The Report of the 5th Regional Grouper Hatchery Production Training Course 2007

Brackishwater Aquaculture Development Center (BADC) - Situbondo Indonesia
9-29 July, 2007

Prepared by:

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1. Background

The Brackishwater Aquaculture Development Center Situbondo (BADC-Situbondo) was established in 1994 as a sub-center for brackishwater aquaculture development by the Ministry of Agriculture to support the program to increase fish production in Indonesia. Since 1 May 2001 it has been upgraded and become a center with 3 divisions: Finfish, Shrimp and Aquaculture. BADC-Situbondo is one of the 12 Technical Implementation Units (TIU) of the Directorate General of Aquaculture, Ministry of Marine Affairs and Fisheries, Indonesia.

BADC-Situbondo has been involved with applied research on grouper aquaculture particularly for hatchery technology since 1994. In 1997, it produced its first batch of grouper fingerlings, however, the survival rate at that time was low. The marine species reared by BADC-Situbondo include *Cromileptes altivelis, Epinephelus fuscoguttatus, E. lanceolatus, Cheilinus undulatus,* and *Chanos chanos*.

With continuous applied research and also technology exchange with other research institutes such as the Research Institute for Mariculture in Gondol, the technology for grouper hatchery has improved and have been adopted by the private sector, including large-, medium-, but mainly small-scale hatcheries.

Consequently, numerous grouper hatcheries - 86 in Situbondo alone - have been established and are now doing good business. These 86 hatcheries produced nearly 4.5 million grouper fingerlings in 2004.

2. Training Facilities

BADC-Situbondo has excellent training facilities for grouper hatchery production technology. A section of the centre incorporating 12 microalgae production tanks, 4 rotifer production tanks and 10 indoor larviculture tanks is devoted to grouper hatchery training course. All the participants received hands-on training from egg handling through to harvest of fingerlings.

In addition, the centre has good research equipment including microscopes, which are used to allow participants to observe egg and larval development and to identify various types of phytoplankton and zooplankton.

3. Objectives

The objective of the training course is to disseminate the grouper hatchery technology that has been developed by various institutes and projects in the region. The technologies developed through the Australian Centre for International Agriculture Research (ACIAR), Research Institute for Mariculture-Gondol (RIM-Gondol) and the Technical Implementation Units of the Directorate General of Aquaculture (DGA), Indonesia are synthesized for this training course. The training is focused on small-scale hatchery system which can be used for multiple marine finfish. Although the technology is specifically developed for small-scale hatcheries, it can also be adopted by medium- and large-scale hatcheries.

The 5th regional grouper hatchery training course was jointly organized by Situbondo Brackishwater Research and Development Centres and Network of Aquaculture Centres in Asia-Pacific (NACA). Training sponsors and support organizations include:

- Australian Centre for International Agriculture Research (ACIAR)
- Ministry of Marine Affairs and Fisheries, Indonesia
- Research Institute for Mariculture – Gondol (RIM-Gondol)
- Network of Aquaculture Centres in Asia-Pacific (NACA)
- Skretting Asia (Nutreco's global aquafeed division)

4. Training Course

The 5th Regional Grouper Hatchery Training Course officially began on the 9 July 2007. A total of 17 participants from eight countries attended the training course; Australia, China (China and Hong Kong), Palau, Philippines, Singapore, Sri Lanka, Thailand and Vietnam. The list of participants is in Annex 1. The 5th training course was another success with all participants being pleased with the overall training activities and field trips.

Mr Slamet Soebjakto, Director of BADC-Situbondo delivered a welcome address followed by Dr Sih Yang Sim (Coordinator – NACA Marine Finfish Aquaculture Program) delivered a speech on behalf of NACA Director General (Professor Sena De Silva). On behalf of the Directorate General for Aquaculture Indonesia, Dr Endhay Kusnendar, Director for Seed Development delivered an opening speech and officially opened the training course for 2007.

Picture 1: Mr Soebjakto delivered a welcome address at the opening of the training course

Picture 2: Dr Kusnendar delivered an opening speech and officially opened the training course

All participants and trainers are providing with the opportunity to introduce themselves to familiarize with each other prior to the training course.

There were 10 technical lectures delivered in the training course providing theoretical aspects and eight general topics were given (Annex 2). Practical components including hand-on work with grouper hatchery, broodstock management, live feed production, disease and health management components such as illustration of PCR tests, artificial feed production and packaging were included. Several field trips in Situbondo and Bali were organized which included visits to commercial grouper and milkfish hatcheries and nurseries, floating cages of grouper grow-out, seabass grow-out farm and live marine food fish and ornamental fish exporters.

5. Training Center Facilities Tour

This year the tour of the BADC-Situbondo facilities was carried out before the official opening, which was conducted in the evening. The visit provided an opportunity to understand the facilities and activities that are being carried out by the centre. The tour included visit to the shrimp and marine finfish broodstock facilities, hatchery systems and training facilities, etc.

