The Report of the 4th Regional Grouper Hatchery Production Training Course 2006

Brackishwater Aquaculture Development Center (BADC) - Situbondo Indonesia
Nov 20-December 9, 2006

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 for hatchery technology since 1994. In 1997, it produced its first batch of grouper fingerlings, however, the survival rate at that time was low.

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

The marine species that on which BADC Situbondo focuses its research and development work include *Cromileptes altivelis*, *Epinephelus fuscoguttatus*, *Epinephelus lanceolatus*, *Cheilinus undulatus*, and *Chanos chanos*.

The hatchery technology for *C. altivelis* and *E. fuscoguttatus* have been developed and taken up by many private sector operations. Consequently, numerous grouper hatcheries - 86 in Situbondo alone - have been established and now doing good business. The 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 are 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 for the training course to allow participants to observe the eggs and larval development, identify various types of phytoplankton and zooplankton, etc..

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 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 are 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.

The 4th regional grouper hatchery training course was jointly organized by Situbondo Brackishwater Research and Development Centres and Network of Aquaculture Centres in Asia-Pacific (NACA).

4. Training sponsors and support organizations include:

- Australia Centre for International Agriculture Research (ACIAR)
- Ministry of Marine Affairs and Fisheries, Indonesia
- Network of Aquaculture Centres in Asia-Pacific (NACA)
- Skretting (Nutreco's global aquafeed division)
- InterVet Singapore

5. Training Course

The 4th Regional Grouper Hatchery Training Course is officially begun on the 20 November 2006. A total of 20 participants come from 13 countries attended the training course which was hosted by the Brackishwater Aquaculture Development Centre (BADC)-Situbondo, Indonesia. The participants come from Australia, Hong Kong, Indonesia, India, Malaysia, Maldives, Myanmar, Philippines, Qatar, Saudi Arabia, Singapore, Thailand and Vietnam. The list of participants is in Annex 1. The training course for 2006 was another success.

Mr Slamet Soebjakto, Director of BADC-Situbondo delivered a welcome address followed by Mr Sih Yang Sim (Coordinator – Regional Grouper Hatchery Production training course) delivered a speech on behalf of NACA Director General (Professor Sena De Silva) and Mr Hiro Matsumoto from Skretting Asia gave a speech at the opening. Dr Made L. Nurjarna, Director General of Aquaculture, Indonesia delivered an opening speech and officially opened the training course for 2006.

Picture 1: Dr Made delivered an opening speech at the training course

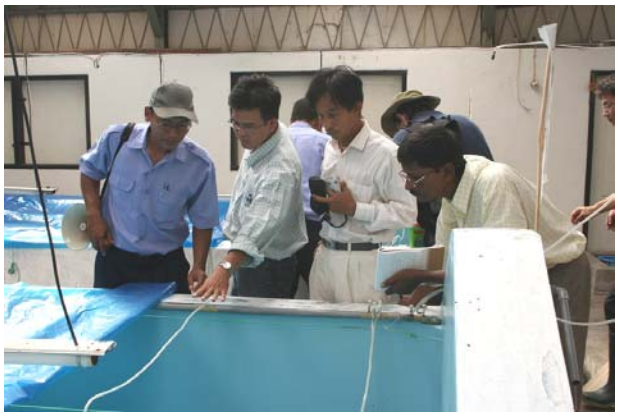
All participants and trainers are providing with the opportunity to introduce themselves and follow by a visit to the facilities at the training center.

There were 14 technical lectures delivered in the training course providing theoretical aspects and five general topics were given (Annex 2). Participants are also provided with opportunity to present their aquaculture projects and activities carried out in their home countries. Practical components including hand-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 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 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, etc.



