Report of the Grouper Hatchery Production Training Course 2005

Brackishwater Aquaculture Development Center (BADC) - Situbondo Indonesia
April 18-May 8, 2005

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 the Technical Implementation Unit (TIU) of the Directorate General of Aquaculture.

BADC-Situbondo has been involved with applied research on grouper aquaculture particularly hatchery technology since 1994. In 1997, it produced its first batch of grouper fingerlings, however, the survival rate at that time was low. With further applied research and technology exchange with other research institutes such as Research Institute for Mariculture in Gondol, the technology for grouper hatchery has improved considerably, and now been taken up by the private sector in the area, including large-, medium-, but mainly small-scale hatcheries.

The marine species on which BADC Situbondo focuses its research and development work include *Cromileptes altivelis*, *Epinephelus fuscoguttatus*, *Epinephelus lanceolatus*, *Cheilinus undulatus*, and *Chanos chanos*, but *C. altivelis* and *E. fuscoguttatus* are the most popular species cultured in private sector hatcheries in the area. There are numerous hatcheries in the area - 86 in Situbondo alone – that have become established and are now doing good business. The 86 hatcheries produced nearly 4.5 million grouper fingerlings in 2004 (until Nov 2004).

2. Training Facilities

BADC-Situbondo has excellent training facilities for grouper hatchery production and technology dissemination. A section of the centre incorporating 12 microalgae production tanks, 4 rotifer production tanks and 10 indoor larviculture tanks are used for grouper hatchery training purposes. The facilities allow trainees to receive hands-on training from egg handling through to harvest of fingerlings. In addition, the centre has good research equipment and facilities available for training, such as microscopes, allowing participants to observe the eggs and larval development and identify various types of phytoplankton and zooplankton feed.

3. Objectives

The 3rd regional grouper hatchery training course was jointly organized from April 18-May 8, 2005 by Situbondo Brackishwater Research and Development Centres and Network of Aquaculture Centres in Asia-Pacific (NACA). The objective of the training course was to disseminate grouper hatchery technology that has been developed by various institutes and projects in the region, within the framework of the Asia-Pacific Marine Fish Aquaculture Network.

The technologies developed by Australia Centre for International Agriculture Research (ACIAR), Research Institute for Mariculture-Gondol (RIM-Gondol) and extension centers of Directorate General of Aquaculture (DGA), Indonesia have been synthesized for this training course. The training is focused on small-scale hatchery system which can be used for multiple species.

Although the technology is specifically developed for small-scale hatcheries, it can also be adopted by medium- and large-scale hatcheries.

4. Training sponsors and support organizations include

The co-sponsors of the training include the Australia Centre for International Agriculture Research (ACIAR), Ministry of Marine Affairs and Fisheries of Indonesia, the Asia-Pacific Economic Cooperation (APEC) and Network of Aquaculture Centres in Asia-Pacific (NACA), Skretting (Nutreco's global aquafeed division) and Inter Vet Singapore.

The organizers wish to give special acknowledgement to Skretting (Nutreco's global aquafeed division) for their support of private sector participation in the training and Intervet Singapore for providing a resource person on marine fish health.

5. Training Course

The training facilities in BADC-Situbondo are of a good size, and a total of 17 participants attended the 3rd regional grouper hatchery training course. They came from Australia, Brunei Darussalam, Indonesia, Malaysia, Marshall Islands, Maldives, Singapore and Vietnam. The list of participants and trainers are in Annex 1. The training course for 2005 was another success, with good feedback from participants on the training course.

The training course began on 18th April 2005 and started with a welcome address by Mr. Slamet Soebjakto, Director of BADC-Situbondo, followed by a keynote speech delivered on behalf of NACA Director General (Mr Pedro Bueno) by Mr Sih Yang Sim (Coordinator – Regional Grouper Hatchery Production training course). Mr Agus A Budhiman, Director of Seed Production delivered the opening speech and officially opened the training course for 2005.

There were 13 technical lectures delivered in the training course to provide the theoretical aspects and three general topics and 3 photos presentations were given (Annex 2). Practical components including hands-on work with grouper hatchery, broodstock management, live feed production, diseases and health management components such as illustration of PCR tests, artificial feed production and packaging. 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, and exporters.

