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Bay of Bengal Large Marine Ecosystem Project

BOBLME – Stock assessment course
27-28 April, 2012, FSI, Mumbai, India
30 April-1 May, 2012, CIFRI, Kolkata, India

Final report

Rishi Sharma
1. Background

Report of BOBLME Stock assessment course, 27-28 April and 30 April-1 May 2012, India.................. 1

FAO APFIC has noted numerous times that there is a need to build capacity in the region as the current level of training and assessment is lacking within the countries in the BOBLME region. Similar comments have been made by SEAFDEC and other entities operating in the Asia Pacific Region that there is a need to train and retain people to learn the basic know how of stock assessment and to collect and maintain data from the various assessment programs in the region. As a result, BOBLME has created a position of the Stock Assessment Coordinator who will develop the stock assessment models and programs for subcomponent 2.3 in the mandate of BOBLME, as well as train scientists and academicians with current state of the knowledge techniques to be applied in the region. This is the fourth and fifth of many courses that will be held in the region, and the first set of courses to be held in India to train fisheries officers, researchers and academics from the various countries on the newer stock assessment techniques.

2. Introduction

The two courses were held at Fisheries Survey of India on April 27th and 28th, 2012, and Central Inland Fisheries Research Institute, Kolkata on April 30th and May 1st respectively. The course covered numerous elements of stock assessment and ecosystem approaches to fisheries assessments. The introduction was made by Dr Vijaykumaran, NC for India for the BOBLME project in India, and by Dr Bhaumik in Kolkata, India, respectively. The course was taught by Dr Rishi Sharma.

Objective

The objectives of the course were three fold:

a) To convey the basic understanding of data collection programs and their use
b) To demonstrate how these could be used in an assessment through Population dynamic models.
c) To convey basic interactions of fish within an ecosystem.

Approach

The course was run in the format of lectures followed by examples. Seven lectures were covered on the following:

1. Ecosystems and biomes where fish interact with the region they reside, and how the feed on areas that have high primary production (as an attribute of oceanic features, tidal mixing or upwelling patterns)
2. Life history and how these factors are important in understanding the population dynamics.
3. Sampling design and collection of catch and effort data
5. Climate Forcing and the effects on ecosystems
6. Spawner and recruit

In FSI, these lectures were followed by exercises to understand Yield per Recruit mechanisms, and the concept of optimal yield. In an interactive game the objective was to estimate optimal spawning stock size that is the basis of Fisheries management in the region, and an interactive game was
played between the participants and evaluated how well they performed in managing a fishery to optimal yield.

In CIFRI, Kolkata, a more interactive approach was taken to explain Yield per recruit, growth curve analysis, and spawner recruit dynamics through Excel based labs. Although the initial scope of this lecture was to have more computer based exercises, the computer literacy of the class was lower than expected, and the eventual material covered was not much more than the FSI course.

3. Workshop effectiveness

A survey was designed for feedback after the course (Appendix III). The course was developed to build capacity in stock assessment knowledge in the region and this workshop presented some basics of stock assessment and their value. In order to understand if it was useful to the audience, a survey was developed that would address the utility of the material presented and whether the course should be modified somewhat. Results of the survey were given Appendix V and Appendix VI. While the FSI, Mumbai survey had a very positive feedback, the CIFRI, Kolkata survey is mixed as some participants were under the impression it’s a workshop only pertaining to Hilsa, and it was more on the general principles of stock assessment.

4. Workshop feedback

There was a huge interest in the two courses (35 participants attended in total, 14 in Mumbai FSI (one from Myanmar) and 21 in Kolkata, CIFRI. In addition, there were additional students in Kolkata, CIFRI that were not official students but interested in the knowledge from the institute itself (1another 10 students or so) for a total of 31 in Kolkata and 14 in Mumbai). However, in FSI there was no extension to anyone outside of FSI, and individuals were all scientists/researchers.