Picture 2: BADC-Situbondo staff explaining the hatchery system during facility tour

Picture 3: Participants touring the one of the grouper broodstock facilities

Picture 4: BADC-Situbondo staff explaining the live feed system during facilities tour

7. Theoretical Components

The 14 technical topics presented during the training course in lecture format covered all the theoretical components of the training course. Additional topics covered the more general aspects of the course. 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
- Parasitic and bacterial diseases
- Viral diseases
- Nutrition and artificial feed for grouper
- Harvesting, packaging and transportation
- Diseases in Tropical Marine Fish (InterVet)
- Fish Health Management (InterVet)

The general topics included:
- Introduction to BADC-Situbondo
- Status of mariculutre in Indonesia
- Brief information on NACA
- Hatchery feed by Skretting
- Regional marine finfish activities

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

8. Hatchery Practical Components

On-the-job 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 hand on training of broodstock feed preparation, post spawning broodstock management (for parasite and health treatment), and other operations. Picture 5 to 9 show some of the practical activities organized for the training course on broodstock components.

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

Picture 6: *Catching broodstock for post-spawning treatment*

Picture 7: Preparation for chemical bath for broodstock after spawning

Picture 8: Freshwater bath of Cromileptes altivelis broodstock for parasite treatment and checking for external parasite

Picture 9: Trainer explaining to participants on broodstock condition before release it into holding tank

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. Picture 10 to 16 show some of the practical activities carried out during the training course.

Picture 10: Preparation of holding tanks for fertilized eggs before stocking into larvae tank or sale to hatcheries

Picture 11: Harvesting of grouper eggs

Picture 12: Cleaning of wastes and sunken eggs from holding tank

Picture 13: Participant counting eggs

Picture 14: Participants preparing plastic bags for packing of fertilized eggs

Picture 15: Harvesting of good quality eggs ready for stocking into larvae tank or sale to hatcheries

Picture 16: Technician demonstrate packing of 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 larvae tank preparation, feeding, observing larvae condition, microscope observation of eggs and larvae development, etc. Pictures 17 to 30 show some of the practical activities carried out.

Picture 17: Fixing filter bag and preparation of larvae tank before stocking fertilized eggs

Picture 18: Participant checking eggs development under microscope

Picture 19: Participants collecting treated eggs for stocking into larvae tank

Picture 20: Participant stocking fertilized eggs into larvae tank

Picture 21: Trainer showing participants the newly hatched grouper larvae

Picture 22: Participants checking newly hatched grouper larvae

Picture 23: Participants checking newly hatched grouper larvae

Picture 24: Collecting sample for counting hatching rate

Picture 25: Participants counting and recording hatching rate

Picture 26: Trainer showing participants how to calculate hatching rate

Picture 27: Collecting larvae for observation under microscope

Picture 28: Showing grouper larva to participants via colour TV

Picture 29: Participants checking water temperature at the larvae tank

Picture 30: Participants counting rotifer density

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 31 and 32 show participants carrying out cleaning activities.

Picture 31: Participant siphoning tank bottom

Picture 32: Participants cleaning larvae tank after harvest

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

The practical component on this section has been developed to cover, decapsulate *artemia*, harvesting of live feed such as rotifer and *artemia*. It also is including some food enrichment activities. Artificial diets preparation and feeding are also carried out by participants. Pictures 33 to 38 below show some of the decapsulation and feeding activities.

Photo 33: Trainer showing participants on preparation of artificial feed for feeding to Day 5-6 larvae

Photo 34: Participants feeding artificial feed to larvae

Picture 35: Trainers demonstrate how to decapsulate artemia

Picture 36: Participants gather decapsulated artemia cysts for storage prior to hatching

Picture 37: Participant conducting decapsulation of artemia cysts

Picture 38: Cleaning up decapsulated artemia cysts

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 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, abnormalities and cannibalism in larvae. Pictures 39 to 42 show the practical activities.

Picture 39: Participants observing of grading activities carried out at the training center

Picture 40: Harvesting of C. altivelis fingerlings for grading

Picture 41: First stage of grading activities carried out by participants

Picture 42: Graded fingerlings are counted before stocking into larvae tank again

vii. Disease Laboratories Practical

Participants were provided with hand on training on bacterial culture and 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 43: Participant preparing bacterial culture activities under supervision of fish health specialist

Picture 44: Participants at the disease lab counting bacterial colony

Picture 45: Trainer demonstrate the process of PCR analysis

Picture 46: Participant conducting PCR activity

Picture 47: Trainer showing the process of the PCR machine

Picture 48: Participants looking at the PCR outcomes

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 pellet with small low cost machinery. After production the feed were spread for oven-drying.

