognized that aquaculture is an age-old practice, and its development went through a range of multi-faceted and multi-tiered stages. In the past, immature fish or shellfish were harvested from nature and transferred to artificially-constructed environments, *e.g.* earthen ponds, to extend their growth. The development continued when fish eggs were collected and fertilized in artificial environments, and the hatchlings were grown to commercial sizes. Eggs and sperm were pressed out from the bodies of male and female broodstocks, mixed together under favorable conditions for hatching, after which the resulting fry and fingerlings are cultivated in ponds or tanks or cages. As the life cycles of various aquatic species were ascertained,

these were adapted to induce the sexual maturation and reproduction of such species.

Although during the early part of aquaculture development, high-value fishes were the main focus but later, as new technologies evolved for cost-effective cultivation of fish, the culture of low-value fish was promoted to produce fish that could contribute to improving the lives of people and reducing poverty in rural areas. This latter development could be considered as the era of modern aquaculture and it was at this period that the Aquaculture Department (AQD) of the Southeast Asian Fisheries Development Center (SEAFDEC) made an entrance into the realm of

aquaculture development in Southeast Asia, and started its journey towards reducing poverty in rural areas through sustainable aquaculture.

FAO defined aquaculture as “the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, and protection from predators, among others...”. Based on such definition and in accordance with the mandates bestowed during its establishment in 1973, AQD has been promoting and undertaking aquaculture research on various aquatic commodities that are relevant and appropriate for the Southeast Asian region; developing human resources for aquaculture advancement; and disseminating and exchanging information on aquaculture.

While embarking on massive infrastructure and facilities development especially in the early days of its establishment,

AQD also started to mobilize regional scientific and technical manpower for its aquaculture R&D activities. Thereafter, the swelling momentum of its research and development activities which has been sustained, eventually led to significant advances in aquaculture development. As a result, aquaculture today is no longer dependent on wild seedstocks since technologies for all aspects of full-cycle aquaculture have been developed by AQD for most of the economically-important commodities.

Remembering the Past 40 Years of AQD

For 40 years, AQD has mustered its strength and the support of stakeholders for the sustainable development of aquaculture in the Southeast Asian region. From the outset, the research thrust of AQD has been geared towards the development of appropriate technologies to increase food production through aquaculture. Focus was therefore placed on R&D areas specific to economically-important species

Box 1. Important contributions of AQD to the advances in aquaculture development

Giant tiger shrimp: AQD’s innovative works on the biology, broodstock management and maturation of the giant tiger shrimp had been largely instrumental in the development of the shrimp hatchery. Results of AQD’s studies on shrimp nutrition, health management and grow-out culture have been very relevant to the needs of the advancing shrimp industry in the Southeast Asian region.

Milkfish: AQD’s pioneering studies on reproduction, larval biology and nutritional requirements of milkfish led to captive breeding and production of high quality milkfish fry. Hatcheries now supply most of the fry and fingerling requirements of the milkfish industry which dramatically expanded from traditional brackishwater pond culture to pens and cages in freshwater bodies and coastal waters. Such feat also served as model for improved fishpond culture technologies which could be adapted for the culture of various commodities in other countries of the region.

Mud crab: The use of wild crablets in mud crab culture, especially in the Philippines which has a long history of mud crab farming, has led to the dwindling mud crab resources. In order to address such concern, AQD developed the technologies for mud crab hatchery, nursery and farming focusing on *Scylla serrata*, which are now being adapted in other Southeast Asian countries.

Tropical abalone: The success of AQD in completing the life cycle of abalone in captivity has led to the promotion of the responsible culture of this species. For the tropical abalone *Haliotis asinina*, AQD has also developed the techniques for mass seed production, formulated diets for juveniles, tested grow-out culture in floating cages, initiated sea ranching and stock enhancement activities, and pilot-tested abalone hatchery technology with the private sector. The technologies developed are being disseminated through AQD’s abalone hatchery and grow-out training course being offered annually.

Tilapia, carp and catfish: After the establishment of AQD’s Binangonan Freshwater Station near Laguna Lake in 1976, AQD embarked on freshwater aquaculture R&D, focusing on the Nile (red) tilapia, bighead carp and the native *clariid* catfish. Since then, breeding and seed production techniques, feed formulations, farm-based genetic selection schemes and methods on the application of DNA markers in stock management have been developed, and disseminated to aquafarmers through training and information activities. AQD is also pursuing research on indigenous freshwater fishes like the silver therapon and climbing perch for sustainable aquaculture and biodiversity conservation.