Picture 3: BADC-Situbondo staff explaining the hatchery system during facility tour

Picture 4: Participants touring one of the grouper broodstock facilities

6. Theoretical Components

The 10 technical topics presented during the training course in lecture format covered all the theoretical components of the training course. Additional topics covered general aspects of marine finfish aquaculture also provided. Annex 3 provides a full list of resource speakers, lecturers and trainers. The technical topics are listed below:

- Site selection, hatchery design, equipment and setup
- Broodstock selection and management
- Eggs handling and development stages, laviculture and nursery
- Live feed production – phytoplankton
- Live feed production – zooplankton
- Parasitic and bacterial diseases
- Nutrition and artificial feed for grouper
- Viral diseases
- Culture environment and water quality management
- Harvesting, packaging and transportation

The general topics included:

- Introduction to BADC-Situbondo
- Status of mariculture in Indonesia
- Brief information on NACA
- Marine finfish aquaculture in Asia
- Development of grouper research in Indonesia
- Sustainable marine finfish aquaculture in the Asia-Pacific region
- Taste test of wild-caught and cultured humpback grouper (*Cromileptes altivelis*) in Hong Kong
- Market Trader Dialogue – Guangzhou Seafood Market

7. Hatchery Practical Components

On-the-job training is considered a very important component of the training course and there were many areas of on-the-job training that provide full exposure to the management and operational skills needed in grouper hatchery production to participants.

The hatchery production practical components include the following:

- Broodstock management
- Eggs collection, quality checking and treatment procedures
- Larviculture and hatchery management
- Live feed culture, enrichment and harvest
- Harvesting and transport
- Fish health
- Artificial feed production

i. Broodstock Management

During the training course, participants were provided with hands-on training of broodstock feed preparation, post-spawning broodstock management (for parasite and health treatment), and other operations. Picture 5 to 8 show some of the practical activities organized for the training course on broodstock components.

Picture 5: Cleaning and preparation of broodstock feed before feeding to broodstock

Picture 6: Catching Napoleon wrasse broodstock for monthly broodstock tank cleaning process

Picture 7: Observing the technicians feeding broodstock

Picture 8: Participant transferring broodstock to holding tank after freshwater bath treatment for external parasite

ii. Eggs Collection, Quality Checking and Treatment Procedures

Several practical components were organized for the training course on egg handling and management. These included harvesting eggs, transferring eggs in incubation area, checking egg quality and packing, etc. The training course commenced during the spawning period, participants were given full hand-on-training on this component. Pictures 9 to 15 show some of the practical activities carried out during the training course.

Picture 9: Preparation of holding tanks for fertilized eggs before stocking into larval tank or sale to hatcheries

Picture 10: Harvesting of grouper eggs

Picture 11: Cleaning of wastes and sunken eggs from holding tank

Picture 12: Harvesting of good quality eggs ready for stocking into larval tank or sale to hatcheries

Picture 13: Participant counting eggs

Picture 14: Participants practicing packing eggs

Picture 15: Participants observing technicians packing fertilized egg for transportation.

iii. Larviculture and Hatchery Management

Several practical components were arranged for larviculture and hatchery management section of the training course, including larval tank preparation, feeding, observing larval condition, microscopic observation of eggs and larval development. Pictures 16 to 27 show some of the practical activities carried out.

Picture 16: Participants cleaning larval tank before stocking water and fertilized eggs

Picture 17: Trainer showing participants how to fix the filter bag and prepare of larval tank before stocking fertilized eggs

Picture 18: Participants cleaning the plastic bucket before stocking eggs into larval tank

Picture 19: Participant stocking fertilized eggs into larval tank

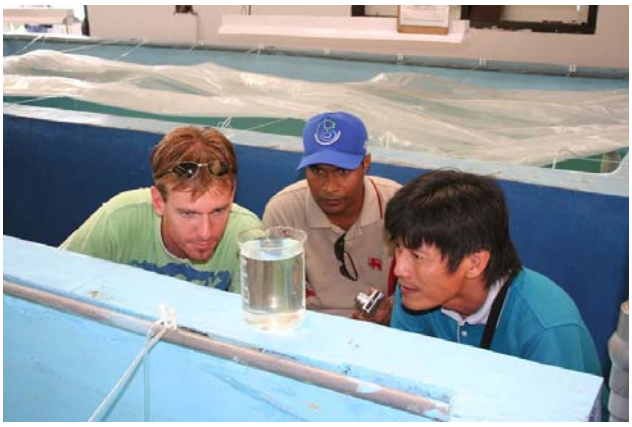
Picture 20: Trainer showing participants egg development via colour TV

Picture 21: Participants checking newly hatched grouper larvae under microscope

Picture 22: Collecting sample for counting egg hatching rate

Picture 23: Participants counting and recording hatching rates

Picture 24: Trainer showing newly hatched larvae to participants



Picture 25: Participants checking newly hatched larvae

Picture 26: Participants checking rotifer density

Picture 27: Participants checking water temperature at the larval tank

iv. Culture Tanks Cleaning

Some participants conducted some of the cleaning activities at the training hatchery unit. The cleaning activities include tank bottom cleaning and siphoning. Pictures 28 and 29 show participants carrying out cleaning activities.

Picture 28: Trainer showing participants how to clean tank bottom by siphoning

Picture 29: Participant siphoning tank bottom

v. Decapsulate *Artemia*, Harvesting Live Feed and Feeding Larvae

The practical component of this section has been developed to cover, decapsulation of A*rtemia*, and harvesting of live feed such as rotifer and A*rtemia*. It also includes some live food enrichment activities. Artificial diet preparation and feeding are also carried out by participants. Pictures 30 to 37 below show some of the decapsulation and feeding activities.