6. Training Center Facilities Tour

After the opening ceremony participants toured BADC-Situbondo facilities. 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 disease laboratories, nutrition and water quality lab, live food lab, hatchery systems, shrimp and marine finfish broodstock facilities and other aspects of the centres' work.

Picture 1: Participants touring the grouper broodstock facilities

Picture 2: The Director of BADC-Situbondo explaining the hatchery system during facility tour

7. Theoretical Basis for Successful Grouper Hatchery Production

The 13 technical topics presented during the training course given in lecture format provided participants with the background to grouper aquaculture and theoretical basis for successful grouper hatchery production. The technical topics are listed below:

- Biology of grouper
- 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)
- Culture environment and water quality
- Diseases and fish health management in hatchery
- Nutrition and artificial feed for grouper
- Harvesting, packaging and transportation
- Diseases in Tropical Marine Fish (InterVet)
- Fish Health Management (InterVet)

Picture 3: Participants listening to lectures in the class room

Presentations on the following general topics were also provided:

- Introduction to BADC-Situbondo
- Status of mariculutre in Indonesia
- A Marine Finfish Aquaculture Network for the Asia-Pacific Region

Three photo presentations were made on the following:

- Regional hatchery practices
- Regional grow-out practices
- Regional markets and species

Annex 3 provides a full list of resource speakers, lecturers and trainers.

8. Hatchery Practical Components

On-the-job or hand-on training has been considered as a very important component of the training course and there were many areas of on-the-job training that have been developed for the training course to 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 enrichment and feeding, checking broodstock condition (for health treatment and eggs development, and other operations. Picture 4 to 9 show some of the practical activities organized for the training course on broodstock components.

Picture 4: Observing broodstock tank cleaning process

Picture 5: Vitamin enrichment for grouper broodstock feed and feeding activity

Picture 6: Freshwater bath of Cromileptes altivelis for parasite treatment

Picture 7: Checking of C. altivelis broodstock for external parasite

Picture 8: Cannulation of giant grouper broodstock

Picture 9: Trainer and technician showing the sperm collected from giant grouper broodstock

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 measuring hatching rate, etc. Although the training course commenced after grouper spawning period, participants were given alternative species (milkfish) for this component of the hand-on-training. Picture 11 to 15 show some of the practical activities carried out during the training course.

Picture 10: Harvesting of milkfish eggs

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

Picture 12: Harvesting of good floating eggs for sale

Picture 13: Participants checking the counting eggs and checking quality

Picture 14: Explaining to participants about good and poor quality eggs under microscope via colour TV

iii. Larviculture and Hatchery Management

Several practical components were arranged for larviculture and hatchery management section of the training course, including feeding, larvae tanks cleaning, observing larvae condition, microscope observation of eggs and larvae development, etc. Picture 15 to Picture 22 show some of the practical activities carried out.

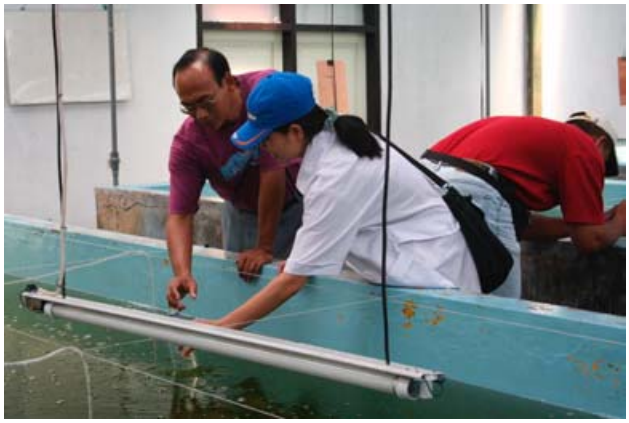
Picture 15: Collecting larvae sample for observation under microscope

Picture 16: Showing grouper larva (below D 20) to under microscope via colour TV

Picture 17: Participants observing larvae condition

Picture 18: Checking of rotifer density in the larvae tanks

Picture 19: Feeding of live food to grouper larvae under trainer guideline



Picture 20: Collecting water sample for analysis

Picture 21: Feeding live feed to grouper larvae by Vietnamese participant

Picture 22: Feeding artificial feed to grouper larvae

iv. Culture Tank Cleaning

Some participants conducted cleaning activities at the training hatchery unit. The cleaning activities include tank bottom cleaning and siphoning, and post-harvest larvae tank cleaning. Picture 23 to 24 show participants carrying out cleaning activities.

