



Evaluation Report

Investigative Workshop: Modeling Reef

Ecosystems

July 21-23, 2010

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Executive Summary

Brief Synopsis of Event

This report is an evaluation of a NIMBioS Investigative Workshop entitled “Modeling Reef Ecosystems” (Reef Ecosystems), which took place at NIMBioS July 21-23, 2010. NIMBioS Investigative Workshops are relatively large (30-40 participants), focus on a broader topic or a set of related topics than Working Groups, attempt to summarize/synthesize the state of the art and identify future directions, and have potential for leading to one or more future Working Groups. Participants may include post-docs and graduate students with less experience in the particular topic than those participating in Working Groups.

The Reef Ecosystems Workshop comprised 36 participants, including co-organizers Jerald Ault (University of Miami, Rosenstiel School of Marine & Atmospheric Sciences) and Susan Yee (U.S. EPA, Gulf Ecology Division). Participants included a diverse collection of biologists, computer scientists, mathematicians, ocean and marine sciences, and the social sciences along with several federal government employees.

The Reef Ecosystems Workshop’s goal was to evaluate the potential for development of a comprehensive coral reef systems model to link multiple interacting environmental stressors, exploitation, episodic events, climate changes, and vessel groundings to the state and dynamics of reef ecosystems stretching from coastal bays to coral reefs. A comprehensive systems model will have enormous value to decision makers as a decision support tool to ensure that critical relationships and potential interactions are not overlooked when evaluating consequences of alternative decisions.

Evaluation Design

An electronic survey aligned to the following evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director:

1. Were participants satisfied with the Workshop overall?
2. Did the meeting meet participant expectations?
3. Do participants feel the Workshop made adequate progress toward its stated goals?
4. Do participants feel they gained knowledge about the main issues related to the research problem?
5. Do participants feel they gained a better understanding of the research across disciplines related to the Workshop’s research problem?
6. What impact do participants feel the Workshop will have on their future research?
7. Were participants satisfied with the accommodations offered by NIMBioS?
8. What changes in accommodations, group format, and/or content would participants like to see at future similar meetings?

An electronic survey aligned to the evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director. The final instrument was hosted online via the University of Tennessee’s secure online survey host

mrInterview. Links to the survey were sent to 31 registered Workshop participants on July 23, 2010 (co-organizers Jerald Ault and Susan Yee, along with NIMBioS affiliates Sharon Bewick, Alan Hastings, and Suzanne Lenhart were not included in the evaluation). Reminder emails were sent to non-responding participants on July 30 and August 4, 2010. By August 14, 2010, 24 of the registered participants had given their feedback, for a response rate of 77%.

An electronic demographic survey aligned to the reporting requirements of the National Science Foundation was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director. The final instrument was hosted online via the University of Tennessee's online survey host mrInterview. Links to the survey were sent to the 30 workshop participants who had not previously attended a NIMBioS event on June 30, 2010. Reminder emails were sent to non-responding participants on July 7 and 15, 2010. By July 20, 2010, 29 participants had filled out the survey for a response rate of 97%. Demographic questions regarding gender, race, and ethnicity, and disability status were optional (disability status is not reported in this evaluation report). All demographic information is confidential, and results are reported only in the aggregate. When feasible, the evaluator filled in missing demographic data from other sources (e.g. address, institution, field of study). The evaluator did not assume race, ethnicity, or disability status for any participant who did not report this information.

Highlights of Results

- Overall satisfaction with the Workshop was varied among respondents. While the majority indicated they either agreed or strongly agreed that the Workshop was very productive (58%), slightly fewer than half agree that it met their expectations (46%).
- Most respondents thought the presentations were useful (88%) and that the presenters were very knowledgeable about their presentation topics (96%), while fewer (67%) agreed the group discussions were useful.
- 87% of respondents either agreed or strongly agreed that they would recommend participating in NIMBioS Workshops to their colleagues.
- Overall, respondents reported being satisfied with the travel, housing, and other amenities provided by NIMBioS.
- Respondents reported variable levels of learning, with an average of 60% of respondents agreeing that they acquired new knowledge about specific topics of the Workshop.
- Most respondents said the most useful aspect of the Workshop was the ability to network with a diverse group of researchers.
- 92% of respondents said they felt that participating in the Workshop helped them better understand the research going on in other disciplines regarding modeling reef ecosystems.
- 63% of respondents agreed that the Workshop made adequate progress toward finding a common language across disciplines for research on the Workshop's topic.
- 63% of respondents agreed that the format of the Workshop was effective for achieving its goals.
- Several respondents said they felt that the exchange of ideas that took place during the Workshop would (or potentially would) initiate and/or influence their future research.
- Several respondents reported they developed solid plans for collaborative research with other Workshop participants, while others indicated they saw potential for collaboration in the future.

Conclusions and Recommendations

Overall, participants had varied opinions of the success of the Workshop, although the majority felt it was successful. While the majority indicated they either agreed or strongly agreed that the Workshop was very productive, slightly fewer than half agree that it met their expectations. Respondents were overall satisfied with the travel, housing, and other amenities offered by NIMBioS.