Photo 30: Trainer showing participants preparation of artificial feed for feeding to Day 5-6 larvae

Photo 31: Trainer showing feeding of artificial feed to larvae

Picture 32: Trainers demonstrate how to decapsulate Artemia

Picture 33: Participants conducting decapsulation of Artemia cysts under trainer supervision

Picture 34: Trainer showing the artificial feed used in the hatchery and explaining the various type of feeds available

Picture 35: Trainer explaining to participant about the composition of a commercial hatchery feed

Picture 36: Preparation of enriched rotifer for feeding to grouper larvae

Picture 37: Feeding of enriched rotifer to grouper larvae

vi. Harvesting Larvae, Grading and Sorting Sizes

This practical component covered harvesting of larvae from culture tanks, grading and size sorting. Grouper fingerlings of about 3 cm size were harvested and participants participated in the harvesting process and size grading. During the training course participants were also provided with the opportunity for sorting of larger size larvae and checking of deformities, abnormalities and cannibalism in larvae. Pictures 38 to 41 show the practical activities.

Picture 38: All participants doing grading activities at the training center

Picture 39: Trainer showing how to measure the size of the humpback grouper fingerlings according to different grade

Picture 40: Grading of 3 cm tiger grouper fingerlings

Picture 41: Participants grading in the larval tank

vii. Disease Laboratory Practical

Participants were provided with hands-on training on bacterial culture and colony counting. The training was under fish health specialists' supervision. A PCR test was carried out for the training course with full procedures explained by trainers. The PCR test was carried out to detect whether the grouper larvae managed by the trainees have any viral infection.

Picture 42: Showing parasite via colour TV to participants at the fish health laboratory

Picture 43: Fish health specialist demonstrate bacterial culture procedures prior to the hands-on training

Picture 44: Trainer demonstrating the process of taking sample for PCR analysis

Picture 45: Participants undertaking PCR analysis under trainers supervision

viii. Artificial Feed Production

A full process artificial feed production was conducted for the training course. Feed formulae were given and participants were shown how to measure and mix raw materials and produce pellets with small low cost machinery. After production the feed was spread for oven-drying. Participants were also provided the opportunity to visit the nutrition laboratory and the trainers explained the various activities in the nutrition laboratory.

Picture 46: Preparation of feed ingredients for grouper artificial feed

Picture 47: Hand mixing of raw materials based on the formula provided

Picture 48: Making feed with simple machine and placing feed on tray for drying process

Picture 49: Participant making feed to various sizes after drying process

Picture 50: Trainer at the nutrition laboratory explaining the laboratory activities to the participants

ix. Live Feed Production

Participants were brought to the live food laboratory for microalgal culture. Explanations on various nutrients needed for microalgal culture were given by the trainer. Explanation of various laboratory activities were also given and participants observed various microalgae species and rotifers under the microscope. Participants were also shown the procedures to prepare fertilizers and batch culture of microalgae before transfer to outdoor large volume culture. Outdoor culture and conditions were explained.

Picture 51: Explanation of various nutrients for microalgae production

Picture 52: Discussion and explanation of various microalgae activities in the laboratory

Picture 53: Trainer explaining the preparation of fertilizers for outdoor microalgae production

Picture 54: Trainer explaining various microalgae types at the medium scale batch culture area

8. Field Trips

There were several field trips arranged for the training course. The field trips included two locations; Situbondo and Bali. The field trips in Situbondo including visits to small-scale, medium-scale and large-scale grouper hatcheries. Visits to floating cage farms farming grouper species and to a seabass grow-out farm was also organized.

Picture 55: Explaining how small-scale grouper hatchery operates by trainer at the small-scale hatchery field trip

Picture 56: Participants are observing the technician at the large-scale hatchery checking rotifer density

Picture 57: Visit to floating cages farming grouper species

Picture 58: Participant looking at the feeding behavior of grouper species at the floating cages

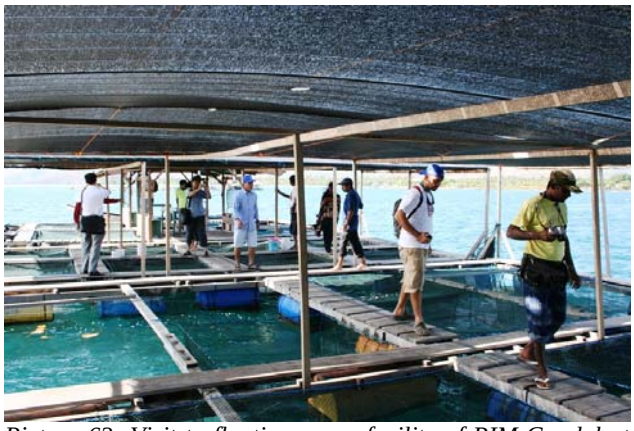
Picture 59: Participants visited a pond based seabass farm and observing feeding activity

Picture 60: Taking group photo with the owner of the seabass farm in Situbondo area

The field trip to Bali also included a visit RIM-Gondol, where a presentation outlining the research activities in the institute was given, follow by a facilities tour to the tuna breeding facilities, grouper broodstock and hatchery systems. An additional field trip to the grouper grow-out floating cages of RIM-Gondol at Pegametan Bay and a large-scale commercial grouper hatchery was also included.

Picture 61: Participants taking group photo at RIM-Gondol

Picture 62: RIM-Gondol staff describing some of the research works on marine finfish species



Picture 63: Visit to floating cages facility of RIM-Gondol at Pegametan Bay

Picture 64: Field trip to large-scale grouper hatchery in Gondol area

The final field visit was organized to Denpasar/Kuta which included the exporters of marine ornamental fish and live seafood. Due to low season (strong waves) most live seafood exporters have limited stock at their premises however, participants are able to discuss and obtain information on live seafood export activities.