Picture 23: Participating in larvae tank cleaning with local students

Picture 24: Siphoning larvae tank

v. Decapsulate Artemia, Harvesting Live Feed and Feeding Larvae

The practical component on this section have been developed to cover, Decapsulate artemia, harvesting of live feed such as rotifer and artemia. It also including some food enrichment activities. Artificial diets were also fed to the larvae by participants. Picture 25 to Picture 29 below show some of the feeding and harvesting activities.

Picture 25: Harvesting of rotifer for enrichment

Picture 26: Putting enrichment material into rotifer enrichment tank

Picture 27: Decapsulate of artemia cytes

Picture 28: Harvesting of artemia for feeding to grouper larvae

Picture 29: Harvesting and packing of decapsulated artema cytes for storage

vi. Harvesting Larvae, Grading and Sorting Sizes

This practical component covered harvesting of larvae from culture tanks, grading and size sorting. *C. altivelis* fingerlings of about 3 cm size were harvested and participants fully 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 and abnormalities in larvae. Picture 30 to Picture 34 show the practical activities.

Picture 30: Harvesting fingerlings of C. altivelis for grading

Picture 31: Deformed C. altivelis grouper fingerlings are identified removed during grading activities

Picture 32: Participants grading grouper larvae based sizes and quality

Picture 33: Fish health specialist is showing how to inject medication for tiger grouper broodstock

Picture 34: Grading of C. altivelis fingerlings and separate the big from small and also remove deformed fingerlings

vii. Packaging and Transportation

Training course participants were also involved in the full process of packaging of fertilised eggs. Picture 35 below illustrates the activities for packaging and transportation of marine fish eggs.

Picture 35: Packaging of harvested eggs for transport

viii. Disease Laboratories Illustration

The training group attended a disease laboratories illustration session delivered by fish health specialists. The illustration included microscope identification of pathogens and video illustration.

ix. PCR Tests Illustration

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 36 to Picture 39 show the PCR activities.

Picture 36: Collecting larvae for PCR analysis

Picture 37: Preparing the larvae sample for PCR

Picture 38: Staining the PCR result

Picture 39: Counting bacteria colony

x. Artificial Feed Production

A full process artificial feed production was conducted for the training course. Four feed formulae were given and participants were shown how to measure and mix raw materials and produce pellet with small low cost machinery. After production the feed were spread for oven-drying. Picture 40 to Picture 44 show the feed making activities.

Picture 40: Preparation of feed ingredients for grouper artificial feed

Picture 41: Making feed with simple machine

Picture 42: Preparation for drying of feed in tray

Picture 43: Turning noodle shaped feed to small feed sizes

Picture 44: Seining feed to get uniform sizes

xi. Live Feed Production

Participants were brought to the live food laboratory for algal culture. Explanation on various nutrients needed for algal culture were given by trainer. Explanation of various lab activities were also carried out and participants observed various microalgae species under the microscope. Participants also had the opportunity to see rotifer under microscope.

Participants were also shown the procedures to prepare fertilizers and batch culture of algae before transfer to outdoor large volume culture. Outdoor culture and condition were explained. Picture 45 to Picture 47 show the feed making activities.

Picture 45: Explaining of various nutrients for microalgae production

Picture 46: Preparation of fertilizers for outdoor microalgae production

Picture 47: Showing how rotifer look like under microscope via colour TV

9. Special Farmers Session

A special session at the training course was organized for the participants which allow them to gain first hand hatchery experiences and stories with the farmers. Two farmers who operate grouper hatcheries were invited and they gave presentation at the class room and sharing their experiences and knowledge with the participants.

Picture 48: Small-scale hatchery own come to share his experience with participants

Picture 49: Another small-scale grouper hatchery owner come to share his experience

10. Field Trips

There were several field trips arranged for the training course. The field trips included two location, Situbondo and Bali. A total of 4 field trips were organized in Situbondo. The field trips in Situbondo including visits small-scale (5), medium-scale (1) and large-scale (2) grouper hatcheries which produce *E. coioides*, *E. fucoguttatus*, and *C. altivelis* fingerlings. Visits to floating cage farms farming grouper species were also organized.