1. The participants want more such courses to build on their technical skills (98% of participants said yes for more training).
2. They appreciated the material a lot.
3. They would bring their data for analysis in a lab-setting in subsequent courses.
4. All individuals were from biologists, research or fisheries officers.
5. All would attend more such courses if held in the future.
6. Game based learning was the best for class participation as opposed to a lecturing environment.
7. Practical computer labs would be useful and support this learning was the general consensus.
8. In Kolkata there was a perception that the course was only relevant to Hilsa though BOBLME was developing a course on the principles of stock assessment and how they need to be applied to Hilsa.

5. Future courses

Course presentation material in electronic format were handed to the participants for making their understanding clearer. Based on the feedback, future courses will be held in the region again covering similar material in greater depth. The focus would be on advanced stock assessment techniques and will require computers and a computer labs for training.
# Appendix I  List of participants

FSI, Mumbai, 27-28 April, 2012

<table>
<thead>
<tr>
<th>Participants from India</th>
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<tbody>
<tr>
<td>Shri Raju Nagpure</td>
<td>Dr Ashok Jaiswar</td>
<td>Dr Anndabhushan Kar</td>
</tr>
<tr>
<td>FSI, Mormugao</td>
<td>CIFE, Mumbai</td>
<td>FSI, Port Blair</td>
</tr>
<tr>
<td>Mr Kirba Shankar</td>
<td>Kum Rajashree Sanadi</td>
<td>Dr M.K. Sinha</td>
</tr>
<tr>
<td>CAIR, Port Blair</td>
<td>FSI, Mumbai</td>
<td>FSI, Chennai</td>
</tr>
<tr>
<td>Dr S.K. Dwivedi</td>
<td>Mr M K Sajeevan</td>
<td>S.G. Patwari</td>
</tr>
<tr>
<td>Senior Scientific Assistant</td>
<td>Sr. Scientific Asst.</td>
<td>Jr. Fisheries Scientist</td>
</tr>
<tr>
<td>FSI, Mumbai</td>
<td>Fishery Survey of India</td>
<td>FSI Mumbai</td>
</tr>
<tr>
<td>India <a href="mailto:skdwivedifs@gmail.com">skdwivedifs@gmail.com</a> Tel: 022 226 171 44/45 Mob: 098 201 854 59</td>
<td>India <a href="mailto:sajeevanfsi@gmail.com">sajeevanfsi@gmail.com</a>; <a href="mailto:saji_saji100567@yahoo.co.in">saji_saji100567@yahoo.co.in</a> Tel: +912 222 617 144 Mob: +919 969 651 349 Fax: +91-22-22702270</td>
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</tr>
<tr>
<td>Dr Ashok S. Kadam</td>
<td>Dr Anshuman Das</td>
<td>Shri C. Babu</td>
</tr>
<tr>
<td>Jr. Fisheries Scientist</td>
<td>Jr. Fisheries Scientist</td>
<td>FSI, Chennai</td>
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<td>Fishery Survey of India</td>
<td>FSI</td>
<td>India</td>
</tr>
<tr>
<td>India <a href="mailto:ashoka_fsi@rediffmail.com">ashoka_fsi@rediffmail.com</a>;</td>
<td>India <a href="mailto:dr.dasansuma@yahoo.com">dr.dasansuma@yahoo.com</a></td>
<td></td>
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<td></td>
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<tr>
<td>India</td>
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</table>

<table>
<thead>
<tr>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Dr Rishi Sharma</td>
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<td></td>
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<tr>
<td>BOBLME</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:Rishi.sharma@boblme.org">Rishi.sharma@boblme.org</a></td>
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</table>
## Participants from India