Picture 49: Preparation of feed ingredients for grouper artificial feed

Picture 50: Hand mixing of feed raw material and checking with trainer of the feed formula

Picture 51: Making feed with simple machine

Picture 52: Placing feed on tray for drying process

ix. Live Feed Production

Participants were brought to the live food laboratory for algal culture. Explanations 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 53: Explaining of various nutrients for microalgae production

Picture 54: Observation of microalgae species under microscope

Picture 55: Preparation of fertilizers for outdoor microalgae production

Picture 56: Spreading fertilizers into outdoor tank for microalgae production

9. 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 visit to small-scale, medium-scale and large-scale grouper hatcheries. Visit to floating cage farms farming grouper species were also organized. In addition, a special field trip to seabass grow-out farm was also organized.

Picture 57: Explaining how small-scale grouper hatchery operate by trainer at the small-scale hatchery field trip

Picture 58: Observing grading activities during a visit to medium-scale grouper hatchery

Picture 59: Visit to floating cages farming grouper species

Picture 60: Participant checking the feeding behavior of grouper species in floating cages

Picture 61: Participants visited a pond based seabass farm and observing feeding activity

Field trip to Bali also including visiting RIM-Gondol, a presentation of the research activities in the institute was given, 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.

Picture 62: Participants taking group photo at RIM-Gondol


Picture 63: RIM-Gondol staff showing some of the research works on marine finfish species


Picture 64: Visit to floating cages facility of RIM-Gondol


Picture 65: Participants checking coral trout juveniles at the floating cage


Picture 66: Field trip to medium-scale grouper hatchery in Gondol area


Picture 67: Small-scale backyard hatchery for milkfish in Gondol area

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

Picture 68: Field trip to a live marine fish exporter and participants listening to the explanation of the activities in the company

Picture 69: Taking photo coral trout that did not make it to the live fish market

10. 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 70: InterVet representative giving two presentations to participants about fish disease and fish health management at farm level

11. Closing Ceremony

The closing ceremony was held on 4th Dec before the group proceeds to Bali for field trips. The closing ceremony begin by Mr Sih Yang Sim provide a closing speech on behalf of NACA. Four representatives from participants giving their feedback speeches and follow by Mr Slamet Subyakto (Director-BADC-Situbondo) delivered a closing speech on behalf of BADC-Situbondo. A certificate was presented to each participant for successfully completion the training course.

Picture 71: Director of BADC-Situbondo presenting certificate to participant from Aceh

Picture 72: Director of BADC-Situbondo presenting certificate to participant from Australia

12.Feedback Analysis from Participants

The following section is the evaluation provided by 18 out of 20 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?***

Sixteen participants considered the lectures organized cover all aspects of grouper hatchery production. Some participants think lacking of the following:

- *Need more coverage on broodstock sex conversion and cannulation*
- *Need to cover present status of grouper culture and future potential and markets*
- *Economic viability*
- *Private hatchery owners should be invited to participate in group discussion*
- *Missed a large proportion of larval rearing because of time limitation*
- *Communication of lecture topics could be improved – use more visuals in lectures with step by step process*
- *More explanation on live feed enrichment*

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

Sixteen participants think that the lectures of the training course provide them with sufficient knowledge and information on grouper hatchery production.

