

**REGIONAL REVIEW ON STATUS AND TRENDS IN AQUACULTURE  
DEVELOPMENT IN ASIA-PACIFIC – 2010**



## CONTENT

PREPARATION OF THIS DOCUMENT	iii
ABSTRACT	iv
CONTENTS	v
ACRONYMS AND ABBREVIATIONS	xi
EXECUTIVE SUMMARY	1
1. INTRODUCTION	5
1.1 Aquaculture in regional economies	5
1.1.1 <i>Gross domestic product (GDP)</i>	6
1.1.2 <i>Employment</i>	6
1.1.3 <i>Food security and nutrition</i>	7
2. GENERAL CHARACTERISTICS OF THE SECTOR	11
2.1 Status and trends	11
2.1.1 <i>Quantity and value with and without aquatic plants</i>	11
2.1.2 <i>Growth rates with and without China</i>	13
2.1.3 <i>Subregional status and trends</i>	15
2.1.4 <i>Species composition and production growth</i>	19
2.1.4.1 <i>Freshwater carnivorous species requiring high input</i>	19
2.1.4.2 <i>Marine and brackishwater carnivorous species (i.e. species requiring high input)</i>	21
2.1.4.3 <i>Finfish requiring low inputs</i>	22
2.1.4.4 <i>Crustaceans</i>	24
2.1.4.5 <i>Molluscs</i>	26
2.1.4.6 <i>Seaweeds</i>	26
2.1.4.7 <i>Niche species</i>	26
2.2 Salient issues	26
2.2.1 <i>Mariculture and biodiversity</i>	26
2.2.2 <i>Species, culture systems and climate change</i>	27
2.2.3 <i>Size of farms, intensity of farming and efficiency</i>	27
2.2.4 <i>Farming systems</i>	29
2.3 The way forward	30
2.3.1 <i>Improving efficiency and productivity</i>	30
2.3.2 <i>Research and development (R&amp;D) and regulatory support to facilitate adoption</i>	30
2.3.3 <i>Focus on fewer species of regional priority</i>	30
2.3.4 <i>Cage culture to turn a potential problem into an opportunity</i>	31
3. RESOURCES, SERVICES AND TECHNOLOGIES	33
3.1 Status and trends	33
3.1.1 <i>Land and water resources</i>	33
3.1.2 <i>Seed</i>	33
3.1.3 <i>Genetic improvement</i>	33
3.1.4 <i>Animal health management</i>	34

3.1.5	<i>Feeds</i>	35
3.1.6	<i>Credit and insurance</i>	36
3.2	Salient issues	36
3.2.1	<i>Seed</i>	36
3.2.2	<i>Aquatic animal health management</i>	37
3.2.3	<i>Putting the feed issue in perspective</i>	37
3.2.4	<i>Credit and insurance</i>	37
3.3	The way forward	37
3.3.1	<i>Seed</i>	37
3.3.2	<i>Feed</i>	38
3.3.3	<i>Biosecurity</i>	38
3.3.4	<i>Credit and insurance</i>	38
4.	AQUACULTURE AND THE ENVIRONMENT	41
4.1	Status and trends	41
4.1.1	<i>Environmental performance of the sector</i>	41
4.2	Salient issues	42
4.2.1	<i>Impacts from nutrient loading</i>	42
4.2.2	<i>Biodiversity and alien species</i>	42
4.2.3	<i>Positive environmental impacts of mariculture</i>	43
4.3	The way forward	44
4.3.1	<i>Stakeholders' influences on responsible farming</i>	44
4.3.2	<i>Policy and technical guidelines</i>	44
4.3.3	<i>Market-based incentives</i>	44
5.	MARKETS AND TRADE	45
5.1	Status and trends	45
5.1.1	<i>Major markets and trade characteristics of important species</i>	45
5.1.2	<i>Food safety requirements</i>	47
5.1.3	<i>Social organizations and clusters in market development</i>	47
5.1.4	<i>Potential for an increase in the demand for aquaculture products</i>	48
5.2	Salient issues	48
5.2.1	<i>Export of not so high value freshwater fishes</i>	48
5.2.2	<i>Non-tariff Trade Barriers</i>	49
5.2.3	<i>Benefits from the value chain</i>	49
5.2.4	<i>Commodity prices</i>	50
5.2.5	<i>Market share of producers</i>	50
5.2.6	<i>Price spreads and viability of farms</i>	51
5.3	The way forward	52
5.3.1	<i>Improving efficiencies along the value chain</i>	52
5.3.2	<i>Consolidating the fragmented marketing system</i>	52
6.	CONTRIBUTION OF AQUACULTURE TO FOOD SECURITY, SOCIAL AND ECONOMIC DEVELOPMENT	53
6.1	Status and trends	53