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Institution</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Debnarayan Chattopadhyay</td>
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</tr>
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</tr>
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</tr>
<tr>
<td>Dr. S. Munilkumar</td>
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<td>Scientist, Allahabad Regional Centre</td>
<td><a href="mailto:absar_alam@rediffmail.com">absar_alam@rediffmail.com</a> Tel: 076 072 713 77</td>
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<td>Scientist, Allahabad Regional Centre</td>
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<td>Assistant Professor, Dept.of Zoology</td>
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<tr>
<td>Dr Suman Bhusan Chakraborty</td>
<td>Assistant Professor, Dept. of Zoology</td>
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<tr>
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</tr>
<tr>
<td>Dr Subrata Kumar De</td>
<td>Associate Professor, Dept of Zoology, Vidyasagar University</td>
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<tr>
<td>Dr Koushik Ghosh</td>
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<tr>
<td>Aquaculture Laboratory, Dept. of Zoology</td>
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<tr>
<td>The University of Burdwan</td>
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<td>India</td>
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<tr>
<td><a href="mailto:kghoshbu@gmail.com">kghoshbu@gmail.com</a></td>
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<tr>
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<td><a href="mailto:Rishi.sharma@boblme.org">Rishi.sharma@boblme.org</a></td>
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</table>
Appendix II    Survey on course in India, FSI & CIFRI

Please answer the questions as to relevance (1 being most irrelevant and 5 being most relevant).

1. What is your role within Department of Fisheries in India?

2. Did you find this course useful?

3. Would you want another course as a follow up in more depth?

4. Would you want a quantitative course to be the focus?

5. Would computer labs make some of this material easier to understand?

6. What areas in India would require some analysis?

7. Would you bring your data to analyse in a longer workshop?
   1. Yes ○  2. No ○  3. Maybe ○

8. Is there a need for more workshops and trainings of this sort in India?
   1. Yes ○  2. No ○  3. Maybe ○

9. What part of the course did you find the most relevant?
   5. Spawner Recruit & Game

10. Other comments
Appendix III  Quiz given to participants of the India workshop

Name:

1) What are the four biomes? For one biome explain the further sub-division into 3 possible habitat types?

2) What are the processes that drive primary production?

3) Write down the logistic equation?

4) What factors determine if a species is r selected?

5) What factors determine a K selected species?

6) If a sampling frame is 30 and we sample fish caught in 10 locations with values of 4, 10, 20, 30, 40, 20, 50, 100, 10, 15 what is the overall catch for the frame?

7) If q=0.001/Boat and CPUE=10 T/Boat, what is the Available Biomass?

8) Why might catchability change?

9) What biotic and abiotic factors affect recruitment?

10) Define growth overfishing?
## Appendix IV

### Results tabulated for survey (FSI)

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*Note multiple responses were given on this.

### Other comments

- Need more time (one week)
- Waiting for long term project
- Myanmar needs a course. Thank you.
- Thank you. This was required but more time needed.
- More time needed. Duration was too short.
- Practical time needed is more.
- Need more lab time
## Appendix V

### Results tabulated for survey (CIFRI)

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<th>Academia</th>
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</table>

*Note: multiple responses were given on this.

### Other comments
- Need more time (one week)
- Waiting for long term project
- Hilsa was focus but emphasis too broad. More time needed on Hilsa
- More Hilsa focus.
- Should have had focus with life history of hilsa.
- Examples should be made pertaining to Indian Fisheries.
Appendix VI   Pictures from FSI, Mumbai course
Appendix VII  Pictures from CIFRI, Kolkata course
Bay of Bengal Large Marine Ecosystem
Project

BOBLME – Stock assessment course
25-28 June, 2012
Penang, Malaysia

Final report

Rishi Sharma
1. Background

FAO APFIC has noted numerous times that there is a need to build capacity in the region as the current level of training and assessment is lacking within the countries in the BOBLME region. Similar comments have been made by SEAFDEC and other entities operating in the Asia Pacific Region that there is a need to train and retain people to learn the basic know how of stock assessment and to collect and maintain data from the various assessment programs in the region. As a result, BOBLME has created a position of the Stock Assessment Coordinator who will develop the stock assessment models and programs for subcomponent 2.3 in the mandate of BOBLME, as well as train scientists and academicians with current state of the knowledge techniques to be applied in the region. This is the eighth of many courses that will be held in the region, and the first set of courses to be held in Malaysia to train fisheries officers, researchers and academics from the various countries on the newer stock assessment techniques.