Commercially-important marine fishes: Considering the high demand for live reef food fish due to the health benefits of eating fish that leads to the brisk expansion of live reef food fish trade (LRFFT), AQD developed the technologies for captive breeding, fry production, farming systems, and feed development and management of high-value marine fish species such as rabbitfish, pompano, mangrove red snapper, sea bass, and groupers. The full-cycle aquaculture of these species will help ease the pressure on wild fisheries and at the same time support the sustainability of LRFFT for the benefit of small-scale fishers and farmers in the Southeast Asian region.

Seaweeds: In an effort to sustain seaweeds as top export commodity of the Southeast Asian region, AQD put together a team of experts to help maintain the competitiveness of the region’s seaweed industry in the world market. The team focused on improving the farming technology of *Kappaphycus* spp. and *Gracilaria* spp., and developing new strains of *Kappaphycus* spp. Farming of these commercially-important red seaweeds could provide alternative livelihood for poor fishers and coastal dwellers in the Southeast Asian countries.

Giant freshwater prawn: In the early 2000s, AQD initiated the genetic improvement of the giant freshwater prawn *Macrobrachium rosenbergii* with the cooperation of research institutes in Thailand and Indonesia. As a result, seed production studies improved the survival in the hatchery by up to 70% while AQD was able to successfully develop lake-based cage culture technology which had been transferred to stakeholders through training and information dissemination activities.

Mussels, oysters and kapis shell: AQD has developed a technique for mussel and oyster culture, the hanging raft method, which is being promoted to farmers because it is more environment-friendly, results in better growth and gives higher financial returns. For the *kapis* shell *Placuna placenta*, AQD developed sustainable broodstock management and spawning techniques, and juvenile production in hatcheries. AQD’s initiative in the restocking of the *kapis* shell along the Panay Gulf starting in the late 90s resulted in recruitment and bountiful harvest ten years later.

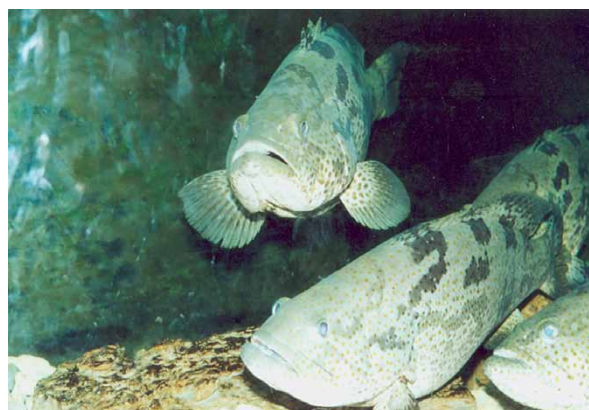


SEAFDEC/AQD Tigbauan Main Station, Iloilo, Philippines

of fish, crustaceans, molluscs, and seaweeds. Specifically, breeding and culture technologies were developed for giant tiger shrimps, milkfish, tilapia, carps, catfish, mussels, oysters, giant freshwater prawn, and high-value marine fishes such as sea bass, groupers, red snapper, rabbitfish, and pompano. Later, aquaculture technologies were also developed for seaweeds, abalone, mud crab, and sandfish, while research activities on mangroves, stock enhancement and community-based fishery resource management were conducted to better protect the aquatic resources while ensuring that resource users continue to benefit and profit from resource use. With more innovations in fish farming technologies through research-and-development to which AQD plays an important role, especially in Southeast Asia, fish farms can now be both profitable and environment-friendly. The important advances achieved by AQD for the past forty years are summarized in **Box 1**.

While AQD continued to reach out to more users and beneficiaries in promoting the technologies it has generated, in the late 1990s a new paradigm of the research-extension continuum was adopted by AQD through intensified aquaculture technology verification and technology transfer. Along this thrust and responding to fishers' concern on declining fish catch, AQD embarked on a pilot community-based fishery resource management (CFRM) project to address the poverty alleviation agenda of small-scale fishers. Utilizing participatory techniques and community-based management principles, AQD engaged the technology users in a community of Malalison Island in Culasi, Antique in west-central Philippines, for its pilot CFRM activity. This resulted in reformed practices on resource use in Malalison Island, *i.e.* from rampant illegal fishing practices to co-managing of fishery resources by the same resource users. Based on this experience, multi-disciplinary, community-based and participatory R&D have become the hallmarks of AQD's approach to development-oriented projects like the uptake of small fishers and farmers on aquaculture technology development through institutional capacity building for sustainable