Respondents reported varied levels of learning about the topics, with an average of 60% of respondents agreeing that they learned more about the central topics of the Workshop. While the many respondents agreed that they had a better understanding of the main issues related to modeling reef ecosystems, some respondents said they either did not gain understanding, or felt “neutral” or about the amount of understanding they gained on the topics, while a small number disagreed that they learned anything about these topics.

The majority of respondents agreed that the Workshop made adequate progress toward finding a common language across disciplines for research on the Workshop's topic, though some indicated that more focus would have helped to define a common language. Almost all respondents agreed that participating in the Workshop helped them better understand the research going on in disciplines other than your own regarding modeling reef ecosystems.

Several respondents said they felt that the exchange of ideas that took place during the Workshop would (or potentially would) initiate and/or influence their future research. In addition to new ideas for research, several respondents also said that they developed unanticipated plans for collaborative research with other Workshop participants, while others said the potential for collaboration was present.

Several suggestions for improvement of future Workshops were suggested by participants, including defining and communicating the focus of the Workshop, and having facilitators help lead and focus discussions. Several respondents felt that more time devoted to small discussion groups would have been beneficial as well.

Based on analysis of participant response data, the recommendations for future Workshops are as follows:

- Several participants indicated that the Workshop needed more focus. Consider defining and discussing with participants the main goals of the Workshop on the first day, and going over each day's goals on subsequent days.
- Consider adding more breakout discussion time, and discuss the structure and objectives of the breakout groups prior to forming the groups.

Modeling Reef Ecosystems Workshop Evaluation Report

Background

Introduction

This report is an evaluation of a NIMBioS Investigative Workshop entitled “Modeling Reef Ecosystems,” which took place at NIMBioS July 21-23, 2010. NIMBioS Investigative Workshops are relatively large (30-40 participants), focus on a broader topic or a set of related topics than Working Groups, attempt to summarize/synthesize the state of the art and identify future directions, and have potential for leading to one or more future Working Groups. Participants may include post-docs and graduate students with less experience in the particular topic than those participating in Working Groups.

The Modeling Reef Ecosystems Investigative Workshop comprised 36 participants, including co-organizers Jerald Ault (University of Miami, Rosenstiel School of Marine & Atmospheric Sciences) and Susan Yee (U.S. EPA, Gulf Ecology Division). Participants included a diverse collection of biologists, computer scientists, mathematicians, ocean and marine sciences, and the social sciences along with several federal government employees.

Workshop Background

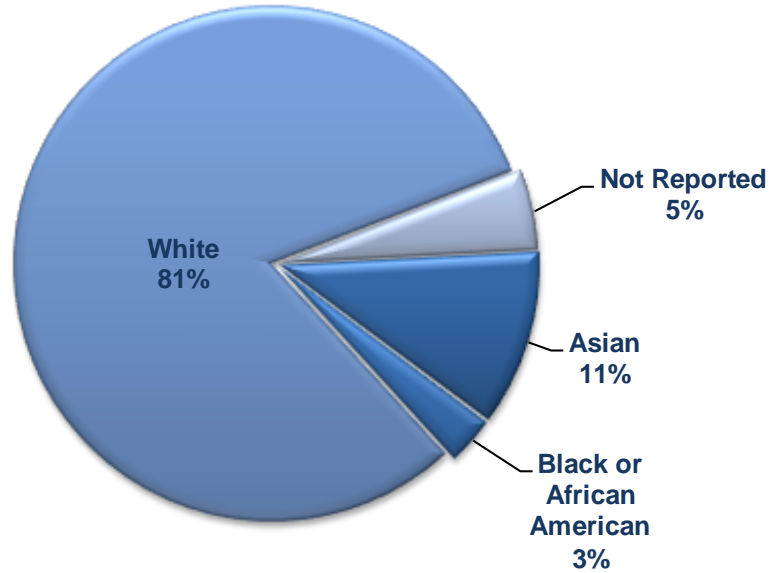
Coral reef ecosystems are highly valued, but threatened by regional human population growth and serial over-exploitation. Human activities in the watershed and coastal zones must be dramatically altered to eliminate threats, but scientific and management efforts are narrowly defined, making it challenging to predict the potential repercussions of decisions within a complex ecosystem under threat from multiple interacting stressors.

The Modeling Reef Ecosystems Workshop evaluated the potential for development of a comprehensive coral reef systems model to link multiple interacting environmental stressors, exploitation, episodic events, climate changes, and vessel groundings to the state and dynamics of reef ecosystems stretching from coastal bays to coral reefs. A comprehensive systems model will have enormous value to decision makers as a decision support tool to ensure that critical relationships and potential interactions are not overlooked when evaluating consequences of alternative decisions.