2. Introduction

The courses was held at FRI, Kampung Aceh 25 to 28 June. The course covered numerous elements of stock assessment and ecosystem approaches to fisheries assessments. The course was taught by Dr Rishi Sharma.

Objective

The objectives of the course were three fold:
   a) To convey the basic understanding of data collection programs and their use
   b) To demonstrate how these could be used in an assessment through Population dynamic models.
   c) To convey basic interactions of fish within an ecosystem.

Approach

The course was run in the format of lectures followed by examples. 10 lectures were covered on the following:

1. Ecosystems and biomes where fish interact with the region they reside, and how the feed on areas that have high primary production (as an attribute of oceanic features, tidal mixing or upwelling patterns)
2. Life history and how these factors are important in understanding the population dynamics.
3. Sampling design and collection of catch and effort data
5. Surplus Production Models
6. Age Structured and Length structured models
7. Spawner and recruit
8. Decision Analysis and Risk Assessment
9. Climate Forcing and the effects on ecosystems

In Malaysia, these lectures were followed by exercises to understand Yield per Recruit mechanisms, and the concept of optimal yield, surplus production and ages structure models using statistical likelihood based techniques. Numerous labs were taught introducing the concept of simulation models and estimation models for each of the topics covered. A separate lab on decision analysis/i.e. risk assessment was also run. Quiz was conducted to test concepts as well.
3. Workshop effectiveness

A survey was designed for feedback after the course (Appendix III). The course was developed to build capacity in stock assessment knowledge in the region and this workshop presented some basics of stock assessment and their value. In order to understand if it was useful to the audience, a survey was developed that would address the utility of the material presented and whether the course should be modified somewhat. Results of the survey were given in Appendix V.

4. Workshop feedback

There was a huge interest in the course. 15 participants attended from University and different agencies in Malaysia (only 10 surveys filled as people left early).

9. The participants want more such courses to build on their technical skills (100% of participants said yes for more training).
10. They appreciated the material a lot.
11. They would bring their data for analysis in a lab-setting in subsequent courses.
12. All individuals were from biologists, research or fisheries officers.
13. All would attend more such courses if held in the future.
14. Game based learning was the best for class participation as opposed to a lecturing environment.
15. Practical computer labs support this learning.

5. Future courses

Course presentation material in electronic format were handed to the participants for making their understanding clearer. Based on the feedback, future courses will be held in the region again covering similar material in greater depth.
## Appendix I  
### List of participants

<table>
<thead>
<tr>
<th>Participants from Malaysia</th>
<th>Participants from Malaysia</th>
<th>Participants from Malaysia</th>
</tr>
</thead>
</table>
| Mr Ibrahim Johari  
Research Officer  
Department of Fisheries  
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ibrahimjohari@yahoo.com | Mr Mohammad Faisal Bin Md Saleh  
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| Tuan Hj. Samsudin Basir  
Sinior Research Officer  
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s_basir@yahoo.com | Lecturer  
Dr Rishi Sharma  
BOBLME  
Rishi.sharma@boblme.org | |
### Agenda