aquaculture mechanism, stock enhancement, and coastal resource management. With its reliable track record in seed production of aquatic species coupled with the successful experience in CFRM, a resource enhancement program was set up in 2000s to nail the technology gap in the culture and capture fisheries. The program entails the releasing of seedstocks reared in hatcheries-nurseries into natural waters, to be managed and eventually harvested by coastal communities. Unlike pond culture which requires high capital investment, the grow-out culture part of resource enhancement needs minimum level of financial outlay. The program promotes the effective protection of restocked juveniles through regulations of harvest sites, sizes, and seasons, by local communities and governments through adequate social organization and enhanced local governance. In addition, environmental protection of the habitats is promoted, *e.g.* sea grass beds, coral reefs, and mangroves, where the released commodities, *e.g.* clams, shells and crabs can survive and grow to marketable sizes. Following such approach, AQD has developed stock releasing-enhancing technologies for the abalone, giant clams, sea horses, and sandfish. For the abalone, AQD developed a shell-marking technique to tag the hatchery-bred seeds prior to releasing and stocking them into the natural environments. Nursery rearing of the giant clam *Tridacna gigas* has also been conducted at AQD's facilities, while sea horses (*Hippocampus barbouri* and *H. comes*) are being propagated at the AQD hatcheries for possible release in marine reserves. AQD has also continued to



improve the techniques for sandfish hatchery and nursery production to improve growth and survival in release sites.

As aquaculture developed rapidly, uncontrolled and irresponsible use of chemicals and drugs could not be averted, and this led to the emergence of a number of infectious diseases threatening the sustainability of aquaculture. To address this concern, AQD embarked on a long-term fish disease management program which includes establishing effective control measures against fish diseases and monitoring chemical and drug use in aquaculture. Using the results of its studies on the biology of known pathogens, AQD developed the protocols for treating bacterial, fungal, parasitic, and viral diseases, which were then applied for cultured species in hatcheries, ponds and cages resulting in improved survival rates. Moreover, the application of polymerase chain reaction (PCR) techniques has revolutionized fish disease diagnostics at AQD.

Being part and parcel of modern aquaculture, the development of cost-effective formulated diets, traditionally derived from low-value fish that are becoming less available, impractical and costly, and considering their benefits for human consumption, was given high priority by AQD. Once the nutritional requirements of important tropical aquaculture species were established and after taking into account their requirements for protein, lipids, carbohydrates, essential fatty acids and amino acids, as well as for some vitamins and minerals, AQD developed complete diets for all life stages (larval, nursery, grow-out and broodstock) of selected economically-important aquaculture species of crustaceans (shrimps and crabs) and fish. Meanwhile, AQD's quest for suitable alternative protein sources for the production of cost-effective practical diets continued in order to divert the dependence of aquafeed industries on fish meal and other fish-based products, and pull them out from the so-called "fish meal trap". This was also meant to steer the direction of AQD towards the promotion of aquaculture for rural development, as called for in the 2001 Resolution and Plan of Action for Food Security for the ASEAN Region (SEAFDEC, 2001). While the nutrient characteristics of alternative feed ingredients were enhanced through biotechnology, AQD revolutionized feeds and feeding management for reduced pollution in aquafarms as well as in effluents (Platon, *et al.*, 2007).

Anchored on arguments that mangroves and aquaculture can co-exist (Aldon, *et al.*, 2008) as well as on the conditions prescribed by Primavera (2004) for effective co-existent to mangroves and aquaculture, and on the premise that mangroves provide a wide array of goods and services from forestry and fisheries (Primavera, 2004a), AQD embarked on a mangrove aquasilviculture project aimed to develop or verify culture technologies that are

compatible with mangroves, which could be incorporated in overall mangrove conservation and rehabilitation programs. AQD's research focused on the aquasilviculture of various commodities such as milkfish, shrimps and mud crabs; assessment of the capability of mangroves to absorb nutrients; population, biological and ecological studies of mangrove-associated fauna; and the impacts of aquaculture on mangroves and fisheries.

Consistent with its desire to enhance the sustainability of aquaculture for rural development, AQD worked out the culture techniques of various phytoplankton and zooplankton that could be used as live feeds for the larvae of fishes, crabs, abalone and shrimps in the hatchery, to minimize dependence on imported brine shrimps which is very costly. The techniques established for the mass propagation of phytoplankton (*Chaetoceros calcitrans*, *Skeletonema costatum*, *Isochrysis galbana*, *Nannochlorum* sp., *Tetraselmis tetrahele*, *Navicula ramosissima*, *Amphora* sp., *Anabaena* spp., *Spirulina platensis*) and zooplankton (rotifers such as *Brachionus rotundiformis*; cladocerans such as *Moina macrocopa*, *Diaphanosoma celebensis*; and copepods such as *Tisbintra* spp., *Acartia* spp., *Pseudodiaptomus* sp.) had been disseminated to stakeholders through training and information dissemination activities.

