Capture-based aquaculture

Global overview
Cover:
Line drawings of commercial aquatic species produced through capture-based aquaculture. Drawings from the FAO Species Identification and Data Programme (SIDP). Montage created by Alessandro Lovatelli and José Luis Castilla Civit.
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Global overview

Edited by
Alessandro Lovatelli
Fishery Resources Officer (Aquaculture)
Aquaculture Management and Conservation Service
FAO Fisheries and Aquaculture Department
Rome, Italy

and

Paul F. Holthus
FAO Consultant
Honolulu, Hawaii
United States of America
Preparation of this document

The two thematic reviews on the (a) environmental and biodiversity and (b) socio-economic issues related to capture-based aquaculture and the eleven species-specific papers covering both marine and freshwater examples contained in this document have been prepared as support material for the “FAO international workshop on technical guidelines for the responsible use of wild fish and fishery resources for capture-based aquaculture production”. The workshop organized by the Food and Agriculture Organization of the United Nations (FAO) was held in Hanoi, Viet Nam, from 8 to 12 October 2007, with the collaboration of the Ministry of Agriculture and Rural Development (MARD).

The commissioning of the papers and presentation at the Hanoi workshop were organized by the Aquaculture Management and Conservation Service (FIMA) of the FAO Fisheries and Aquaculture Department and financially supported by the regular programme and extrabudgetary funds from the Government of Japan in support of the project “Towards sustainable aquaculture: selected issues and guidelines”.

Part 1 of the publication consists of two thematic reviews: “Environmental and biodiversity impacts of capture-based aquaculture” by Yvonne Sadovy and Min Liu of the University of Hong Kong and “Social and economic impacts of capture-based aquaculture” by Robert Pomeroy of the University of Connecticut-Avery Point. Part 2 reproduces the eleven species-specific papers prepared, in alphabetical order, by Choi Kwang Sik (oyster) of the Cheju National University (Republic of Korea); Makoto Nakada (yellowtail) of the Tokyo University of Marine Science and Technology (Japan); Thomas Nielsen (consultant) and Patrick Prouzet (European eel) of the Institut français de recherche pour l’exploitation de la mer (France); Bjørg H. Nøstvold, Kjell Ø. Midling, Bent M. Dreyer and Øystein Hermansen (cod) of the Norwegian Institute of Fisheries and Aquaculture Research (Norway); Francesca Ottolenghi (bluefin tuna) of Halieus (Italy); Anders Poulsen, Don Griffiths, So Nam and Nguyen Thanh Tung (Pangasid catfish and snakehead) respectively of the Ministry of Agriculture and Rural Development (Viet Nam) (first two authors), Inland Fisheries Research and Development Institute (Cambodia) and Southern Sub-Institute of Fisheries Planning (Viet Nam); Victor Pouomogne (Clarias catfish) of the Institute of Agricultural Research for Development (Cameroon); Mhd Mokhlesur Rahman (Indian major carps) of the Center for Natural Resource Studies (Bangladesh); Magdy Saleh (mullets) of the General Authority for Fish Resources Development (Egypt); Colin Shelley (mud crab) of YH & CC Shelley Pty Ltd (Australia); and Mark Tupper and Natasja Sheriff (grouper) of the WorldFish Center (Malaysia).

The photographs presented in the species papers were taken by the authors unless otherwise indicated.

The final revisions and inputs for the papers were provided by the technical editors, A. Lovatelli and P.F. Holthus.
Abstract

Aquaculture is a diverse and multibillion dollar economic sector that uses various strategies for fish production. The harvesting of wild individuals from very early stages in the life cycle to large mature adults for on-growing under confined and controlled conditions is one of these strategies. This system, referred to as capture-based aquaculture, is practised throughout the world using a variety of marine and freshwater species with important environmental, social and economic implications. The need to evaluate the sustainability of this farming practice in light of its economic viability, the wise use of natural resources and socio-environmental impacts as a whole has been extensively discussed at national, regional and international levels.

In 2004, the Food and Agriculture Organization of the United Nations (FAO) launched a project entitled “Towards sustainable aquaculture – selected issues and guidelines” funded by the Government of Japan which included a thematic component on the use of wild fish and fishery resources for aquaculture production. The objective is to produce a set of technical guidelines that would assist policy-makers in developing informed and appropriate capture-based aquaculture regulations that would take into account the use and conservation of the aquatic resources exploited.