**SCHEDULE FOR STOCK ASSESSMENT COURSE 25-29 JUNE 2012**

<table>
<thead>
<tr>
<th>Date</th>
<th>8.00-8.30</th>
<th>8.30-10.30 (2 hrs.)</th>
<th>10.45-12.45 (2 hrs.)</th>
<th>2.15-3.15 (1 hr.)</th>
<th>3.30-4.30 (1 hr.)</th>
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<tbody>
<tr>
<td>25/06/12</td>
<td>Registration / Opening Ceremony</td>
<td>Ocean Habitats Life-History</td>
<td>Sampling Design Population Dynamics 1</td>
<td>Lab on Sampling Design</td>
<td>Lab on Logistic, with process error and Observatio Error eg.</td>
</tr>
<tr>
<td></td>
<td>26/06/12</td>
<td>Continuation of Labs Previous day Pop Dyn-II</td>
<td>Pop Dyn-II Cont. Age Structured Model/YPR Labs</td>
<td>YPR Labs continued Spawner RECRUIT</td>
<td>Parameter estimation for Models Lab on SR Mgmt cont</td>
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<tr>
<td></td>
<td>27/06/12</td>
<td>Lab on SR Management</td>
<td>More complex Age Structured Models</td>
<td>Lab on Age Structured Models</td>
<td>Review</td>
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<tr>
<td></td>
<td>28/06/12</td>
<td>Climate Forcing Ecosystem Models</td>
<td>Review Course/Feedback End</td>
<td>Lunch</td>
<td></td>
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</table>

Day 1: Topics 1 and 2 Overview, followed by detailed Topic 3 with some labs
Day 2: lecture 4 and more in-depth lectures on models and labs (Simple SP, YPR, and other such models, etc.)
Day 3: VPA, Age structured and Length Structured Models with labs
Day 4: Spawner recruit Models and Labs
Day 5: Climate Forcing and Ecosystem Models/ Revision on concepts
Appendix III  Survey on course in Malaysia

Please answer the questions as to relevance (1 being most irrelevant and 5 being most relevant).

1. What is your role within Department of Fisheries in Malaysia?


2. Did you find this course useful?


3. Would you want another course as a follow up in more depth?


4. Would you want a quantitative course to be the focus?


5. Would computer labs make some of this material easier to understand?


6. What areas in Malaysia would require some analysis?


7. Would you bring your data to analyse in a longer workshop?

   1. Yes  2. No  3. Maybe

8. Is there a need for more workshops and trainings of this sort in Malaysia?

   1. Yes  2. No  3. Maybe

9. What part of the course did you find the most relevant?


10. Other comments
Appendix IV  

Quiz given to participants of the Malaysia workshop

Name:

1) What are the four biomes? For one biome explain the further sub-division into 3 possible habitat types?

2) What are the processes that drive primary production?

3) Write down the logistic equation?

4) What factors determine if a species is r selected?

5) What factors determine a K selected species?

6) If a sampling frame is 30 and we sample fish caught in 10 locations with values of 4, 10, 20, 30, 40, 20, 50, 100, 10, 15 what is the overall catch for the frame?

7) If q=0.001/Boat and CPUE=10 T/Boat, what is the Available Biomass?

8) Why might catchability change?

9) What biotic and abiotic factors affect recruitment?

10) Define growth overfishing?
Results Tabulated for Survey (Malaysia):

<table>
<thead>
<tr>
<th>Question</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biologist</td>
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<td>Q1</td>
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<td>Response 1</td>
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<td>Q9*</td>
<td>Response 1</td>
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<tr>
<td>Q10</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note multiple responses were given on this

**Other comments**

Need more on basics as intermediate level course was difficult for us
Divide into 2 course Basics, and then modeling stock assessment
Too short. Very good course, too many formulas, and fast pace. Regardless good for jub.
Excellent, but computer labs were too fast for us. More time required in understanding the calculations
Appendix VI  Pictures from Malaysia
Bay of Bengal Large Marine Ecosystem
Project

BOBLME – Stock assessment course
11-12 June, 2012
Maldives

Final report

Rishi Sharma
1. Background

FAO APFIC has noted numerous times that there is a need to build capacity in the region as the current level of training and assessment is lacking within the countries in the BOBLME region. Similar comments have been made by SEAFDEC and other entities operating in the Asia Pacific Region that there is a need to train and retain people to learn the basic know how of stock assessment and to collect and maintain data from the various assessment programs in the region. As a result, BOBLME has created a position of the Stock Assessment Coordinator who will develop the stock assessment models and programs for subcomponent 2.3 in the mandate of BOBLME, as well as train scientists and academicians with current state of the knowledge techniques to be applied in the region. This is the seventh of many courses that will be held in the region, and the first set of courses to be held in Maldives to train fisheries officers, researchers and academics from the various countries on the newer stock assessment techniques.