Looking at the Present to Orchestrate Aquaculture Development

After the adoption of the Resolution and Plan of Action for Food Security for the ASEAN Region in June 2001, these instruments had been used by AQD as policy framework for the promotion of sustainable aquaculture development in the Southeast Asian region (Toledo *et al.*, 2011). Almost ten years later in 2010, AQD convened the Regional Technical Consultation for Sustainable Aquaculture Development of Southeast Asia Towards 2020 in Bangkok, Thailand in March 2010 to assess the implementation of the 2001 Resolution and Plan of Action under the various aspects of aquaculture and determine the issues that constrain the sustainable development of aquaculture in the Southeast



Box 2. Thrust of AQD's R&D towards 2020

Meeting social and economic challenges of aquaculture in Southeast Asia: Ten years into the 21st century, aquaculture remains confronted with issues on equity in terms of opportunities and the distribution of benefits that fall short in addressing food security and livelihood of small-scale sector stakeholders. This requires crafting programs that could address the social and economic challenges in the promotion of rural or small-scale holder aquaculture (Salayo, 2012). More specifically, the issues that need urgent attention include: capacity building, access to capital as well as markets, policies and governance, and avenues for aquaculture as an option for improving resilience of fish farmers and fishers to the impacts of climate change. Therefore, AQD will exert efforts to address such concerns by: (i) enhancing the role of aquaculture in improving the livelihood and food security at all levels (local, national and regional); (ii) supporting the sustainability of the environment and resources; and (iii) identifying relevant policies, infrastructure and linkages that will better equip the Southeast Asian countries in meeting the socio-economic challenges in the next ten years.

Quality seed production for sustainable aquaculture: In spite of recent advancements in selective breeding and seed production technologies for aquaculture commodities and the availability of genetically-improved aquaculture strains, there remains a pressing need to improve seed quality and yield for sustainable aquaculture in the Southeast Asian region (Romana-Eguia, 2012). AQD will therefore continue to enhance the reliable supply of better quality seedstock through the development of action plan that would address the research and development needs associated with the environmental and genetic requisites for better quality seeds, facilitate the maintenance and dissemination/distribution of improved stocks including access by a wide range of farmers to and marketing of quality seeds.

Healthy and wholesome aquaculture: R&D efforts in aquaculture have resulted in phenomenal growth of the sector during the last four decades, but it is being confronted with more problems that need to be addressed in order to assure its sustainability for future generations (Coloso, 2012). Moreover, there is certainty that in the next decade, practices which threaten food safety and concerns relating to the impact of aquaculture on the ecosystem will continue. AQD has been promoting the concept of wholesome and healthy aquaculture as a holistic approach to fish disease management as well as development of cost-effective feeds that optimize the production of robust and healthy farmed aquatic commodities with the least negative impact of the environment. AQD will continue its R&D in fish nutrition and fish disease management to ensure a steady and reliable supply of safe and quality fish beneficial to the public, as well as enhance the capacity and affordability of adopting such practices by a wide range of small-scale farmers.

Maintaining environmental integrity through responsible aquaculture: Despite the significant progress made by SEAFDEC in the regionalization and promotion of the Code of Conduct for Responsible Fisheries, the aquaculture sector in the region is still confronted with issues related to environmental protection and wise use of resources (de Jesus-Ayson and Gallardo, 2012). Therefore, there is a need to continue the environmental monitoring of water and sediment quality associated with ponds, net cages, and pens to ensure productivity and sustainability as well as minimizing the adverse impacts of and adaptations to climate change. AQD will address the research needs and develop strategic actions that will aim to promote the environmental sustainability of aquaculture in the region.

Adapting to climate change impacts: Climate change is a compounding threat to the sustainability of aquaculture development. Impacts occur as a result of gradual warming, the increasing acidity of the oceans and associated physical and chemical changes. How these changes affect the aquaculture organisms in general, the different aquaculture systems and structures, the various support systems to aquaculture operations, and to the fish farmers, are largely unknown. Fish farmers and the general public will need to have better understanding about climate change and its likely impact(s) to their livelihood opportunities for better preparation and adaptation. Since largely almost nothing is known how climate change will affect the biology of various species presently farmed and the various support systems, AQD will generate important data on this aspect to serve as basis for the mitigation measures that will be provided. How climate change affects important related ecosystems like the mangrove and coral reef ecosystems will be ascertained as well.