Picture 53: Explaining how small-scale grouper hatchery operate by trainer in a small-scale hatchery field trip

Picture 51: Traditional fishing boat for field trip to floating cage farms growing

Picture 50: Visit to floating cages farming grouper species

Picture 52: Participants checking fish in the cage during a field trip

Field trips to Hatcheries and Nurseries

Picture 54: Malaysian participant asking small-scale hatchery technician about the situation in the larvae tank

Picture 55: Observing a grading activities during a visit to small-scale grouper hatchery

Picture 56: Visit to small-scale grouper hatchery and looking at the rotifer culture section

Picture 57: Harvesting and grading activities at a small-scale hatchery

Picture 58: Field trip to backyard hatchery during harvesting and packaging at night for transport by air

Picture 59: Feeding tiger grouper fingerlings during a field trip visit to a large-scale grouper hatchery

Field trips to Bali

Picture 60: A special visit to RIM-Gondol to

Picture 61: Visit to floating cages facility of RIM-Gondol

Picture 62: Visit to large-scale hatchery in Gondol area

Picture 63: Observing grading activities in medium-scale grouper hatchery

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

Picture 65: Small-scale backyard hatchery for milkfish in Gondol area

Field trip to Live food fish exporters

Picture 66: Harvesting of grouper species for shipment to Hong Kong by air

Picture 67: Exporter weighing grouper species for air transport, Bali

Picture 68: The owner and staff of the export company explaining to participants the activities in the company

Picture 69: The full process of the packaging of live groupers for air shipment to Hong Kong was demonstrated to participants

Field trip to Bali also including visiting RIM-Gondol, a presentation of the research activities in the institute was given by the Director Dr Adi Hanafi, following by facilities tour to the tuna breeding facilities, super intensive marine finfish system, and grouper broodstock and hatchery systems.

A field trip was arranged to visit the grouper grow-out floating cages of RIM Gondol, and a commercial floating cage farm.

Field trip to large-scale grouper hatchery and small-scale backyard hatcheries of grouper and milkfish was also included in the field trip to Bali.

The final field visit was organized to Denpasar/Kuta which included the exporters of marine ornamental fish, and live reef food fish.

11.Asia-Pacific Marine Finfish Aquaculture Network

A special presentation was given by Dr Mike Rimmer on the ACIAR marine finfish project and the Asia-Pacific Marine Finfish Aquaculture Network.

Picture 70: Dr Mike Rimmer, project leader of ACIAR marine finfish project giving a presentation of the project and the Asia-Pacific Marine Finfish Aquaculture Network

12. InterVet Fish Health Presentations

A special session on private sector presentation on fish diseases and fish health management was organized in Bali. Dr Cedric Kumar of InterVet provided two presentations based on InterVet regional experiences with farmers.

Picture 71: InterVet representative giving two presentations to participants about fish disease and fish health management at farm level

13. Closing Ceremony

The closing ceremony was held on 8th May. Dr Farkturi (DGA, Indonesia), Mr Pedro Bueno (DG, NACA), Dr Geoff Allan (ACIAR), and Dr Mike Rimmer (ACIAR marine finfish project leader) attended the closing ceremony.

The closing ceremony speeches included speeches from Dr Farkturi (DGA, Indonesia), Mr Pedro Bueno (DG, NACA), Dr Geoff Allan (ACIAR), and Mr Slamet (BADC-Situbondo) delivering on behalf of each of the organisers. A representative from the participants gave a speech to thank the organizers and the trainers.

A certificate was presented to each participant for successfully completion the training course.

Picture 72: Indonesia Director General for Aquaculture, Dr Fakturi presenting a certificate to Indonesia participant

Picture 73: NACA Director General Mr Pedro Bueno presenting the certificate to Vietnam participant

Picture 74: BADC-Situbondo Director Mr Slamet presenting a certificate for Brunei participant

14. Feedback Analysis from Participants

The following section is the evaluation provided by 16 out of 17 participants based on a questionnaire (Annex 4) distributed on the last day of the training course. Overall the responses are positive.