2. Introduction

The courses was held at the IT Center, Male on the 11th and 12th of June. The course covered numerous elements of stock assessment and ecosystem approaches to fisheries assessments. The course was taught by Dr Rishi Sharma.

Objective

The objectives of the course were three fold:

a) To convey the basic understanding of data collection programs and their use
b) To demonstrate how these could be used in an assessment through Population dynamic models.
c) To convey basic interactions of fish within an ecosystem.

Approach

The course was run in the format of lectures followed by examples. Seven lectures were covered on the following:

1. Ecosystems and biomes where fish interact with the region they reside, and how the feed on areas that have high primary production (as an attribute of oceanic features, tidal mixing or upwelling patterns)
2. Life history and how these factors are important in understanding the population dynamics.
3. Sampling design and collection of catch and effort data
5. Climate Forcing and the effects on ecosystems
6. Spawner and recruit

In Maldives, these lectures were followed by exercises to understand Yield per Recruit mechanisms, and the concept of optimal yield. In an interactive game the objective was to estimate optimal spawning stock size that is the basis of Fisheries management in the region, and an interactive game was played between the participants and evaluated how well they performed in managing a fishery to optimal yield.
3. Workshop effectiveness

A survey was designed for feedback after the course (Appendix II). The course was developed to build capacity in stock assessment knowledge in the region and this workshop presented some basics of stock assessment and their value. In order to understand if it was useful to the audience, a survey was developed that would address the utility of the material presented and whether the course should be modified somewhat. Results of the survey were given in Appendix III.

4. Workshop feedback

There was a huge interest in the course. 20 participants attended from University and different agencies in Maldives (only 18 survey filled as people left early on 2nd day).

1. The participants want more such courses to build on their technical skills (98% of participants said yes for more training).
2. They appreciated the material a lot.
3. They would bring their data for analysis in a lab-setting in subsequent courses.
4. All individuals were from biologists, research or fisheries officers.
5. All would attend more such courses if held in the future.
6. Game based learning was the best for class participation as opposed to a lecturing environment.
7. Practical computer labs would be useful and support this learning was the general consensus.

5. Future courses

Course presentation material in electronic format were handed to the participants for making their understanding clearer. Based on the feedback, future courses will be held in the region again covering similar material in greater depth.
# Appendix I  List of participants

<table>
<thead>
<tr>
<th>Participants from Maldives</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms Aminath Haifa Assistant Director Environmental Protection Agency <a href="mailto:aminath.haifa@epa.gov.mv">aminath.haifa@epa.gov.mv</a></td>
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<td>Nazeefa Marine Research Center <a href="mailto:mnazeefa@gmail.com">mnazeefa@gmail.com</a></td>
</tr>
<tr>
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</tr>
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</tr>
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<td>Mr Riffath Naeem Senior Environment Analyst Environment Protection Agency <a href="mailto:rifath.naeem@epa.gov.mv">rifath.naeem@epa.gov.mv</a></td>
<td>Mohamed Ushan Reef Surveyor Marine Research Centre</td>
<td>Aminath Ali MIFCO <a href="mailto:aminath.ali@mifco.com">aminath.ali@mifco.com</a></td>
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<td>Salah Mohamed Felivaru <a href="mailto:solah@felivaru.com.mv">solah@felivaru.com.mv</a></td>
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</tr>
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<td>Ms Mariyam Shida Afzal Marine Research Center <a href="mailto:mshidha@gmail.com">mshidha@gmail.com</a></td>
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</tr>
<tr>
<td>Dr Mohammed Shiham Adam Director General Ministry of Fisheries and Agriculture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Lecturer
- Dr Rishi Sharma BOBLME Rishi.sharma@boblme.org
Appendix II Survey on course in Maldives

Please answer the questions as to relevance (1 being most irrelevant and 5 being most relevant).