Asian region. Recommendations from the Consultation were used as basis for defining the next decade's strategies for the sustainable development of aquaculture in the region, where addressing the challenges that confront the small-scale aquafarmers operating the region's aquaculture farms, which are mostly small-scale, was emphasized. These included the need to: (i) meet social and economic challenges of Southeast Asian aquaculture; (ii) produce quality seeds for sustainable aquaculture; (iii) promote healthy and wholesome aquaculture; (iv) maintain environmental integrity through responsible aquaculture; and (v) protect the environment and adapt to the impacts of climate change (Acosta *et al.*, 2011).

As AQD now enters into the threshold of its ruby jubilee on 9 July 2013, it aspires to adhere to the roadmap for sustainable aquaculture development with much passion reflecting the fiery red of the gemstone ruby. Therefore, while sustaining the implementation of research, technology verification and demonstration, and training and information activities based on the priorities and needs of the Member Countries, AQD intends to aggressively push forward the sustainable

development of aquaculture in Southeast Asia through the: (i) development of responsible aquaculture technologies and practices; (ii) responsible use of aquatic resources for the purpose of aquaculture; (iii) adoption of measures to avoid environmental degradation; and (iv) the promotion of environmentally-sound aquaculture methods and commodities. Using the subsequent 2011 Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020 (SEAFDEC, 2011) as basis to re-craft its new direction, AQD will put more emphasis on the formulation of strategies that will help meet the current and emerging socio-economic challenges of aquaculture in Southeast Asia. For the next decade, AQD will therefore focus its future R&D thrust on five major concerns summarized in (Box 2). Nonetheless, AQD will also sustain the systematic packaging of its research results into commercially-viable aquaculture technologies and production systems for dissemination as means of enhancing its services to the private sector and the fishery industry as a whole, and will continue to provide technical assistance to the Member Countries in starting up or in the adoption of new technologies.

In addition, while following up on the need to address various aquaculture concerns as stipulated in the 2011 Resolution and Plan of Action, AQD has re-directed its pace towards the fundamental steps of improving livelihood and alleviating poverty in rural communities. One of the approaches embarked by AQD is the Program on Meeting Social and Economic Challenges in Aquaculture or MSECAP (Salayo *et al.*, 2012), which is aimed at developing and implementing social and economic strategies in aquaculture and resource management to secure food and incomes of the peoples in Southeast Asia, as well as alleviate poverty in rural communities. The strategies outlined in MSECAP include the implementation of R&D activities that explore the participatory and community-based modality in the promotion of aquaculture technologies in rural communities.

As planned, MSECAP is expected to deliver results that will converge towards developing prototype aquaculture technology adoption pathways that would satisfy the social and economic needs of the peoples in the Southeast Asian region. This approach is also in accordance with the recommendations clearly expressed during the 2011 ASEAN-SEAFDEC Conference (SEAFDEC, 2012).