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

Twelve participants considered the lectures organized cover all aspects of grouper hatchery production. Improvements were suggested as follows:

- *Layout and design of hatchery*
- *More hands-on-training*

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

Thirteen participants think that the lectures of the training course provide them with sufficient knowledge and information on grouper hatchery production. Improvements were suggested as follows:

- *Need more on biology*
- *More details in the materials provided*
- *Communication gap*

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

Eleven participants considered the practical components organized by the training course cover all aspects on grouper hatchery production. But they think that the practical components should be further improved. Improvements were suggested as follows:

- *Improve broodstock components*
- *Need more hands-on*
- *Culture of algae and rotifer*
- *Cover all stages of larviculture from eggs to harvest*

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

All 16 participants considered daily routine on-the-job training is necessary throughout the training course. Improvements were suggested as follows:

- *Providing the practical to ourselves and do it for ourselves*
- *More on algae and larvae production*
- *Start work in hatchery from early morning (6:00 am)*
- *More microscope works, everyday look at the larvae, measure, look at gut contents*
- *To follow a batch through from Day 0-35*

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

Fifteen participants think that they have received sufficient level of technical support throughout the training course. But one participant noted some communication problem due to language differences. One suggests the need for more practical approach on larvae stage.

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

There were three type of field trips arranged, the backyard hatchery, floating netcages, and live food fish and marine ornamental exporters field trips were considered by many participants as a good arrangement and provides good experiences. Based on observation the participants were generally satisfied with the trip.

Backyard hatchery			*Live food fish & marine ornamental exporters*			*Floating netcages*		
Good	***Average***	***Poor***	***Good***	***Average***	***Poor***	***Good***	***Average***	***Poor***
14	*1*	*1*	*7*	*7*	*2*	*9*	*7*	*0*

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

It appears that 15 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; 15 participants were able to develop some contacts. One participant did not provide answer.

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. Three considered the training course was excellent, 11 said it was well organized, and 3 think it was average.

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

All 16 participants considered the training course need to be improved in some aspects. Improvements were suggested as follows::

- *More hand on practical*
- *Presentation and facilitation skills*
- *Hand on training on set up, layout and good husbandry*
- *Timing for spawning time*
- *Plankton and rotifer culture*
- *Artificial spawning and eggs collection*
- *Give more hand on experience for managing and handling on larvae, green water and rotifer culture*
- *Provide more daily training activities and reduce training course duration*

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

All 16 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?***

Thirteen 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 comments from some participants are listed below:

- *In some aspects, but I wouldn't train people without further experience, a number of production cycle completed*
- *Only on theory aspect not on the practical*
- *I learned very much from this course, specially broodstock culture*
- *I will be able to train other hatchery owners in my country*
- *I can help farmers improving their knowledge and skill in hatchery production*
- *Yes but not much confident, just in some steps that I have background*

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:

- *Write a report with knowledge of grouper hatchery production that I get and practice some skills and also train students*
- *For the moment we has not setup our hatchery, I might start explore my knowledge about what I have known*
- *Provide on-job training*
- *Conduct seminars and meetings*
- *I will apply all things from this course to practice*
- *I will give my knowledge to who ever ask from me*
- *I will apply the knowledge that I acquired from the course to my business such as grouper hatchery, grouper nursery, etc*
- *With government farms and cooperate with agencies*
- *With government agencies, cooperate with farmers/fishermen*
- *Thru the notes and presentations acquired during the training*
- *Open my own hatchery*
- *Begin study grouper seed production*
- *Don't have confident to train and give knowledge to others because not really expose to practical site*
- *Only on certain aspect especially on theory site*

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

Fifteen participants would like to participate in a network to facilitate discussion and future activities and contacts, only one participant does not provide respond on this. All participants who would like to participate in network activities and indicated they would like the Asia-Pacific Marine Finfish Aquaculture Network to facilitate the activities for them.