Picture 65: Field trip to a live seafood exporter and participants listening to the explanation of the activities in the company

Picture 66: Technician at the live seafood exporter explaining the live transport system used by his company

9. Special Small-Scale Hatchery Owner Experience and Asia-Pacific Marine Finfish Network Program

A special session on small-scale hatchery operator experience was organized in BADC-Situbondo for the training course. The head of the small-scale hatchery association in Situbondo shared his experiences in small-scale hatchery operation with participants.

Dr Mike Rimmer, Project Leader of the ACIAR Marine Finfish Project FIS/2002/077 presented some of the research outputs from the ACIAR projects and also regional experiences to the training course participants.

Picture 67: The head of the small-scale hatchery association in Situbondo sharing his experience in small-scale hatchery operation with participants

Picture: 68: Dr Mike Rimmer provides three presentations to the participants

10. Closing Ceremony

The closing ceremony was held on 29th July in Bali. The Director General for Aquaculture (Indonesia) Dr Made L Nurdjana, Director for Seed Development, Dr Endhay Kusnendar and Director for Aquaculture Production Development, Mr Iskandar Ismanadji and ACIAR Marine Finfish Project FIS/2002/077 Project Leader Dr Mike Rimmer attended the closing ceremony. A certificate was presented to each participant for successfully completing the training course.

Picture 69: Dr Made L. Nurdjana presenting certificate to participant from Palau

Picture 70: Dr Endhay Kusnendar presenting certificate to participant from Australia

Picture 71: Mr Slamet Soebjakto, Director of BADC-Situbondo presenting certificate to participant from Sri Lanka

Picture 72: Dr Mike Rimmer presenting certificate to participant from Sri Lanka

11. Feedback Analysis from Participants

The following section is the evaluation provided by all 17 participants based on a questionnaire (Annex 4) distributed on the last day of the training course. Overall the responses were positive.

1. ***Do you think the lectures cover all aspects of grouper hatchery production?***

All participants considered the lectures organized cover all aspects of grouper hatchery production. One participant suggested it would be good to include more on nursery aspect and another participant suggested that the economic and marketing parts should be improved.

2. ***Do the lectures provide sufficient knowledge and information on grouper hatchery production to participants?***

Sixteen participants indicated that the lectures of the training course provided them with sufficient knowledge and information on grouper hatchery production. One participant felt that the feeds and nutrition and also disease aspects need improvement.

3. ***Do you think the practical components cover all aspects on grouper hatchery production?***

Fifteen participants considered that the practical components organized by the training course covered all aspects on grouper hatchery production. Some felt that the practical components could be further improved. Some participants' comments:

- *Time allocated for the practical is not enough*
- *However, it would be good if there are different stages larvae provided to the training group*
- *Need more technical and laboratory aspects*
- *Practical work on algal culture and cannulation*

4. ***Do you think it is necessary to have daily routine on-the-job training throughout the whole course for participants?***

Fifteen participants considered daily routine on-the-job training is necessary throughout the training course. Some participants' comments:

- *I found the daily routine very valuable to help me understand the changing requirement especially in the hatchery*
- *I think this is the most important part. Hands on is very different to theory in regards to understanding*
- *More time for individuals hands-on and reduce number of field trips*
- *On-the-job training for a full hatchery cycle will be great*

5. ***Do you think that you have received sufficient level of technical support throughout the course?***

All participants agreed that they have received sufficient level of technical support throughout the training course. But some participants think there is some communication problem due to language differences.

6. ***What do you think of the field trip arrangements?***

There were four types of field trips arranged, the backyard hatchery, floating netcages, seabass farm and live food fish and marine ornamental exporters field trips were considered by many participants as a good arrangement and providing good experiences. Based on observation the participants were generally satisfied with the trip. However, due to low season (strong waves) live seafood exporters have limited stock at their premises so the rating for live food fish exporters is average.

Backyard hatchery			***Live food fish & marine ornamental exporters***			***Floating netcages***		
Good	***Average***	***Poor***	***Good***	***Average***	***Poor***	***Good***	***Average***	***Poor***
15	*2*	*0*	*2*	*12*	*3*	*12*	*5*	*0*

7. ***Do you think the training and the field trips have provided you with good future contacts?***

All participants were able to gather some contacts for their future aquaculture activities after they returned home. The training course and the field trips had provided an opportunity for the participants to obtain future contacts for supplies and marketing.

8. ***Do you think overall the training course is satisfactory and meets your expectation? Please pick the following level of satisfactory:***

Overall the training course met participants' expectation. Four considered the training course was excellent, 11 said it was well organized, and two felt that it was average.

9. ***Is there a need for the training course to be improved? If so in what aspects?***

Three participants felt that there was no need for further improvement for the training course. However, 14 participants considered the training course need to be improved in some aspects. Below are some of their comments:

- *More time for practical on feeding, live feed production and larval rearing*
- *Lectures must be comprehensive*
- *Lecture on packaging and transportation*
- *Shorten the training period*
- *To include exam and test for theory and practical*

10. ***Do you think your knowledge and practical experience on grouper hatchery production have increased after this training course?***

All participants believed they have increased their knowledge and practical experience on grouper hatchery production after the course.