References

- Acosta, B.O., R.M. Coloso, E.D.J. Ayson, and J.D. Toledo (Eds). 2011. Sustainable Aquaculture Development in Southeast Asia Towards 2020. Proceedings of the Regional Technical Consultation for Sustainable Aquaculture Development in Southeast Asia Towards 2020; 17-19 March 2010, Bangkok, Thailand; 167 p.
- Aldon, E.T., R.R. Platon and V.T. Sulit. 2008. Mangroves or aquaculture? Why not both? *In*: Fish for the People Vol. 6 No. 2 (2008), Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 15-19
- Coloso, Relicardo M. 2012. Healthy and Wholesome Aquaculture. *In*: Proceedings of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2010 “Fish for the People 2020: Adaptation to a Changing Environment”, Bangkok, Thailand, 13-17 June 2011. Vol II: Thematic Panel Sessions. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 109-113
- De Jesus-Ayson, Evelyn and Wenresti Gallardo. Maintaining Environmental Integrity through Responsible Aquaculture. *In*: Proceedings of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2010 “Fish for the People 2020: Adaptation to a Changing Environment”, Bangkok, Thailand, 13-17 June 2011. Vol II: Thematic Panel Sessions. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 115-120
- Platon, R.R., W.G. Yap, and V.T. Sulit. 2007. Towards sustainable aquaculture in the ASEAN region. *In*: Fish for the People Vol. 5 No. 1 (2007), Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 21-32
- Primavera, J.H. 2004. Capacity of mangroves to process shrimp pond effluents. *In*: Promotion of Mangrove-Friendly Shrimp Aquaculture in Southeast Asia; SEAFDEC Aquaculture Department, Tigbauan, Iloilo, Philippines; pp 94-103
- Primavera, J.H. 2004a. Retaining our mangrove greenbelt: Integrating mangroves and aquaculture. *In*: Fish for the People Vol. 2 No. 3 (2004), Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 20-26
- Romana-Eguia, Maria Rowena. 2012. Supply of Good Quality Seed for Sustainable Aquaculture. *In*: Proceedings of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2010 “Fish for the People 2020: Adaptation to a Changing Environment”, Bangkok, Thailand, 13-17 June 2011. Vol II: Thematic Panel Sessions. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 105-108
- Salayo, Nerissa D. 2012. Meeting Social and Economic Challenges in Aquaculture. *In*: Proceedings of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2010 “Fish for the People 2020: Adaptation to a Changing Environment”, Bangkok, Thailand, 13-17 June 2011. Vol II: Thematic Panel Sessions. Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 101-104
- Salayo, N.D., D.B. Baticados, E.V. Aralar, and B.O. Acosta. 2012. Meeting social and economic challenges in Southeast Asian aquaculture. *In*: Fish for the People Vol. 10 No. 2 (2012), Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 19-28
- SEAFDEC. 2001. Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 7 p
- SEAFDEC. 2011. Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020, Southeast Asian Fisheries Development Center, Bangkok, Thailand; 23 p
- SEAFDEC. 2012. Proceedings of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 “Fish for the People 2020: Adaptation to a Changing Environment”, Bangkok, Thailand, 13-17 June 2011. Vol II: Thematic Panel Sessions. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 311 p
- Toledo, J.D., B.O. Acosta, R.M. Coloso, and E.G. de Jesus-Ayson. 2011. Promoting sustainable aquaculture development to increase fish supply and improve livelihoods of rural people in Southeast Asia. *In*: Fish for the People Vol. 9 No. 2 (2011), Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 44-50

For more information about the R&D programs of AQD, please contact the AQD Chief Dr. Felix G. Ayson (Email: aqdchief@seafdec.org.ph)

CALENDAR OF EVENTS

Date	Venue	Title	Organizer(s)
2013			
22 Jul-13 Dec	On-line course	On-line/Distance Learning Course: Basic Principles of Aquaculture Nutrition	SEAFDEC/AQD
22-23 July	Vientiane, Lao PDR	5 th Meeting of the ASEAN Fisheries Consultative Forum (AFCF)	ASEAN
23-25 July	Myeik, Myanmar	On-site Training on Optimizing Energy and Safety at Sea for Small Fishing Vessels	SEAFDEC/TD
24-25 July	Singapore	RTC on Chemical and Drug Residues in Fish and Fish Products in Southeast Asia for Biotoxins Monitoring in ASEAN Region: ASP, AZA and BTX	SEAFDEC/MFRD
24-26 July	Vientiane, Lao PDR	21 st Meeting of the ASEAN Sectoral Working Group on Fisheries (ASWGF)	ASEAN
6-14 August	Pohnpei, Micronesia	9 th Regular Session of the Scientific Committee of the Western and Central Pacific Fisheries Commission (WCPFC)	WCPFC
13-16 August	Champasak, Lao PDR	Special SOM-34 th AMAF and SOM-12 th AMAF Plus Three	ASEAN
20-21 August	Kuala Lumpur, Malaysia	Sub-regional Technical Meeting for Development of Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Seas	SEAFDEC/TD
9-13 September	The Hague, Netherland	Global Summit Conference on Oceans, Food Security and Blue Growth	The Netherland
11-12 September	Singapore	End-of-Project Seminar on Utilization of Freshwater Fish for Value-added Products	SEAFDEC/MFRD
16-20 September	Rizal, Philippines	Training on Catfish Hatchery and Grow-out Operations	SEAFDEC/AQD
23-29 September	Kuala Lumpur, Malaysia	35 th Meeting of ASEAN Ministers on Agriculture and Forestry	ASEAN
30 Sep-4 Oct	Phuket, Thailand	APFIC Regional Expert Workshop on Tropical Trawl Fishery Management	APFIC
3-4 October	Bangkok, Thailand	Special Meeting of the SEAFDEC Council	SEAFDEC
7-9 October	Kuala Lumpur, Malaysia	Core Expert Meeting on Combating IUU Fishing in the Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products	SEAFDEC/MFRDMD
7-11 October	St. Petersburg, Russia	7 th Session of COFI - Sub-Committee on Aquaculture	FAO
10-12 October	Adelaide, Australia	8 th Meeting of the Compliance Committee of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT)	CCSBT
14-17 October	Adelaide, Australia	20 th Annual Meeting of the CCSBT, incorporating the Extended Commission	CCSBT
21-25 October	Rizal, Philippines	Training on Carp Hatchery and Grow-out Operations	SEAFDEC/AQD
22-24 October	Kuala Lumpur, Malaysia	Core Expert Meeting on Management of Sea Turtle Foraging Habitats in Southeast Asian Waters	SEAFDEC/MFRDMD
22-27 October	Spain	15 th Working Party on Tropical Tunas of the Indian Ocean Tuna Commission (IOTC)	IOTC
5-7 November	Thailand	2 nd On-site Training Workshop on Traceability Systems for Aquaculture Shrimp in Thailand	SEAFDEC/MFRD
18-25 November	Cape Town, South Africa	23 rd Regular Meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT)	ICCAT
25 Nov-4 Dec	Iloilo, Philippines	Training on Community-based Freshwater Aquaculture for Remote Rural Areas of Southeast Asia	SEAFDEC/AQD
25-27 Nov	Penang, Malaysia	36 th Meeting of SEAFDEC Program Committee	SEAFDEC Sec. -MFRDMD
28-29 Nov	Penang, Malaysia	16 th Meeting of Fisheries Consultative Group of the ASEAN-SEAFDEC Strategic Partnership (FCG/ASSP)	SEAFDEC Secretariat
November (Tentative)	Malaysia	6 th RPOA Coordination Committee Meeting	RPOA-IUU
2-5 December	Bangkok, Thailand	International Symposium on Small-scale Freshwater Aquaculture Extension	JICA, NACA & Thai DOF
2-6 December	Cairns, Australia	10 th Regular Session of the WCPFC	WCPFC
2-6 December	Victoria, Seychelles	16 th Scientific Committee of the IOTC	IOTC