1. What is your role within Department of Fisheries in Maldives?

2. Did you find this course useful?

3. Would you want another course as a follow up in more depth?

4. Would you want a quantitative course to be the focus?

5. Would computer labs make some of this material easier to understand?

6. What areas in Maldives would require some analysis?

7. Would you bring your data to analyse in a longer workshop?
   1. Yes 2. No 3. Maybe

8. Is there a need for more workshops and trainings of this sort in Maldives?
   1. Yes 2. No 3. Maybe

9. What part of the course did you find the most relevant?

10. Other comments
## Appendix III  Results tabulated for survey

<table>
<thead>
<tr>
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<td>Biologist</td>
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<td>Intro</td>
<td>Life History</td>
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<td>Q9*</td>
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<td>Q10</td>
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</tbody>
</table>

*Note multiple responses were given on this Other comments

Appendix IV  
Pictures of the course
Bay of Bengal Large Marine Ecosystem Project

BOBLME – Stock assessment course

31 May-1 June, 2012
Colombo, Sri Lanka

Final report

Rishi Sharma
1. Background

FAO APFIC has noted numerous times that there is a need to build capacity in the region as the current level of training and assessment is lacking within the countries in the BOBLME region. Similar comments have been made by SEAFDEC and other entities operating in the Asia Pacific Region that there is a need to train and retain people to learn the basic know how of stock assessment and to collect and maintain data from the various assessment programs in the region. As a result, BOBLME has created a position of the Stock Assessment Coordinator who will develop the stock assessment models and programs for subcomponent 2.3 in the mandate of BOBLME, as well as train scientists and academicians with current state of the knowledge techniques to be applied in the region. This is the sixth of many courses that will be held in the region, and the first set of courses to be held in Sri Lanka to train fisheries officers, researchers and academics from the various countries on the newer stock assessment techniques.

2. Introduction

The courses was held at NARA, Colombo on the 31st of May and the 1st of June. The course covered numerous elements of stock assessment and ecosystem approaches to fisheries assessments. The course was taught by Dr Rishi Sharma.

Objective

The objectives of the course were three fold:

a) To convey the basic understanding of data collection programs and their use
b) To demonstrate how these could be used in an assessment through Population dynamic models.
c) To convey basic interactions of fish within an ecosystem.

Approach

The course was run in the format of lectures followed by examples. Seven lectures were covered on the following:

1. Ecosystems and biomes where fish interact with the region they reside, and how the feed on areas that have high primary production (as an attribute of oceanic features, tidal mixing or upwelling patterns)
2. Life history and how these factors are important in understanding the population dynamics.
3. Sampling design and collection of catch and effort data
5. Climate Forcing and the effects on ecosystems
6. Spawner and recruit

In NARA, these lectures were followed by exercises to understand Yield per Recruit mechanisms, and the concept of optimal yield. In an interactive game the objective was to estimate optimal spawning stock size that is the basis of Fisheries management in the region, and an interactive game was played between the participants and evaluated how well they performed in managing a fishery to optimal yield.

3. Workshop effectiveness

A survey was designed for feedback after the course (Appendix III). The course was developed to build capacity in stock assessment knowledge in the region and this workshop presented some
basics of stock assessment and their value. In order to understand if it was useful to the audience, a survey was developed that would address the utility of the material presented and whether the course should be modified somewhat. Results of the survey were given in Appendix IV.

4. Workshop feedback

There was a huge interest in the course. 22 participants attended from University and different agencies in Sri Lanka (only 14 survey filled as people left early ion 2nd day).

1. The participants want more such courses to build on their technical skills (98% of participants said yes for more training).
2. They appreciated the material a lot.
3. They would bring their data for analysis in a lab-setting in subsequent courses.
4. All individuals were from biologists, research or fisheries officers.
5. All would attend more such courses if held in the future.
6. Game based learning was the best for class participation as opposed to a lecturing environment.
7. Practical computer labs would be useful and support this learning was the general consensus.

