

# Transition from low-value fish to compound feeds in marine cage farming in Asia



**Cover photographs:**

*Left:* Low-value fish harvested from Lampung Bay, Bandar Lampung, Indonesia (courtesy of FAO/Patrick White).

*Right top to bottom:* Preparing trash fish for marine cage fishes, Zhanjiang, Guangdong, China (courtesy of FAO/M.C. Nandeesh). Compound pellet feed for marine cage culture in Thailand (courtesy of FAO/Mohammad Hasan).

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## Preparation of this document

This fisheries and aquaculture technical paper presents the results of the FAO Regional Technical Cooperation Project “Reducing the dependence on the utilization of trash fish/low-value fish as feed for aquaculture of marine finfish in the Asian Region (TCP/RAS/320 (D))”, which was implemented between August 2008 and July 2011 in four selected countries in Asia; China, Indonesia, Thailand and Viet Nam. The project has been implemented in collaboration with the FAO Regional Office for Asia-Pacific (FAORAP) and the Network of Aquaculture Centres in Asia and the Pacific (NACA) and was coordinated by Mohammad R. Hasan, Aquaculture Officer (FIRA). This document comprises two sections; Part A being the consolidated report and a synthesis of the results of the different components and activities of the project, and Part B being the annexes containing the detailed reports of the above mentioned components. The preparation of this technical paper was also coordinated by Mohammad R. Hasan and many persons contributed both technically and/or editorially to the production of this volume.

## Abstract

This technical paper presents the findings of the FAO Regional Technical Cooperation Project TCP/RAS/3203 (D) “Reducing the dependence on the utilization of trash fish/low-value fish as feed for aquaculture of marine finfish in the Asian Region,” which was implemented between 1 August 2008 and 31 July 2011 in China, Indonesia, Thailand and Viet Nam. It comprises the results of the project components, namely, farmers’ participatory on-farm trials and a concurrent survey of farmers’ perceptions concerning the use of two feed types and microcredit, environmental impact assessments of the use of both feed types, and a survey and analysis of the potential impacts of a change to pellet feeds on the livelihood prospects of fishers and suppliers of trash fish/low-value fish. An assessment of changes in the perceptions of farmers before and after the farm trials was undertaken, and a final regional stakeholders’ workshop was conducted after the completion of all the project components. Incorporated in the relevant parts of the report are the findings of a follow-up mission conducted 16 months after the end of the project. This mission was designed to confirm the findings, and assess further activities in line with the recommendations made at the final regional stakeholders’ workshop.

There were indications of the clear benefits to farmers as well as to the environment of adopting pellet feeds. Some indicators were not statistically significant, but present opportunities for addressing the constraints to the farmers’ adoption of pellet feeds. A dominant finding was that the technical and economic performance from pellet feeds can be considerably enhanced by improving feed management, which was not a common attribute among the trial farmers. Furthermore, overall farm performance, whichever feed type was used, could be improved by introducing better management practices. The environmental impact assessments on the use of the two feed types suggested that good feed management and overall farming practices, and improving the quality of trash fish/low-value fish or pellets reduce the impacts of feed on the water beneath and around the culture sites. In addition, a good culture site where the carrying capacity is not stressed by aquaculture and non-aquaculture activities will considerably reduce the mortality risks from biotic and abiotic hazards. The technical and economic findings of the study were noted by the farmers, and contributed to the changes in their attitudes towards the pellet feeds from negative or neutral to positive. The recommendations of the project included providing the opportunities and enabling the farmers to translate their positive attitude into actual and sustained adoption of pellet feeds. Interventions that would promote the adoption of pellet feeds, among others, would include reasonable credit facility, species- and growth-stage-specific feed formulations, farmers being associated to take advantage of economy of scale, and advice on better management practices. A standardized guide for a better management practice in cage mariculture was unanimously requested by the farmers.

The impact on the livelihood of fishers and fish suppliers from losing the cage culture industry as a direct market for their trash fish/low-value fish was found to be minimal; they have robust coping mechanisms, which can be strengthened by policy and technical assistance from government.

**Hasan, M.R.**

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## Abbreviations and acronyms

AA	amino acid
ACIAR	Australian Centre for International Agriculture Research
AOAC	Association of Analytical Communities (previously Association of Official Analytical Chemists; previously Association of Official Agricultural Chemists)
BMP	better management practice
CF	condition factor
cfu	colony forming unit
CNY	Chinese Yuan Renminbi
DO	dissolved oxygen
EEZs	exclusive economic zones
eFCR	economic feed conversion ratio
FAO	Food and Agriculture Organization of the United Nations
FAO RAP	Regional Office for Asia and the Pacific of FAO
FCR	feed conversion ratio
FIEP	Fisheries Economics and Policy Division of the FAO Fisheries and Aquaculture Department
FIFO	fish-in fish-out
FIRA	Aquaculture Service of the FAO Fisheries and Aquaculture Department
GIS	geographical information system
ICZM	integrated coastal zone management
IDR	Indonesian Rupiah
LRFFT	live reef food fish trade
LFRT	live food fish restaurant trade
NACA	Network of Aquaculture Centres in Asia-Pacific
NGOs	non-governmental organizations
NH <sub>3</sub>	ammonia
NO <sub>2</sub>	nitrite
NO <sub>3</sub>	nitrate
Pf	pellet feed
pH	potential hydrogen ion concentration
PO <sub>4</sub>	phosphate
PPP	public private partnership
R&D	Research & Development
SGR	specific growth rate
Tf/Lvf	trash fish/low-value fish
TCP	Technical Cooperation Programme
THB	Thai Baht
TNC	the Nature Conservancy
TOM	total organic matter
US\$	US dollar
VND	Vietnamese Dong
VNN	viral nervous necrosis