This publication contains technical information prepared in support of and background material for the “FAO international workshop on technical guidelines for the responsible use of wild fish and fishery resources for capture-based aquaculture production” held in Viet Nam in October 2007. The first draft of the technical guidelines on capture-based aquaculture was produced during this meeting. This publication contains two parts. Part 1 consists of two reviews on (a) environmental and biodiversity and (b) social and economic impacts of capture-based aquaculture and Part 2 consists of eleven species review papers. Both marine and freshwater examples have been reviewed and include finfish (mullet, bluefin tuna, European eel, cod, grouper, yellowtail, Clarias catfish, Indian major carps, and snakehead and Pangasiid catfish), crustaceans (mud crab) and molluscs (oyster).
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Contributors

Don Griffiths
Ministry of Agriculture and Rural Development
Hanoi, Viet Nam

Øystein Hermansen
Norwegian Institute of Fisheries and Aquaculture Research
Tromsø, Norway

Choi Kwang Sik
Cheju National University
Jeju City, Republic of Korea

Kjell Øyvind Midling
Norwegian Institute of Fisheries and Aquaculture Research
Tromsø, Norway

Makoto Nakada
Tokyo University of Marine Science and Technology
Fujimi-shi, Saitama, Japan

Francesca Ottolenghi
Halieus
Rome, Italy

Robert Stephen Pomeroy
University of Connecticut–Avery Point
Groton, Connecticut
United States of America

Anders Poulsen
Ministry of Agriculture and Rural Development
Hanoi, Viet Nam

Victor Pouomogne
Institute of Agricultural Research for Development
Foumban, Cameroon

Patrick Prouzet
IFREMER
Laboratoire halieutique d’Aquitaine
Anglet, France

Mhd Mokhlesur Rahman
Center for Natural Resource Studies
Dhaka, Bangladesh

Yvonne Sadovy
The University of Hong Kong
China, Hong Kong Special Administrative Region (SAR)