6.1.1	<i>Income and employment</i>	53
6.1.2	<i>Food security</i>	53
6.1.3	<i>Women in aquaculture</i>	53
6.1.4	<i>Creating and distributing wealth</i>	53
6.2	Salient issues	54
6.2.1	<i>Small-scale farms and their contribution to rural development</i>	54
6.3	The way forward	54
6.3.1	<i>Women-oriented aquaculture</i>	54
7.	EXTERNAL PRESSURES ON THE SECTOR	55
7.1	Status and trends	55
7.1.1	<i>Hazards</i>	55
7.1.2	<i>Impacts of natural and biological disasters on aquaculture</i>	55
7.1.3	<i>Impacts of urbanization</i>	55
7.2	Salient issues	56
7.2.1	<i>Resilience and adaptive capacity</i>	56
7.3	The way forward	56
7.3.1	<i>The ecosystem approach to aquaculture (EAA) and risk management</i>	56
7.3.2	<i>The implications of climate change</i>	56
8.	THE ROLE OF SHARED INFORMATION: RESEARCH, TRAINING, EXTENSION AND NETWORKING	59
8.1	Status and trends	59
8.1.1	<i>Training and information</i>	59
8.1.2	<i>Research</i>	60
8.2	Salient issues	62
8.2.1	<i>Information technology</i>	62
8.3	The way forward	63
8.3.1	<i>Quantifying research impact</i>	63
8.3.2	<i>Lessons in regional cooperation</i>	63
8.3.3	<i>Producer organizations and knowledge transfer models</i>	63
8.3.4	<i>Public-private partnerships and alliances</i>	64
8.3.5	<i>Opportunities from regional cooperation arrangements</i>	64
8.3.6	<i>Consultative meeting among donor and development assistance agencies</i>	64
9.	GOVERNANCE AND MANAGEMENT OF THE SECTOR	65
9.1	Status and trends	65
9.1.1	<i>Stages in the establishment of governance mechanisms for aquaculture and where the region stands</i>	65
9.1.2	<i>Overall perspective on the management of the sector</i>	66
9.2	Salient issues	67
9.3	The way forward	68
10.	IMPLEMENTATION OF THE BANGKOK DECLARATION	69
10.1	Compliance: an overview	69
10.2	The way forward	70

10.2.1	<i>Challenges and opportunities</i>	70
10.2.2	<i>Foreseeable major trends in the sector in the Asia-Pacific region</i>	71
10.2.3	<i>Noteworthy developments in the Asia-Pacific region</i>	75
11.	REFERENCES	77
	ANNEX	83
	<b>BOXES</b>	
Box 1:	Organic effluent from catfish farms in the Mekong Delta, Viet Nam.	39
Box 2:	Stockpiling of shrimp in times of low world prices – an example from Thailand.	46
Box 3:	Japanese research and regulatory responses to some aquaculture issues.	61
Box 4:	Aquaculture Livelihood Service Centers, Aceh, Indonesia.	62
Box 5:	Access to and downloads from the Network of Aquaculture Centres in Asia-Pacific (NACA) Web site.	63
Box 6:	Southern bluefin tuna cage culture in Australia: TIME Magazine award as second best invention of 2009.	74
	<b>TABLES</b>	
Table 1:	Estimated contributions of capture fisheries and aquaculture to the gross domestic product (GDP) in selected Asian countries, 2004–2006.	6
Table 2:	Top-ten global aquaculture producing countries in 2008 by quantity and value, excluding aquatic plants.	12
Table 3:	Aquaculture production of countries in the Asia-Pacific region, 2008.	13
Table 4:	Top-15 culture species in the Asia-Pacific region by quantity (thousand tonnes) excluding aquatic plants.	20
Table 5:	Top eight tilapia-producing countries in the Asia-Pacific region, 2008.	23
Table 6:	Top ten producing countries of carps and barbs in the Asia-Pacific region, 2008.	23
Table 7:	Top four producing countries of milkfish ( <i>Chanos chanos</i> ) in the Asia-Pacific region, 2008.	24
Table 8:	Top-ten producing countries of penaeid shrimp in the Asia-Pacific region, 2008.	25
Table 9:	Top-eight producing countries of giant river prawn in the Asia-Pacific region, 2008.	25
Table 10:	Number of instances of introduction of 17 species of tilapine fishes and their ecological and socio-economic impacts.	43