- *Simplify presentation*
- *Marketing (strategies and problems)*

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. Some think that the practical components should be further improved. Some comments were provided by participants:

- *Broodstock cannulation and checking eggs development stages*
- *Microscope should be provided at the hatchery section of the training facility in order for participants to do observation of larvae development, live feed, disease, etc*
- *Need more hand-on and full hatchery cycle*
- *Culture of algae and rotifer*
- *Broodstock feed preparation*

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

Fourteen participants considered daily routine on-the-job training is necessary throughout the training course. Some comments that provided by participants are given below:

- *Participants should be asked to monitor the water quality, calculation of feed requirement, feeding and proper record keeping, and these should be done daily*
- *Daily hatchery works on all stages, feeding, water siphoning, etc*
- *If possible, one batch of students may be assigned to different sections (broodstock, larval, feed, live feed, etc) for 2-3 days get practical hands-on exposure and confidence*

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 three types 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***
17	*1*	*0*	*9*	*9*	*0*	*15*	*3*	*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. Five considered the training course was excellent, 12 said it was well organized, and one think it is average.

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

Six participants think there is no need for further improvement for the training course. However, 12 participants considered the training course need to be improved in some aspects. Below are some of their comments:

- *More hand on practical to cover the full larvae culture period*
- *Marketing*
- *Communication*
- *To spend more time working with larvae in the hatchery*
- *More detail on costing and planning of hatchery construction would help*
- *Time management – 3 weeks is too long and lectures and practical can be compressed into a shorter time frame and it wasn't necessary to have many field trips*
- *Water treatment system*
- *Nutrition*

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?***

Fifteen 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:

- *Basic training to others on hatchery management*
- *I will try to improve my grouper breeding project after that I can train other farmers*

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:

- *If anyone want to know how we are doing here I can tell him*
- *I will star the seed production in my own hatchery*
- *Hands on practical and notes for reading*
- *Produce a report and keep in the library so that all staff of aquaculture units can use it, also there will be a training course for the staff*
- *I will try to tell them the simple technique of grouper culture*
- *Work more closely with hatcheries and farmers*
- *Give seminar for local farmers, industry people and government agencies at home*
- *I will try to start broodstock center and give the eggs for various farmer groups to start their own backyard hatcheries, after giving them sufficient training. Some farmer groups may be given training on farming practices, so that, they can buy fingerlings from hatcheries and rear them in cages*
- *Advice/consulting*
- *Start grouper aquaculture development operation in my country*
- *Give presentation at shrimp hatchery association meeting and at Collage of Fisheries*
- *Conduct practical training if successful in spawning*

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

Sixteen participants would like to participate in a network to facilitate discussion and future activities and contacts, two participants do not provide respond on this. All participants, except one, would like to participate in network activities indicated they would like the Asia-Pacific Marine Finfish Aquaculture Network to facilitate the activities for them.

13. Annexes

Annex 1: Details of the Participants for the 4th Regional Grouper Hatchery Production Training Course November 20 – December 9, 2006

No	Name	Position and Address	Field, Specialization and Experiences
1.	Mr Mohad Mahmoud A M Flamarzi	Head of Aquaculture Unit Fishery Department (State of Qatar) PO Box 9100, Doha-Qatar Telephone: +974-4364212 Fax: +974-4364212 E-mail: aquaculturest2@hotmail.com; MFLAMARZI@mmaa.gov.qa	• shrimp culture, hatchery and grow-out • seabream seed production
2.	Mr Govindaraji Eraniappan	Owner Periyar Integrated Fish Farm 1/574 GST Road, Vandalur, Chennai 600048, Tamil Nadu, India Telephone: +91-44-22397675 Mobile: +91-944-3359359 Fax: n/a E-mail: piffaqua@yahoo.com	• freshwater prawn seed and mud crab seed production • 16 years aquaculture experience
3.	Mr Hussain Muaviath	Senior Field Officer Marine Research Centre H White Waves, Moonlight Hingun, Male', Republic of Maldives Telephone: +960-3322242 Fax: +960-3322509 E-mail: n/a	• n/a
4.	Mr Hussain Ahmed	Assistant Project Officer Marine Research Centre H White Waves, Moonlight Hingun, Male', Republic of Maldives Telephone: +960-3322242 Fax: +960-3322509 E-mail: hussahmed77@hotmail.com	• n/a
5.	Mr Agustunus Sutandar	Chairman PT Corexindo Mitra Lestari Gedung Menra Era, Lt 12A, Suite No 2, Jl. Senen Raya, No 135-137, Jakarta 10710, Indonesia Telephone: +62-8551118988 Fax: +62-21-3860255 E-mail: sutandar@corexindo.com	• Information and communication technology industry • 2 years in grouper hatchery
6.	Mr Boby Ignatius	Scientist Central Marine Fisheries Research Institute P.B. No 1603, Ernakulam North P.O., Kerala 682018, India Telephone: +91-484-2394867 Mobile: +91-944-6739731 Fax: +91-484-2394909 E-mail: bobycmfri@rediffmail.com; bobycmfri@yahoo.co.in	• seed production of marine finfishes and mollusks • 10 years in hatchery production of fish seeds and molluscan seeds