Southeast Asian Fisheries Development Center (SEAFDEC)

What is SEAFDEC?

SEAFDEC is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote sustainable fisheries development in Southeast Asia.

Mandate

To develop and manage the fisheries potential of the region by rational utilization of the resources for providing food security and safety to the people and alleviating poverty through transfer of new technologies, research and information dissemination activities

Objectives

- To promote rational and sustainable use of fisheries resources in the region
- To enhance the capability of fisheries sector to address emerging international issues and for greater access to international trade
- To alleviate poverty among the fisheries communities in Southeast Asia
- To enhance the contribution of fisheries to food security and livelihood in the region

SEAFDEC Program Thrusts

- Developing and promoting responsible fisheries for poverty alleviation
- Enhancing capacity and competitiveness to facilitate international and intra-regional trade
- Improving management concepts and approaches for sustainable fisheries
- Providing policy and advisory services for planning and executing management of fisheries
- Addressing international fisheries related issues from a regional perspective



SEAFDEC Addresses

Secretariat

P.O. Box 1046
Kasetsart Post Office
Bangkok 10903
Thailand
Tel: (66-2)940-6326
Fax: (66-2)940-6336
E-mail: secretariat@seafdec.org
<http://www.seafdec.org>

Training Department (TD)

P.O. Box 97
Phrasamutchedi
Samut Prakan 10290
Thailand
Tel: (66-2)425-6100
Fax: (66-2)425-6110 to 11
E-mail: td@seafdec.org
<http://www.seafdec.or.th>

Marine Fisheries Research Department (MFRD)