15. Annexes

Annex 1: Details of the Participants for the Regional Grouper Hatchery Production Training Course April 18-May 8, 2005

No	Name	Position and Address	Field, Specialization and Experiences
1.	Mr. Koh Chee Boon (Amos)	Program Executive Agri-food & Veterinary Authority 5 Maxwell Road #01-01, Tower Block, MND Complex, Singapore 069110 Tel: +65-9794 8212 Fax: +65-9714 6449 E-mail: koh_chee_boon@ava.gov.sg; amoskoh76@hotmail.com	• Fish hatchery • About 2 years in larviculture (e.g. seabass, golden snapper, crismson red snapper and golden trevally)
2.	Mr. Lee san	Matsya Mico Aquaculture Pte. Ltd. 40 A Toh Crescent, Singapore 507952 Tel: +65-9424 1925 Fax: +65-6542 1906 E-mail: s.lee@mmafarm.com	• Operations
3.	Mr. Murray Elliott	Manager/Technician Tastyabbs 35 Caithwill Crt, Narre Warren North, Victoria 3804, Australia Tel: +61-4-2705 1674 (mobile) Fax: +61-3-9706 2280 (phone/fax) E-mail: murrayelliott78@hotmail.com	• Technician/ management all aspects of freshwater salmonid production, abalone, freshwater crayfish, inland saline aquaculture • Degree in aquaculture, six years experience working on a variety of aquaculture farms, including some consulting on various new aquaculture proposals
4.	Mr. Azhar Mohamad Saidin	Project Manager Fisheries Development Authority of Malaysia Lot 38, Grace Square 2, Sembulan Pantai, 88100 Kota Kinabalu, Sabah, Malaysia Tel: +60-13-866 7908 Fax: +60-88-25 0400 E-mail: tuahmass@hotmail.com	• Hatchery broodstock development experience • 20 year – Project Manager
5.	Mr. Shawal bin Tembol	Project Manager Fisheries Development Authority of Malaysia Projeck Penetasan Udang/Ikan LKIM Rhulo, PO Box 25, 22100 Bandar Permaisuri, Setiu, Terengganu, Malaysia Tel: +60-19-984 6877 Fax: +60-9-697 7378; 692 0966 (DL) E-mail: ppulkimten@yahoo.com	• Shrimp hatchery and aquaculture • 12 years Farm Manager

6.	Dr. Manoj Nair R	Aquaculture Research Scientist USDA Land Grant Program, College of the Marshall Islands College of Marshall Islands (CMI), PO Box 1258, Majuro, MH 96960, Republic of Marshall Islands Tel: +692-528 5033/5034/3031 Fax: +692-528 4699, 625 7203 E-mail: manojnair999@yahoo.com; manojnair@manojnair.com	• Shellfish hatchery and farming • 3 ½ years in Research and development of hatchery and farming technology of mollusks mainly pearl oysters, mussels, giant clams and gastrapos shells
7.	Mr. Randy Thomas	Aquaculture Manager Rongelap Atoll Local Government PO Box 1766, Majuro, MH96960, Republic of Marshall Islands Tel: +692-625 5401/7271 Fax: +692-625 5400/4667 E-mail: manojnair999@yahoo.com	• A few months experience in aquaculture
8.	Mr. Nguyen Dich Thanh	Lecturer and Researcher Aquaculture Faculty, University of Fisheries No 2 Nguyen Dinh Chieu Str, Nhatrang City, Khanhhoa Province, Vietnam Tel: +84-58-83 1149 (ext 169) Fax: +84-58-83 1145 E-mail: nguyendichthanh@yahoo.com	• Marine finfish culture • Reproduction of seabass (*Lates calcarifer*)
9.	Mr. Ngo Van Manh	Lecturer and Researcher Aquaculture Faculty, University of Fisheries No 2 Nguyen Dinh Chieu Str, Nhatrang City, Khanhhoa Province, Vietnam Tel: +84-58-83 1149 (ext 169) Fax: +84-58-83 1145 E-mail: manh872001@yahoo.com	• Marine finfish culture • Reproduction of sandbass (*Psammoperca waigiensis*)
10.	Ms. Dinh Thi Nhung	Lecturer Aquaculture Faculty, University of Fisheries No 2 Nguyen Dinh Chieu Str, Nhatrang City, Khanhhoa Province, Vietnam Tel: +84-58-83 1149 (ext 171) Fax: +84-58-83 1145 E-mail: nhung2803@yahoo.com	• Physiology of fishes • Biological characteristics of fish
11.	Mr. Khong Cheong Foo (Allan)	Managing Director Matsya Mico Aquaculture Pte. Ltd. 40 A Toh Crescent, Singapore 507952 Tel: +65-9738 9150 Fax: +65-6542 1906 E-mail: a.khong@mmafarm.com	• Sales and marketing