7.	Mr Abubakar M. Al-Sahli	Researcher Fish Farming Center Ministry of Agriculture, PO Box 9612, Jeddah 21423, North Abhar, Kingdom of Saudi Arabia Telephone: +009-662-2342082 Fax: +009-662-2341943 E-mail: amas_2004@hotmail.com	• Finfish aquaculture • 2 years in marine fish hatcheries focus on Asian seabass and marine tilapia
8.	Mr Abdullah W Al-Zahrani	Researcher Fish Farming Center Ministry of Agriculture, PO Box 9612, Jeddah 21423, North Abhar, Kingdom of Saudi Arabia Telephone: +009-662-2342082 Fax: +009-662-2341943 E-mail: awzahrani100@yahoo.com	• Shrimp aquaculture • 5 years in shrimp aquaculture and 2 years in fish farming
9.	Mr Richard Connell Holdcroft	Systems Editor South China Morning Post C51 Sai Wan Terrance, Quarry Bay, Hong Kong Telephone: +852-22503202 Fax: +852-28111048 E-mail: Richard.holdcroft@scmp.com	• n/a
10.	Mr Neil Wendover	Technical Officer InterVet Norbio Singapore Pte Ltd 1 Perahu Road, Singapore 718847 Telephone: +65-718847 Fax: +65-63971131 E-mail: neil.wendover@intervet.com	• Aquatic animal health, veterinary services • Tilapia/marine fish in Africa and Asia
11.	Mr Denny R Chavez	INVE (Thailand) Ltd 79/1 Moo 1 Nakhon Sawan-Phitsanulok Road, Tambon Nong Lum, Amphoe Wachirabarami, Phichit 66220, Thailand Telephone: +66-2-9600200 Mobile: +66-811740719 Fax: +66-56-692499 E-mail: straightgaff@yahoo.com	• marine fish seed production
12.	Mr Ramelan	Staff Balai Budidaya Air Payau Ujung Batee Aceh Aquaculture rehabitation Project, Jl Krueng Raya KM16 (PO Box 46), Banda Aceh 23000, Indonesia Telephone: n/a Fax: n/a E-mail: n/a	• Grouper broodstock
13.	Ms Fitriana	Staff Balai Budidaya Air Payau Ujung Batee Aceh Aquaculture rehabitation Project, Jl Krueng Raya KM16 (PO Box 46), Banda Aceh 23000, Indonesia Mobile: +62-81360597001 Fax: Nil E-mail: rifa_9@yahoo.com	• hatchery and feed production • milkfish hatchery
14.	Mr Hla Pe	Aquaculturist (Seed Production) Aquafarmers co. Ltd E 401, Anawratha Housings, Pyay Road, Kamaryut, Yangon, Myanmar Telephone: +95-1-664798; 537251 Fax: +95-1-526982 E-mail: hlape@mail4u.com.mm; hlazawwin@hotmail.com	• Marine fish seed production • Catfish seed production (1992-1996) • Penaeus seed production (1996-2006)