## FIGURES

Figure 1:	The trends in food fish consumption in the Asia-Pacific region and the world, and the percentage contribution of Asia-Pacific to total world consumption.	7
Figure 2:	Trends in food fish consumption (kg/caput/year) in the Asia-Pacific region and the world, and the proportion of the Asia-Pacific consumption to the world consumption.	8
Figure 3:	Global and Asian population trends to 2050 and the percentage of Asia to the world.	8
Figure 4:	The contributions of capture fishery and aquaculture to the total food fish availability in the Asia-Pacific region, forecasted changes in the population levels in the region, and the food fish needs to 2050 based on the current per caput consumption in the region.	9
Figure 5:	Trends in global aquaculture production (quantity and value) excluding aquatic plants, 1984–2008.	11
Figure 6:	Volume (tonnes) and percent contribution of each commodity group to the total aquaculture production in the Asia-Pacific region, 2008.	12
Figure 7:	Value (thousand US\$) and percent contribution of each commodity group to the total aquaculture production in the Asia-Pacific region, 2008.	12
Figure 8:	Trends in aquaculture production (by volume) in the Asia-Pacific region by environment, 1980–2008.	14
Figure 9:	Trends in production of the main aquaculture commodities in (i) the Asia-Pacific region without China, (ii) in China, and (iii) in the Asia-Pacific total and (iv) the percent contribution of China to Asia-Pacific total ("Others" refers to amphibians, invertebrates, others).	15
Figure 10:	Trends in the volume of aquaculture outputs of Asia-Pacific and China and the percent contribution of China and Asia-Pacific (excluding China) to Asia-Pacific total.	15
Figure 11:	Trends in the value of aquaculture outputs of Asia-Pacific and China and the percent contribution of China and Asia-Pacific (excluding China) to Asia-Pacific total.	16
Figure 12:	Trends in aquaculture production in the Asia-Pacific region by major species-groups, excluding aquatic plants.	16
Figure 13:	Changes in the production of freshwater carnivorous species in the Asia-Pacific region, 1979–2008.	22
Figure 14:	Production of marine and brackishwater species/species-groups in the Asia-Pacific region, 1979–2008.	23
Figure 15:	Trends in world and Asian production (capture and culture) of groupers, wrasses and snappers and the percent contribution of Asian aquaculture to the world total.	28
Figure 16:	The relationship of mean average production per year (each data point, 2000 to 2006) to farm size of coastal pond culture in Thailand.	29
Figure 17:	A schematic representation of the price of pangasiid catfish at each stage in the value chain in the Mekong Delta, Viet Nam.	50
Figure 18:	Share of costs of catfish (usual retail price US\$8.5/kg) purchased by the consumer.	51
Figure 19:	Trends in the average farm gate price of cultured freshwater species and selected species groups over the years.	52

Figure A1:	Trends in production of giant tiger prawn (GTP) in the Asia-Pacific region and elsewhere and the percent contribution from the region and elsewhere to world production, and the percent of GTP of all (including whiteleg shrimp, WLS) shrimp production in the Asia-Pacific region.	83
Figure A2:	Trends in striped catfish production in the Mekong Delta, total aquaculture production and the contribution of the former to the total.	84
Figure A3:	Export volume of striped catfish fillets and value of exports.	84
Figure A4:	Trends in the aquaculture area and productivity per unit area in Myanmar.	85
Figure A5:	The rice paddy area and fish production from rice–fish culture in China, 1985–2007.	86