12.	Mr. Hengky Lawrence	Jl. A. Yani No 42/527 Rt 3/01 Karang Jati, Balikpapan 76123, Indonesia Tel: +62-542-73 6261; 62-813 1562 4535 (mobile) Fax: +61-4-0273 3936 E-mail: heng_qi@yahoo.com	• Agribusiness (aquaculture) • Experience: a few months in silver perch and ornamental fish farms in Queensland, Australia
13.	Mr. Law Seng Keong	Manager Gasing Fisheries Sdn. Bhd No 9 Jln Tambur 33/19, Shah Alam Technology Park, 40400 Shah Alam, Malaysia Tel: +60-3-5124 7392 Fax: +60-3-5123 1212 E-mail: plawppr@yahoo.com	• Piping, water treatment • 10 years in construction
14.	Mr. Mubaashir Rafeeu	Senior Officer Maldives Industrial Fisheries Company Ltd Felivaru Tuna Processing Plant, Lh Felivaru, Hilaalee Magu, Male, Republic of Maldives Tel: +960-23 0376; 960-75 7232 Fax: +960-32 3955 E-mail: mubashir@felivaru.com.mv	• Aquaculture • 1 year in yellow fin tuna fattening
15.	Mr. Nguyen Quoc Thai	Manager No 1 Tiger Shrimp Hatchery 5 Hamlet, Quynh Lien Commune, Quynh Luu District, Nghe An Province, Vietnam Tel: +84-38-65 2552 Fax: nil E-mail: qthai04@yahoo.co.uk	• Tiger shrimp hatchery • Small-scale shrimp hatchery, grow-out for tilapia, grouper and tiger shrimp
16.	Mr. Pg Asamadi Pg Hj Md Salleh	Fisheries Assistant Jabatan Perikanan Kementerian Perindustriran dan Sumbar-sumber Utama, Jln Menteri Besar, Berakas BB 3910, Brunei Darusalam Tel: +67-3876 0723 (mobile), 238 3067 (office) Fax: nil E-mail: nil	• Hatchery and broodstock development
17.	Mr. Faisal	Fisheries Officer Loka BAP Ujung Batee Komplek LOKA BAP, Ujung Batee, Aceh Besar, Indonesia Telephone: +62-651-24686; +62-813 6000 6555 (mobile) Fax: +62-651-24686 E-mail: nil	• aquaculture

Annex: 2: Training Course Program

Date	Day	Time Schedule and Contents		
		07.30 – 10.00	10.30 – 12.00	13.00 – 15.00
April 17	Sun	Arrival of participants in Situbondo		
April 18	Mon	▪ Participant registration ▪ Welcome address - Mr. Slamet Subjakto ▪ Keynote speech - NACA- Mr. Sih Yang Sim ▪ Opening address - Mr. Agus A Budhiman	▪ Introduction to BADC – Situbondo - Mr. Slamet Subjakto ▪ Brief information on NACA - Mr. Sih Yang Sim ▪ Status of mariculture in Indonesia - Mr. Agus A Budhiman	▪ Visit BDAC facilities Mr. Slamet Subjakto, Mr. Bambang H, Mr. Agus S
April 19	Tue	▪ Biology of Grouper - Mrs. Siti Subaidah	▪ Site Selection, Hatchery Design, Equipment and Setup - Mr. Gatot Pitoyo	▪ Visit small scale hatcheries around Situbondo Mr. Bambang H, Mr. Agus S, Mr. Mei
April 20	Wed	▪ Broodstock Selection and Management - Mr. M.A. Rahman	▪ Eggs Handling and Development Stages - Ms. Gemi Triastutik	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
April 21	Thu	▪ On-the-job training at broodstock unit Mr. M.A. Rahman; Mr. A.B. Muslim	▪ Larviculture and Nursery - Mr. Agus Suriawan	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
April 22	Fri	**Indonesia Public Holiday**		
April 23	Sat	▪ Live feed Production (phytoplankton) - Mrs. Sri Cahyaningsih	▪ Live feed production (zooplankton) - Mr. Achmad Nur Mei	▪ On-the-job training at live feed unit (outdoor scale) Mrs. Sri Cahyaningsih, Mr. Mei, Mrs. Indah
April 24	Sun	**Rest Day**		
April 25	Mon	▪ On-the-job training at live feed unit (laboratory scale) Mrs. Sri Cahyaningsih, Mrs. Indah, Mr. Mei	▪ Culture Environment and Water Quality Management - Mr. Bambang H	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
April 26	Tue	▪ Diseases and Fish Health Management in Hatchery - Dr. Murdjani; Mrs. Yani Lestari	▪ On-the-job training at disease laboratory Mrs. Yani Lestari, Ms. Gemi Triastutik	▪ On-the-job training at disease laboratory Mrs. Yani Lestari, Ms. Gemi Triastutik
April 27	Wed	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni	▪ Nutrition and artificial feed for grouper - Mr. Slamet Subyakto; Veni Darmawiyanti	▪ On-the-job training at artificial feed preparation unit Veni Darmawiyanti
April 28	Thu	▪ On-the-job training at artificial feed preparation unit Veni Darmawiyanti	▪ Harvest, Packaging and transportation - Bambang H	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni

Date	Day	Time Schedule and Contents		
		07.30 – 10.00	10.30 – 12.00	13.00 – 15.00
April 29	Fri	▪ Field trip to floating net cages	▪ Regional hatcheries practices – Mr Sih Yang Sim	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
April 30	Sat	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni	▪ Field trip to hatcheries and nurseries	▪ Field trip to hatcheries and nurseries
May 1	Sun	**Rest Day**		
May 2	Mon	▪ On-the-job training at broodstock unit Mr. M.A. Rahman; Mr. A.B. Muslim	▪ Regional Grow-out Practices - Mr. Sih Yang Sim	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
May 3	Tue	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni	▪ Regional Markets and species – Mr Sih Yang Sim	▪ On-the-job training at hatchery unit Mr. Agus S, Mr. Bambang H, Mr. Jati, Mrs. Yuni
May 4	Wed	• Presentation by Dr Adi Hanafi (Director of RIM-Gondol) ▪ Presentaion by Dr Mike Rimmer on ACIAR marine fish project and the Asia-Pacific Marine Finfish Aquaculture Network ▪ Visit RIM-Gondol facilities		
May 5	Thu	**Indonesia Public Holiday**		
May 6	Fri	Visit small-scale hatcheries, nurseries and grow-out in Gondol area		
May 7	Sat	Move to Denpasar and visit live food fish and marine ornamentals exporters		
May 8	Sun	Morning – InterVet presentations on marine fish diseases and health management Evening - Closing reception in Denpasar		

Annex 3: Details of the Trainers and Technicians for the Regional Grouper Hatchery Production Training Course, April 18-May 8, 2005

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.	Dr. Muhammad Murdjani	Director Center for Brackishwater Aquaculture Development PO Box 1 Jepara 54800 Central Java Indonesia Tel: +62 291 591125 Fax: +62 291 591724 E-mail: bbbapjpr@rad.net.id	• Research on grouper (more than 20 years) and aquatic animal health management
3.	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
4.	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)
5.	Mr. Gatot Pitoyo	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 8124905077 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Shrimp and marine finfish hatchery

6.	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
7.	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
8.	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)
9.	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: bbapstbd@rad.net.id	• Marine finfish hatchery and mass culture of phytoplankton
10.	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

11.	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
12.	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
13.	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
14.	Mr. Jati Waluya	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +62 338 673328; +62 812349953 Fax: +62 338 390299 E-mail: bbapstbd@rad.net.id	• Marine finfish hatchery
15.	Mr. Dzikri Wahyudi	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

16.	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
17.	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
18.	Mr. Achmad 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: bbapstbd@rad.net.id	• Marine finfish broodstock and hatchery
19.	Mr. Sih Yang Sim	Research Associate Network of Aquaculture Centres in Asia-Pacific (NACA) Research Associate PO Box 1040, Kasetsart Post Office, 10900 Bangkok, Thailand Tel: +66-2-561 1728 (ext 120) Fax: +66-2-561 1727 E-mail: sim@enaca.org	• Marine finfish aquaculture • Commercial tiger shrimp hatchery and grow-out, R & D and regional cooperation and networking for marine finfish aquaculture (8 years)

Annex 4: Feedback Questionnaire for Grouper Hatchery Production Training Course, May 2003

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