Magdy Saleh
General Authority for Fish Resources Development
Cairo, Egypt

Colin Shelley
YH & CC Shelley Pty. Ltd
Brisbane, Australia

Mark Tupper
WorldFish Center
Penang, Malaysia
# Abbreviations and acronyms

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>ADB</td>
<td>Asia Development Bank</td>
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<tr>
<td>AIT</td>
<td>Asian Institute of Technology</td>
</tr>
<tr>
<td>APEC</td>
<td>Asia-Pacific Economic Cooperation</td>
</tr>
<tr>
<td>APGN</td>
<td>Asia-Pacific Grouper Network</td>
</tr>
<tr>
<td>APO</td>
<td>Associate Professional Officer</td>
</tr>
<tr>
<td>BFAR</td>
<td>Bureau of Fisheries and Aquatic Resources (Philippines)</td>
</tr>
<tr>
<td>BFRSS</td>
<td>Bangladesh Fisheries Resources Survey Systems</td>
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<tr>
<td>BFT</td>
<td>Bluefin tuna</td>
</tr>
<tr>
<td>BNP</td>
<td>Bacillary Necrosis of <em>Pangasius</em></td>
</tr>
<tr>
<td>BOBP</td>
<td>Bay of Bengal Programme</td>
</tr>
<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>BWDB</td>
<td>Bangladesh Water Development Board</td>
</tr>
<tr>
<td>CBA</td>
<td>Capture-based aquaculture</td>
</tr>
<tr>
<td>CCRF</td>
<td>Code of Conduct for Responsible Fisheries</td>
</tr>
<tr>
<td>CIRAD</td>
<td>Centre de coopération en recherche agronomique pour le développement (Cameroon)</td>
</tr>
<tr>
<td>CITES</td>
<td>Convention on International Trade in Endangered Species</td>
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<tr>
<td>CNRS</td>
<td>Center for Natural Resource Studies (Bangladesh)</td>
</tr>
<tr>
<td>COD</td>
<td>Chemical oxygen demand</td>
</tr>
<tr>
<td>COFI</td>
<td>Committee on Fisheries</td>
</tr>
<tr>
<td>COPIFOPEM</td>
<td>Collectif des pisciculteurs intensifs de Fokoué et Penka Michel (Cameroon)</td>
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<tr>
<td>CPUE</td>
<td>Catch per unit effort</td>
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<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organization</td>
</tr>
<tr>
<td>DANIDA</td>
<td>Danish International Development Agency</td>
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<tr>
<td>DARD</td>
<td>Department of Agriculture and Rural Development</td>
</tr>
<tr>
<td>DFID</td>
<td>Department for International Development (United Kingdom of Great Britain and Northern Ireland)</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved oxygen</td>
</tr>
<tr>
<td>DOCA</td>
<td>Deoxycorticosterone acetate</td>
</tr>
<tr>
<td>DOF</td>
<td>Department of Fisheries</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>EELREP</td>
<td>Estimation of the reproduction capacity of European eel</td>
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<tr>
<td>EIA</td>
<td>Environmental impact assessment</td>
</tr>
<tr>
<td>EIFAC</td>
<td>European Inland Fisheries Advisory Commission</td>
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<tr>
<td>ELISA</td>
<td>Enzyme linked immunosorbent assay</td>
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<td>ELP</td>
<td>Early Life-history phase</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FAL</td>
<td>Fisheries Act Law</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>FCA</td>
<td>Fishermen’s cooperative association (Japan)</td>
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<tr>
<td>FCDI</td>
<td>Flood control drainage and irrigation</td>
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<tr>
<td>FCR</td>
<td>Food Conversion Ratio</td>
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<td>FFRC</td>
<td>Freshwater Fisheries Research Center (Bangladesh)</td>
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<td>FOB</td>
<td>Free on Board</td>
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<tr>
<td>FRSS</td>
<td>Fisheries Resource Survey System (Bangladesh)</td>
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FSMFs  Fish seed multiplication farms (Bangladesh)
FSPS  Fisheries Sector Programme Support
GEF  Global environment facility
GFPCM  General Fisheries Commission for the Mediterranean
GIS  Geographical Information System
GSI  Gonad Somatic Index
HACCP  Hazard Analysis and Critical Control Points
HBA  Hatchery-based aquaculture
HCG  Human Chorionic Gonadotropin
HUFA  Highly Unsaturated Fatty Acids
ICCAT  International Commission for the Conservation of Atlantic Tunas
ICES  International Council for the Exploration of High Seas
ICLARM  International Center for Living Aquatic Resources Management
IFAD  International Fund for Agricultural Development
IFREMER  Institut français de recherche pour l’exploitation de la mer
INDICANG  INDICateurs d’abondance et de colonisation sur l’ANGuille européenne Anguilla anguilla
IRAD  Institut de recherche agricole pour le développement (Cameroon)
ITCZM  Integrated Tropical Coastal Zone Management
IUCN  World Conservation Union
IUU  Illegal, unregulated and unreported fishing
JFA  Japanese Fisheries Agency
LHRH-A  Luteinizing Hormone Releasing Hormone Analogue
LRFF  Live Reef Food Fish
LRFT  Live Reef Fish Trade
MAC  Marine Aquarium Council
MARD  Ministry of Agriculture and Rural Development (Viet Nam)
MEDRAP  Mediterranean Regional Aquaculture Project
MINRESI  Ministère de la recherche scientifique et de l’innovation (Cameroon)
MPAs  Marine Protected Areas
MRC  Mekong River Commission
NACA  Network of Aquaculture Centres in Asia-Pacific
NGOs  Non-governmental Organizations
ODA  Overseas Development Agency (United Kingdom of Great Britain and Northern Ireland)
PBT  Pacific bluefin tuna
PCB  Polychlorinated biphenyls
PCSD  Palawan Council for Sustainable Development
PECOSUDE  Pêches côtières et estuariennes du sud de l’Europe
PEPISA  Pêcheurs et pisciculteurs de Santchou (Cameroon)
R&D  Research and Development
RAP  Regional Office for Asia and the Pacific (FAO)
RIA2  Research Institute for Aquaculture No.2 (Viet Nam)
ROI  Return on investment
SAPB  Shrimp Action Plan for Bangladesh
SAR  Special Administrative Region
SARS  Severe Acute Respiratory Syndrome
SBT  Southern bluefin tuna
SCRS  Standing Committee on Research and Statistics (ICCAT)
SEAFDEC  South East Asian Fisheries Development Center
<table>
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<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>SL</td>
<td>Standard Length</td>
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<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
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<tr>
<td>SPREP</td>
<td>South Pacific Regional Environment Programme</td>
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<tr>
<td>SSB</td>
<td>Spawning Stock Biomass</td>
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<tr>
<td>STECF</td>
<td>Scientific, Technical and Economic Committee for Fisheries</td>
</tr>
<tr>
<td>SUDA</td>
<td>Sustainable Development of Aquaculture</td>
</tr>
<tr>
<td>TAC</td>
<td>Total allowable catch</td>
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<tr>
<td>TAFA</td>
<td>Tasmanian Fisheries and Aquaculture</td>
</tr>
<tr>
<td>TBT</td>
<td>Tributyltin</td>
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<tr>
<td>TL</td>
<td>Tail Length</td>
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<tr>
<td>TNC</td>
<td>The Nature Conservancy</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VHS</td>
<td>Viral Haemorrhagic Septicaemia</td>
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<tr>
<td>WFC</td>
<td>WorldFish Center (ex-ICLARM)</td>
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