11. ***Did the training course provide you with knowledge and skills sufficient to train other technical staff or farmers in your country / region?***

Fourteen participants felt that the training course has provided them with knowledge and skills sufficient to train other technical staff and farmers at their homelands. Some participants' comments:

- *The small scale hatchery and the staff from BADC Situbondo have given me lots of useful technical information on marine finfish hatchery that I can transfer to my staff*
- *Not 100% sufficient but somewhat it's good enough*
- *The course provide me with knowledge and skills sufficient to train my staff and other farmers*

- *Having a copy of all the presentations and the notes makes it a lot easier to transfer information*

12. ***When you return home, how will you pass on the knowledge and skills that you acquired during this course?***

The answers to this question vary; some said they will conduct seminar to disseminate technical knowledge, some will conduct hatchery trails. The details of the responses are listed below:

- *I will extend the skills that I acquired to my colleagues and improve techniques for grouper hatchery*
- *I have to write a report and discuss with the other officials, funding agency, farmers to create awareness about the grouper hatchery production*
- *I will give a presentation to my colleagues and modify or improve the facilities for grouper hatchery*
- *Presentation and practical sessions with technicians in my company*
- *We will have meetings and explain to others to start grouper hatcheries in or country coastal areas*
- *I have to write a report about this training to out Principal Advisor*
- *Teach my students*
- *The university will put up a grouper hatchery not only for production but also as a training and demo facility for aquaculture students and fish farmers*
- *The small scale hatchery is one of the project I will work for and spend more time on the job training and broodstock management and also provide training to fish farmers*
- *Train farmers in at home*

13. ***Would you like to participate in a network/discussion group after this training course to facilitate discussion and future activities and contacts?***

All participants would like to participate in a network to facilitate discussion and future activities and contacts and all of them indicated they would like the Asia-Pacific Marine Finfish Aquaculture Network to facilitate the activities for them.

12. Annexes

Annex 1: Details of the Participants for the 5th Regional Grouper Hatchery Production Training Course - 9-29 July, 2007

No	Name	Position and Address	Field, Specialization and Experiences
1.	Ms. Anjanette Johnson	Fisheries Technician Queensland Department of Primary Industry and Fisheries (QDPI&F) 38-40 Tingira St, Portsmith, Cairns Queensland Australia Telephone: +61-7-40573774 Mobile: +61-4-27601082 Fax: +61-7-40573813 E-mail: Anjanette.Johnston@dpi.qld.gov.au	• Larviculture - grouper • hatchery specifically on grouper (tiger and orange-spotted groupers); bioremediation in prawn ponds
2.	Mr. Patricio Antonio Lillo	243 O'shea Esplanade Machans Beach, Carins Queensland 4878, Australia Telephone: +61-7-40370159 Mobile: +61-4-28109216 Fax: nil E-mail: antolillo@gmail.com	• finfish hatchery • grow out – mussels, scallops and salmonids; seafood processing; hatchery of seabass
3.	Mr. Adam Cooper	Senior Aquaculture Technician Australian Aquaculture Technologies Ltd 48-50 Dover Drive, Burleigh Queensland 4220 Australia Telephone: +61-7-55203122 Mobile: +61-4-04198821 Fax: +61-7-55202756 E-mail: gypsycooper@hotmail.com; adam@australianaquaculturetechnologies.com.au	• development of grouper (*Cromileptes altivelis*) hatchery • barramundi (*Lates calcarifer*) grow-out; murray cod (*Maccullochelai peeli*); jade perch
4.	Mr. Mohamed Hassan	President Fishermen Co-operative Societies Union, Pottuvil Shanaztan Market Road Pottuvil 08 Sri Lanka Telephone: +94-63-2248103 Mobile: +94-77-7845266 Fax: +94-11-4514820 E-mail: nil	• worked with fishermen and paddy farmers • supervising fishing and agriculture sectors in Pottuvil area
5.	Mr. Selvaratnam Rodric Arudselvam	Income Generation Facilitator German Technical Cooperation (GTZ) GTZ-REPSI/NRP, 25 9th Lane, Colombo-3 Sri Lanka Telephone: +94-11-4528400-4 Mobile: +94-77-6393401 Fax: +94-11-4514820 E-mail: rodric80@yahoo.com	• community development, trained in seaweed cultivation • 2.5 years working with fisheries community to improve livelihood of the fishermen and assist society, unions, federation and fisheries department to improve fishermen livelihood