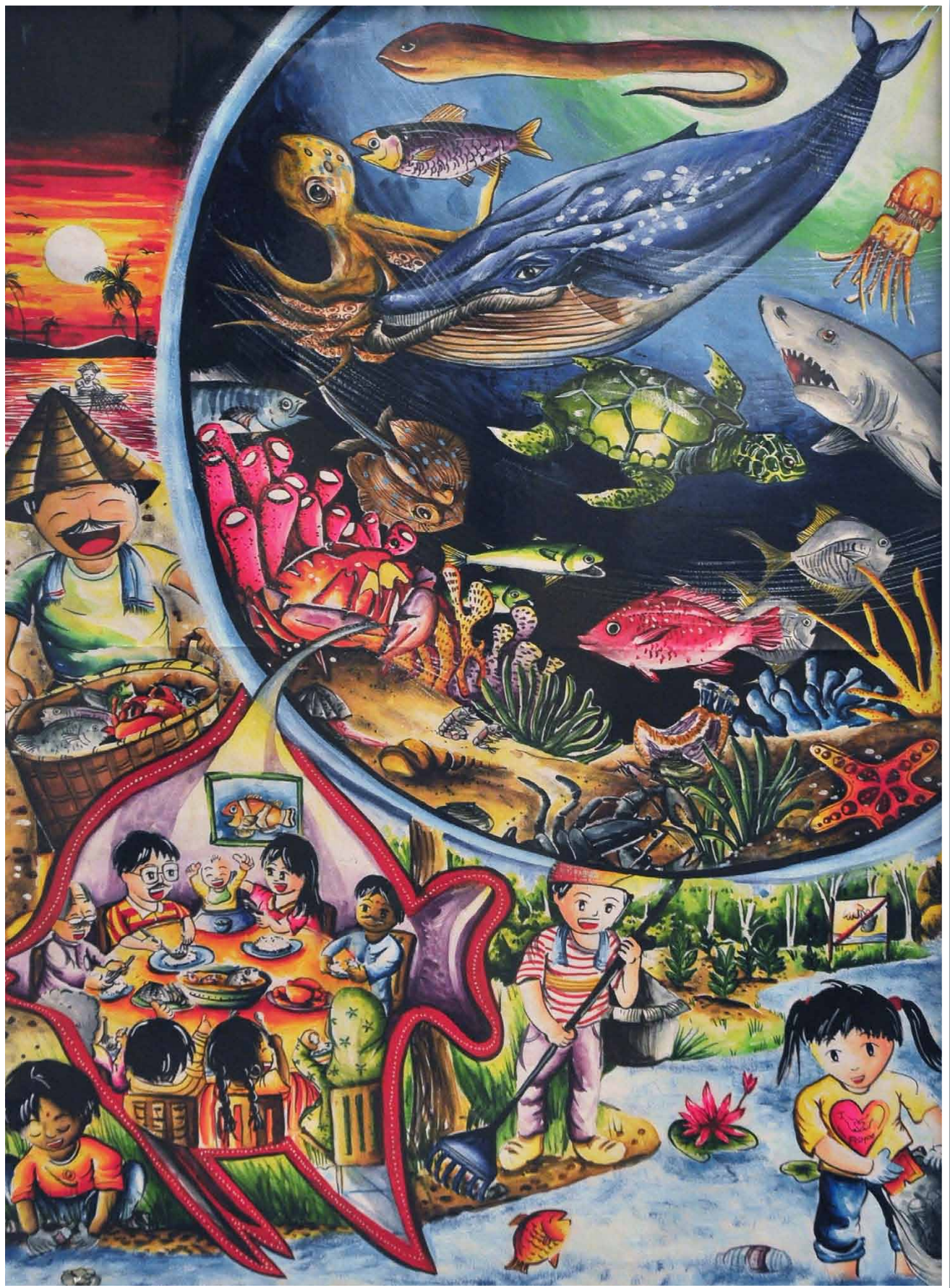
2 Perahu Road
off Lim Chu Kang Road
Singapore 718915
Tel: (65)6790-7973
Fax: (65)6861-3196
E-mail: ava_mfrd@ava.gov.sg
<http://www.seafdec.org>

Aquaculture Department (AQD)

Main Office: Tigbauan,
5021 Iloilo, Philippines
Tel: +63 33 511 9171
Fax: +63 33 511 8709, 511 9170
Manila Office: Rm 102 G/F
Philippine Social Science Center (PSSC)
Commonwealth Avenue, Diliman
Quezon City 1101 Philippines
Tel & Fax: (63-2) 927-7825
E-mail: aqdchief@seafdec.org.ph
<http://www.seafdec.org.ph>

Marine Fishery Resources Development and Management Department (MFRDMD)

Taman Perikanan Chendering,
21080 Kuala Terengganu, Malaysia
Tel: (609) 616-3150
Fax: (609) 617-5136
E-mail: mfrdmd@seafdec.org.my
<http://www.seafdec.org.my>



The first prize drawing winner, **Goh Wern Sze**, from the national drawing contest in Malaysia

National Drawing Contests were organized in all ASEAN-SEAFDEC Member Countries as part of the preparatory process for the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 "Fish for the People 2020: Adaptation to a Changing Environment" held by ASEAN and SEAFDEC in June 2011 in Bangkok, Thailand, in order to create awareness on the importance of fisheries for food security and well-being of people in the region.