15.	Mr James David	General Manager Ankith Aquatics Palamanpeta, Via Tuni 533401, Payakaraopeta Mandal, Visakhapatnam District, Andhra Pradesh, India Telephone: +0091-9848144880; 08025365133 Fax: n/a E-mail: jamesdavid2005@yahoo.co.in	• Tiger shrimp hatchery production • 14 years tiger shrimp farming and hatchery
16.	Mr Pramote Sangsuksirikul	Owner Pramotefarm; Nemofarm 180 Bangsaen-Angsila Road, Ampher Muang, Chonburi 20130, Thailand Telephone: +66-819441155 Fax: +66-38-398308 E-mail: pramotefarm@hotmail.com	• seabass and clownfish hatcheries • 23 years seabass seed production and 1.5 year clownfish seed production
17.	Mr Nguyen Van Hung	Researcher Research Institute for Aquaculture No 3 (RIA 3) 33 Dangtat St, Nha Trang, Vietnam Telephone: +84-58-838427 Fax: +84-58-831846 E-mail: ngvhungria3@yahoo.com	• Marine fish seed production • Seabass seed production
18.	Mr Dennis Ah-Kee	Manager Indigenous Aquaculture Unit (DAFF) Australian Government Department of Agriculture, Fisheries and Forestry GPO Box 858, Canberra, ACT 2601, Australia Telephone: +61-2-62724743 Fax: +61-2-62724875 E-mail: dennis.ah-kee@daff.gov.au	• Aquaculture project development and management
19.	Mr Chris Knowles	Operations Manager Murex Mariculture PO Box 2511, Port Lincoln 5606,South Australia, Australia Telephone: n/a Fax: n/a E-mail: chris@instar.com.mm	• Fish farming • Diploma of Aquaculture; Bachelor of Technology (Aquaculture) • 4 years experience in feed management, data analysis and health technician
20.	Mr Neil David Hartstein	Senior Research Scientist DHI Water & Environment 11th Floor Hill View Side Wisma Perindustrian, Jalan Istidut Likas, 88400 Kota Kinabalu, Sabah, Malaysia Telephone: +6-088-260780 Fax: +6-088-260781 E-mail: ndh@dhi.com.my	• Environmental effects and site selection

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.	Mr. Ahmad Bohari 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
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.	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
12.	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
13.	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

14.	Mrs. Sofiati	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.	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
16.	Mrs. Indah Zuraida	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	• Fish nutrition
17.	Mr. Didik Budi Nursanto	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 fish hatchery; fish disease
18.	Ms. Wiwin Mukti A	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	• Fish disease and water quality management
19.	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
20.	Mr. Mizab Asdary	Situbondo Brackishwater Aquaculture Development Center PO. BOX 5 Panarukan, Situbondo, Jawa Timur Indonesia Tel: +6281336265705 Fax: +62 338 390299 E-mail: me_sharp@yahoo.com	• Broodstock Center of Vannamae

21.	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 (10 years)