5. Future courses

Course presentation material in electronic format were handed to the participants for making their understanding clearer. Based on the feedback, future courses will be held in the region again covering similar material in greater depth.
### Appendix I  List of participants

<table>
<thead>
<tr>
<th>Participants from Sri Lanka</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>Mr M.D.S.T. De Croos University of Wayamba Sri Lanka <a href="mailto:deleepa_dc@yahoo.com">deleepa_dc@yahoo.com</a></td>
<td>Ms A.A.S.H. Athukorala NARA Sri Lanka <a href="mailto:sujeewahemanthi@gmail.com">sujeewahemanthi@gmail.com</a></td>
</tr>
<tr>
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</tr>
<tr>
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<td>Ms Meneka Gammanpila NARA Sri Lanka <a href="mailto:gmeneka@yahoo.com">gmeneka@yahoo.com</a></td>
<td>Ms Dinali Ranmadugala NARA Sri Lanka <a href="mailto:dinalir@yahoo.com">dinalir@yahoo.com</a></td>
</tr>
<tr>
<td>Ms H. K. Bandaranayake Marine Biological Resources Division NARA Sri Lanka <a href="mailto:kisharabandaranayake@yahoo.com">kisharabandaranayake@yahoo.com</a></td>
<td>Mr Ananda Athukorala NARA Sri Lanka <a href="mailto:ananda_at@hotmail.com">ananda_at@hotmail.com</a></td>
<td>Mr K. Ranatunga University of Sri Jayewardenepura Sri Lanka <a href="mailto:ranatunga@sjp.ac.lk">ranatunga@sjp.ac.lk</a></td>
</tr>
<tr>
<td>Ms K.H.C.B. Hettiarachchi Planning and Monitoring Division Ministry of Fisheries and Aquatic Resources Sri Lanka <a href="mailto:chiranthi77@gmail.com">chiranthi77@gmail.com</a></td>
<td>Ms Kalyani Hewapathirana Fisheries Biologist DFAR Sri Lanka <a href="mailto:kalhewa2009@yahoo.com">kalhewa2009@yahoo.com</a></td>
<td>Ms Deishini Herath National Aquatic Resources Research &amp; Development Agency (NARA) Sri Lanka <a href="mailto:deishini.herath@yahoo.com">deishini.herath@yahoo.com</a></td>
</tr>
<tr>
<td>Ms Nadeesha Hasarangi NARA Sri Lanka <a href="mailto:nadeesahasarangi@gmail.com">nadeesahasarangi@gmail.com</a></td>
<td>Mr Suraj Chandrakumara DFAR Sri Lanka</td>
<td></td>
</tr>
</tbody>
</table>

**Lecturer**

Dr Rishi Sharma
BOBLME
Rishi.sharma@boblme.org
Appendix II  Survey on course in Sri Lanka

Please answer the questions as to relevance (1 being most irrelevant and 5 being most relevant).

1. What is your role within Department of Fisheries in Sri Lanka?

2. Did you find this course useful?

3. Would you want another course as a follow up in more depth?

4. Would you want a quantitative course to be the focus?

5. Would computer labs make some of this material easier to understand?

6. What areas in Sri Lanka would require some analysis?

7. Would you bring your data to analyse in a longer workshop?
   1. Yes 2. No 3. Maybe

8. Is there a need for more workshops and trainings of this sort in Sri Lanka?
   1. Yes 2. No 3. Maybe

9. What part of the course did you find the most relevant?
   5. Spawner Recruit & Game

10. Other comments
# Appendix III  Results tabulated for survey

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*Note multiple responses were given on this*

**Other comments**
Appendix IV  Pictures from NARA, Colombo
Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project and to lay the foundations for a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

For more information, please visit www.boblme.org