6.	Mr. Samsul Arifeen Mohamed Hassan	Income Generation Facilitator German Technical Cooperation (GTZ) GTZ-REPSI/NRP, 25, 9th Lane, Colombo-3 Sri Lanka Telephone: +94-63-2634139; 94-11-4528400-4 Mobile: +94-77-6994586 Fax: +94-11-4514820 E-mail: hassan_arifeen@yahoo.com	• identify income generation activities • 3 years in income generation sector
7.	Mr. Abduraji S. Tahil	Vice Chancellor for Research and Development Mindanao State University at Tawi-Tawi Sanga-Sanga, Bongao Twai-Tawai 7500 the Philippines Telephone: +63-2-5338855 Mobile: +63-9-189231009 Fax: +63-2-5338856 E-mail: rstahil@yahoo.com	• abalone ecology and finfish culture • feeding ecology of abalone; siganids culture and CRM
8.	Mr. Lawrence Sumor	Fisheries Technician II Palau Mariculture Demonstration Center - Bureau of Marine Resources P.O. Box 359, Koror Palau 96940 Telephone: +680-4883322 Mobile:nil Fax: nil E-mail: pmdc@palaunet.com	• giant clam, trochus and green snail breeding • 15 years in giant clam breeding and mariculture
9.	Mr. Percy Rechelluul	Fisheries Technician Bureau of Marine Resources – Ministry of Resources & Development P.O. Box 359, Koror Palau 96940 Telephone: +680-4886994 Mobile: +680-7792326 Fax: nil E-mail: yakau92@yahoo.com	• marine fish hatchery • 3 years in marine fish aquaculture with Japanese
10.	Mr. Shanthasekaran Thillayampalam	Fisherman Community Officer Fishermen Cooperation Society – Sri Lanka Eastern Province Panama Pattu, Komari Sri Lanka Telephone: +94-67-5673072 Mobile: +94-716504228 Fax: nil E-mail: komaricontractors@yahoo.com	• fishermen community development • one year prawns and crab factory; one year outboard motor repairing; World Vision Society Board member; 2 years C.F.D.R.
11.	Mr. Nguyen Tan Sy	Lecturer in Aquaculture Faculty University of Fisheries in Nha Trang 02 Nguyen Dinh Chieu Street Nha Trang City Vietnam Telephone: +84-58-850166 Mobile: +84-9-83497494 Fax: +84-58-831142 E-mail: syhguyentan2003@yahoo.com	• biology

12.	Mr. Manuel Ruvinsalas	Accountant Fishermen's Cooperation Federation Ltd – Jaffna District 100, Main Street, Jaffna Sri Lanka Telephone: +94-21-2222347 Mobile: +94-77-7116520 Fax: +94-21-2229797 E-mail: jdfcsu.federation.jaffna@yahoo.com	• social service activities • 10 years in social service activities; 7 years co-operative accounting work; housing scheme development organization (Jaffna)
13.	Mr. Jui Yong Koh	Manager Max Solutions LLP 183 Toa Payoh Ctcl #03-294 (HDB Hub) Singapore 310183 Telephone: nil Mobile: +65-9-3255226 Fax: +65-62592461 E-mail: maxsolve@singnet.com.sg	• fish hobbyist
14.	Mr. Chatchawal Wuthimethee	Fisheries Biologist Trat Coastal Aquaculture Station 205 Moo 2 Aoyai, Maung District Trat Province Thailand 23000 Telephone: +66-39-543334; 3335 Mobile: +66-8-7-866535 Fax: +66-39-543167 E-mail: wuthimethee@yahoo.com	• seabass nursery; blue spotted coral grouper breeding
15.	Dr. Zhang Haifa	Section Chief Guangdong Dayawan Fishery Development Centre Yaqian, Aotou, Huizhou City Guangdong Province P.R. China Telephone: +86-75-25574826 Mobile: +86-13-802865766 Fax: +86-75-25578672 E-mail: zhhaifa812@hotmail.com	• grouper hatchery production
16.	Ms. Au Chi Man (Vivian)	Fisheries Technical Officer Agriculture, Fisheries & Conservation Department HKSAR Au Tau Fisheries Office 27 Milestone Castle Peak Road Au Tau, Yuen Long, N.T. Hong Kong SAR Telephone: +852-24719142 Mobile: nil Fax: +852-24827064 E-mail: fto_autau@afcd.gov.hk	• inland aquaculture • induce spawning of jade perch; artemia hatching
17.	Ms. Sumithira Karunairajah	District Aquaculture Extension Officer National Aquaculture Development Authority of Sri Lanka Regional Aquaculture Extension Centre Kachcheri, Vavuniya Sri Lanka Telephone: +94-24-2221653 Mobile: +94-78-6145280 Fax: +94-24-2221653 E-mail: sumithira79@yahoo.com	• agriculture and freshwater aquaculture and organizational management • 3 years in freshwater aquaculture extension and farming projects

Annex 2: Details of the Trainers and Technicians for the Regional Grouper Hatchery Production Training Course, November 20 – December 9, 2006

No	Name	Position and Address	Field, Specialization and Experiences
1.	Mr. Slamet Soebjakto	Director Situbondo Brackishwater Aquaculture Development Center PO. Box 5 Panarukan Situbondo , Jawa Timur Indonesia Tel: +62 338 673328; +62 81559516797 ; +62 811353131 Fax: +62 338 390299 E-mail: slamet_subyakto@yahoo.com; bbapstbd@rad.net.id	• shrimp and marine finfish hatchery and aquatic animal nutrition
2.	Mrs. Siti Subaidah	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 811355410 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Shrimp hatchery and shrimp broodstock management
3.	Mr. M.A. Rahman	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 817829172 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Grouper broodstock management (more than 10 years)
4.	Mr. Bambang Hanggono	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8156896231 Fax: +62 338 390299 E-mail: bambanghanggono@yahoo.com; bbapstbd@rad.net.id	• Marine finfish hatchery and water quality management
5.	Mr. Agus Suriawan	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8123487853 Fax: +62 338 390299 E-mail: agus_suriawan@yahoo.com; bbapstbd@rad.net.id	• Grouper hatchery
6.	Mrs. Sri Cahyaningsih	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: sri_cahyaningsih@yahoo.com; bbapstbd@rad.net.id	• Culture of phytoplankton (laboratory and mass scale)