Annex: 3: Training Course Program

Date	Day	Time Schedule and Contents		
		07.30 – 10.00	10.30 – 12.00	13.00 – 15.00
Nov 19	Sun	Arrival of participants in Situbondo		
Nov 20	Mon	▪ Participant registration ▪ Welcome address – Mr Slamet Soebjakto ▪ NACA Speech – Mr Sih Yang Sim ▪ Skretting Speech - Mr Hiroyoshi Matsumoto ▪ Opening Speech – Dr Made L Nurjarna	▪ Introduction to BADC – Situbondo - Mr. Slamet Soebjakto ▪ Brief information on NACA - Mr. Sih Yang Sim ▪ Skretting presentation on artificial feed – Mr Hiroyoshi Matsumoto ▪ Status of mariculture in Indonesia - Director of Seed Production (DGA)	▪ Visit BDAC facilities
Nov 21	Tue	▪ Biology of Grouper - Mrs. Siti Subaidah	▪ Site Selection, Hatchery Design, Equipment and Setup – Mr M.A. Rahman	▪ On-the-job training at hatchery unit - Mr. Agus S and Mr Dzikri
Nov 22	Wed	▪ On-the-job training at hatchery unit (preparation of sea water) - Mr. Agus S and Mr Dzikri	▪ Eggs Handling and Development Stages ▪ Broodstock Selection and Management – Mr M. A.B. Muslim	▪ On-the-job training at hatchery unit (preparation of larvae tank and sea water) - Mr. Agus S and Mr Dzikri
Nov 23	Thu	▪ On-the-job training at broodstock unit (egg handling and stocking) - Mr. A.B. Muslim & Mr. Agus	▪ Larviculture and Nursery - Mr. Agus Suriawan	▪ Visit small scale hatcheries around Situbondo - Mr. Bambang H, Mr Didik & Mr. Mizab
Nov 24	Fri	▪ On-the-job training at hatchery unit (sampling HR) - Mr. Agus S and Mr Dzikri	▪ Live feed production (phytoplankton) - Mrs. Sri Cahyaningsih	▪ Live feed production (zooplankton) - Mr. Achmad Nur Mei
Nov 25	Sat	▪ On-the-job training at live feed unit (indoor scale) - Mrs. Sri Cahyaningsih	▪ On-the-job training at live feed unit (outdoor scale) - Mr. Mei & Mrs. Indah	▪ On-the-job training at hatchery unit (algae application) - Mr. Agus S and Mr Dzikri
Nov 26	Sun	**Rest Day**		
Nov 27	Mon	▪ On-the-job training at broodstock unit - Mr. A.B. Muslim	▪ Parasitic and bacterial diseases – Mr Bambang H	▪ On-the-job training at disease laboratory - Mrs. Yani L & Ms. Gemi T
Nov 28	Tue	▪ Viral diseases – Mrs Yani L	▪ On-the-job training at disease laboratory - Mrs. Yani L & Ms. Gemi T	▪ On-the-job training at disease laboratory - Mrs. Yani L & Ms. Gemi T
Nov 29	Wed	▪ On-the-job training at hatchery unit (grading observation) - Mr. Agus S and Mr Dzikri	▪ Nutrition and artificial feed for grouper – Mrs Veni D	▪ On-the-job training at artificial feed preparation unit - Mrs Veni D
Nov 30	Thu	▪ Culture Environment and Water Quality Management - Mr. Bambang H	▪ On-the-job training at artificial feed preparation unit - Mrs Veni D	▪ On-the-job training at hatchery unit (grading) - Mr. Agus S and Mr Dzikri

Date	Day	Time Schedule and Contents		
		07.30 – 10.00	10.30 – 12.00	13.00 – 15.00
Dec 1	Fri	▪ On-the-job training at hatchery unit - Mr. Agus S and Mr Dzikri	▪ Harvest, Packaging and transportation - Bambang H	▪ Field trip to floating net cages - Mr. Bambang H, Mr. Didik and Mr. Mizab
Dec 2	Sat	▪ On-the-job training at hatchery unit (grading) - Mr. Agus S and Mr Dzikri	▪ Field trip to hatcheries and nurseries – Mr Bambang H, Mr. Didik and Mr. Mizab	▪ Field trip to seabass farm – Mr Bambang H, Mr. Didik and Mr. Mizab
Dec 3	Sun	**Rest Day**		
Dec 4	Mon	▪ On-the-job training at hatchery unit (water circulation) - Mr. Agus S and Mr Dzikri	▪ Regional Marine Finfish activities - Mr. Sih Yang Sim	▪ On-the-job training at hatchery unit - Mr. Agus S and Mr Dzikri ▪ Closing ceremony and reception
Dec 5	Tue	▪ Proceed to Gondol by road ▪ Presentation by RIM-Gondol on research activities ▪ Visit RIM-Gondol facilities		
Dec 6	Wed	▪ Visit small-scale hatcheries, nurseries and grow-out in Gondol area		
Dec 7	Thu	▪ Move to Denpasar and visit live food fish exporters		
Dec 8	Fri	▪ Presentation by Intervet on fish diseases and fish health management ▪ Visit live ornamental fish exporter		
Dec 9	Sat	▪ Relaxation field trip and social activities		
Dec 10	Sun	▪ Participants depart for home		

Annex 4: Feedback Questionnaire for Grouper Hatchery Production Training Course, December 2006

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