7.	Mr. Achmad Nur Mei Muhtar	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8124909974; +62 8536046234 Fax: +62 338 390299 E-mail: achmadnurmei@yahoo.co.id; mei1024@plasa.com	• Marine finfish hatchery and mass culture of phytoplankton
8.	Mrs. Yani Lestari Nur'aini	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8124904050 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id; labpenyakit@yahoo.com	• Aquatic animal health management
9.	Ms. Gemi Triastutik	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8155102438: +62 8123283112 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id; labpenyakit@yahoo.com	• Aquatic animal health management
10.	Mrs. Veni Darmawiyanti	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Aquatic animal nutrition
11.	Mrs. Indah Kusumaningrum	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Zooplankton culture
12.	Mrs. Wiwie Sumarjati	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Shrimp and marine finfish hatchery

13.	Mrs. Sri Wahyuningsih	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Marine finfish hatchery
14.	Mr. Santoso	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Shrimp and marine finfish hatchery
15.	Mr. Ahmad Buchari Muslim	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8124909974; +62 85236046234 Fax: +62 338 390299 E-mail: bohari_muslim@yahoo.co.id	• Marine finfish broodstock and hatchery
16.	Mr. Wendy	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Shrimp hatchery
17.	Dr. Sih Yang Sim	Coordinator – Marine Finfish Aquaculture Program Network of Aquaculture Centres in Asia-Pacific (NACA) PO Box 1040, Kasetsart Post Office, 10900 Bangkok, Thailand Tel: +66-2-561 1728 (ext 116) Fax: +66-2-561 1727 E-mail: sim@enaca.org	• marine finfish aquaculture • 3 years commercial tiger shrimp hatchery and grow-out • 8 years R & D and regional cooperation and networking for marine finfish aquaculture

Annex: 3: Training Course Program 2007

DAY / DATE	TIME	ACTIVITY
Sunday / July 8	-	Arrival of participants in Situbondo
Monday / July 9	13.00 – 13.30	▪ Participant registration
	13.30 – 15.30	▪ **Introduction to BADC – Situbondo** ▪ Mr. Slamet Subyakto
		▪ **Brief information on NACA** ▪ Mr. Sih Yang Sim
		▪ **Brief information about the training activity**
	15.30 – 16.30	▪ Visit BADC facilities
	16.30	▪ Back to hotel
	19.00 – 21.00	▪ Welcome address –BADC-Situbondo ▪ NACA Speech ▪ Opening address - Director of Seed Production ▪ Participants and instructors introduction
Tuesday / July 10	08.00 – 10.00	• **Status of Marine Finfish Culture in Indonesia** • Director of Seed Production – DGA
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	• **Development of grouper research in Indonesia** • Mr. Ketut Suwirya
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **On-the-job training at hatchery unit (tank and water preparation)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
Wednesday / July 11	08.00 – 10.00	▪ **Site Selection, Hatchery Design, Equipment and Setup** ▪ Mr. Wendy
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Broodstock Selection and Management** ▪ Mr. Bambang H and Mr. A.B. Muslim
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **On-the-job training at hatchery unit (tank and water preparation)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
Thursday / July 12	08.00 – 10.00	▪ **On-the-job training at broodstock unit (canulation and hormonal injection)** ▪ Mr. A.B. Muslim and Mr. Agus
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Eggs Handling and Development Stages and Larviculture and Nursery** ▪ Mr. Agus S
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ Visit small scale hatcheries around Situbondo ▪ Mr. Bambang H, Mr. Didik, Mr.Tabah
Friday / July 13	08.00 – 10.00	▪ **On-the-job training at broodstock unit (egg handling and stocking – Mouse grouper)** ▪ Mr. A.B. Muslim and Mr. Agus
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Live feed Production (phytoplankton)** ▪ Mrs. Sri Cahyaningsih
	12.00 – 13.00	▪ Lunch
	13.00 – 15.00	▪ **Live feed production (zooplankton)** ▪ Mr. Achmad Nur Mei

DAY / DATE	TIME	ACTIVITY
Saturday / July 14	08.00 – 10.00	▪ **On-the-job training at hatchery unit (sampling of hatching rate and larva observation)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **On-the-job training at live feed unit (indoor scale)** ▪ Mrs. Sri Cahyaningsih
	12.00 – 13.00	▪ Lunch
	13.00 – 15.00	▪ **On-the-job training at live feed unit (outdoor scale)** ▪ Mr. Achmad Nur Mei and Mrs. Indah K
Sunday / July 15	▪ ***Broodstock and first feeding activities – on-the-job training***	
Monday / July 16	08.00 – 10.00	▪ **On-the-job training at hatchery unit (rotifer application)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Parasitic and bacterial disease** ▪ Mr. Bambang H
	12.00 – 13.00	▪ Lunch
	13.00 – 15.00	▪ **On-the-job training at disease laboratory** ▪ Mrs. Yani L and Mr. Bambang Hanggono
Tuesday / July 17	08.00 – 10.00	▪ **On-the-job training at broodstock unit (egg handling and stocking – Tiger grouper)** ▪ Mr. A.B. Muslim and Mr. Agus
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Nutrition and artificial feed for grouper** ▪ Mrs. Veni Damawiyanti
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **On-the-job training at artificial feed preparation unit** ▪ Mrs. Veni D, Mrs. Indah Z and Suratin
Wednesday / July 18	08.00 – 10.00	▪ **Viral disease** ▪ Mrs. Yani L
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **On-the-job training at disease laboratory** ▪ Mrs. Yani L and Mr. Bambang Hanggono
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **On-the-job training at disease laboratory** ▪ Mrs. Yani L and Mr. Bambang Hanggono
Thursday / July 19	08.00 – 10.00	▪ **On-the-job training at hatchery unit (alga application)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **On-the-job training at hatchery unit (grading)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **Culture Environment and Water Quality Management** ▪ Mr. Bambang H
Friday / July 20	08.00 – 10.00	▪ **Field trip to floating net cages** ▪ Mr. Bambang H, Mr. Didik and Mr. Tabah
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **On-the-job training at hatchery unit (grading and artemia decapsulation)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **Harvest, Packaging and transportation** ▪ Mr. Febriko

DAY / DATE	TIME	ACTIVITY
Saturday / July 21	08.00 – 10.00	▪ **On-the-job training at hatchery unit (artificial feed application)** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ Field trip to hatcheries and nurseries ▪ Mr. Bambang H, Mr. Didik and Mr. Tabah
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ Field trip to hatcheries, nurseries and seabass farm ▪ Mr. Bambang H, Mr. Didik and Mr. Tabah
Sunday / July 22	***Trip to Bromo Mountain***	
Monday / July 23	08.00 – 10.00	▪ **On-the-job training at hatchery unit** ▪ Mr. Agus S, Mrs. Wiwi and Mrs. Yuni
	10.00 – 10.30	• Coffee break
	10.30 – 12.00	▪ **Regional marine finfish activities** ▪ Dr. Sih Yang Sim
	12.00 – 13.00	• Lunch
	13.00 – 15.00	▪ **Small scale hatchery owner experience** ▪ Hatchery technician
Tuesday / July 24	07.00 WIB	o Depart from San Sui Hotel - Situbondo
	12.00 – 13.00 WITA	o Arrive at Gondol Mariculture Research Center (GMRC)
		o Lunch at GMRC
	13.00 – 16.00 WITA	o Welcome address by Director of GMRC
		o Visit GMRC facilities
	16.00 WITA	o Back to Sunari hotel – Lovina
Wednesday / July 25	08.00 WITA	o Depart from Sunari hotel - Lovina
	09.00 – 12.00 WITA	o Visit floating net cages in Gondol
		o Visit small scale hatchery in Gondol
	12.00 – 13.00 WITA	o Lunch at GMRC
	13.00 – 15.00 WITA	o Visit PT. Solaar Sahara Usaha Mina
	15.00 WITA	o Back to Sunari hotel – Lovina
Thursday / July 26	07.00 WITA	o Move to Denpasar
	10.00 – 10.30 WITA	o Visit Bedugul Lake
	10.30 – 12.00 WITA	o Move to Denpasar
	12.00 – 13.00 WITA	o Lunch at Denpasar
	13.00 – 16.00 WITA	o Visit live ornamental marine fish
	16.00 WITA	o Back to hotel at Legian – Kuta
Friday / July 27	09.00 – 12.00 WITA	• Visit live fish exporter
	12.00 – 13.00 WITA	• Lunch
	14.00 – 15.00 WITA	▪ **Asia Pacific Marine Finfish Aquaculture Activities** ▪ Dr. Mike Rimmer
Saturday / July 28	08.00 WITA	• Depart from hotel
	09.00 – 12.00 WITA	• Visit Kintamani
	12.00 – 13.00 WITA	• Lunch
	13.00 – 16.00 WITA	▪ Visit Tanah Lot Temple
Sunday / July 29	16.00 – 20.00 WITA	▪ Closing ceremony

Annex 4: Feedback Questionnaire for Grouper Hatchery Production Training Course, July 2007

1. Do you think the lectures cover all aspects of grouper hatchery production?
   Yes
   No
   If "No" which area you think should be included or improved?
   _____
   _____

2. Do the lectures provide sufficient knowledge and information on grouper hatchery production to participants?
   Yes
   No
   If "No" which lecture you think should be improved?
   _____
   _____

3. Do you think the practical components cover all aspects on grouper hatchery production?
   Yes
   No
   If "No", which area you think should be improved?
   _____
   _____
   _____

4. Do you think it is necessary to have daily routine on-the-job training throughout the whole course for participants?
   Yes
   No

   If necessary, how would you improve the 'hands-on' aspects of the course.
   _____
   _____
   _____

5. Do you think that you have received sufficient level of technical support throughout the course?
   Yes
   No
   If "No" please elaborate.
   _____
   _____
   _____

6. What do you think of the field trip arrangements?
   - Backyard hatchery

   Good Average Poor

   - Live fish exporters and fish markets

   Good Average Poor

   - Floating Netcages

Good Average Poor

7. Do you think the training and the field trips have provided you with good future contacts?
   Yes
   No

8. Do you think overall the training course is satisfactory and meet your expectation? Please pick the following level of satisfactory:
   Excellent Good Average Poor

9. Is there a need for the training course to be improved? If so in what aspects?
   Yes
   No
   If "Yes" please provide details
   _____
   _____
   _____

10. Do you think your knowledge and practical experience on grouper hatchery production have increased after this training course?
    Yes
    No

11. Did the training course provide you with knowledge and skills sufficient to train other technical staff or farmers in your country / region?
    _____
    _____
    _____

12. When you return home, how will you pass on the knowledge and skills that you acquired during this course?
    _____
    _____
    _____

13. Would you like to participate in a network/discussion group after this training course to facilitate discussion and future activities and contacts?
    Yes
    No

    If "Yes", would you like the Asia-Pacific Marine Finfish Aquaculture Network to facilitate this activity?
    Yes
    No

    If "No" who do you think would be a better option?
    _____

THE END