Participant Demographics

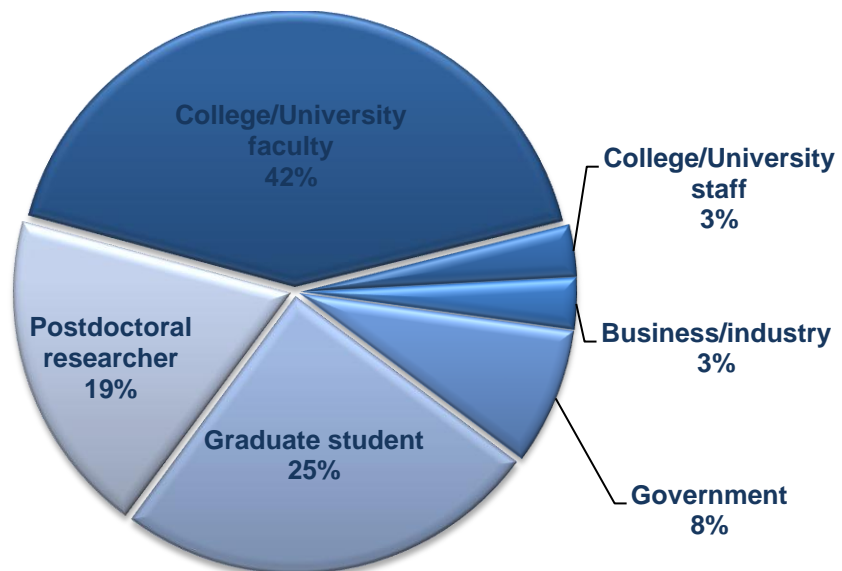
The 14 females and 22 males (one of whom self-identified as being of Hispanic/Latino ethnicity) mostly self-identified racially as white (Figure 1).

Figure 1. Racial composition of participants (n =36)



Program participants were mostly college/university faculty or staff, graduate students, or postdoctoral researchers (Figure 2).

Figure 2. Status of participants (n=36)



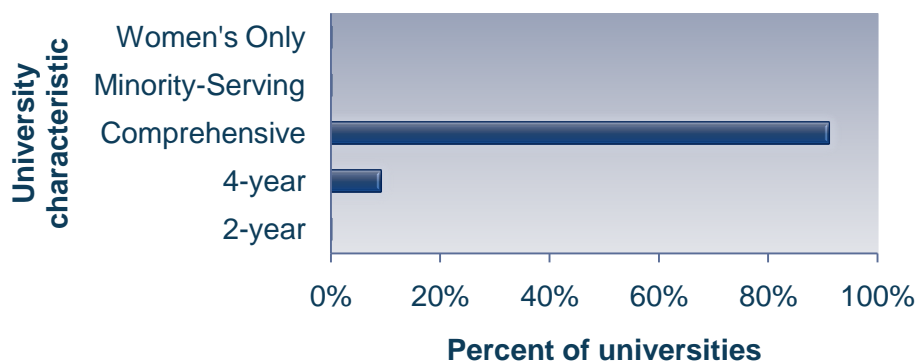
Primary fields of study for the 36 participants included biological/biomedical sciences, computer & information sciences, mathematics, ocean/marine sciences, and social sciences (Table 1).

Table 1. Participant fields of study and areas of concentration

Field of Study	Concentration	# Participants
Biological/Biomedical Sciences	Biology/Biological Sciences, General	2
	Ecology	8
Computer & Information Sciences	Information Science & Systems	1
Mathematics	Applied Mathematics	4
	Mathematical Biology	2
	Mathematical Ecology	3
Ocean/Marine Sciences	Marine Sciences	11
	Ocean/Marine, Other	3

Participants represented 25 unique institutions across the United States, Australia, Colombia, the Philippines, and South Africa. Within the U.S., 9 different states were represented. Included in the institutions were 22 universities, one business, and two federal agencies. Of the 22 colleges/universities, most were classified as comprehensive (having undergraduate and graduate programs) schools (Figure 3).

Figure 3. Characteristics of participants' universities



Evaluation Design

Evaluation Questions

The evaluation of the Workshop was both formative and summative in nature, in that the data collected from participants was intended to both gain feedback from participants about the quality of the current Workshop and also to inform future meetings. The evaluation framework

was guided by Kirkpatrick's Four Levels of Evaluation model for training and learning programs (Kirkpatrick, 1994¹). Several questions constituted the foundation for the evaluation:

1. Were participants satisfied with the Workshop overall?
2. Did the meeting meet participant expectations?
3. Do participants feel the Workshop made adequate progress toward its stated goals?
4. Do participants feel they gained knowledge about the main issues related to the research problem?
5. Do participants feel they gained a better understanding of the research across disciplines related to the Workshop's research problem?
6. What impact do participants feel the Workshop will have on their future research?
7. Were participants satisfied with the accommodations offered by NIMBioS?
8. What changes in accommodations, group format, and/or content would participants like to see at future similar meetings?

Evaluation Procedures

An electronic survey aligned to the evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director. The final instrument was hosted online via the University of Tennessee's secure online survey host mrlInterview. Links to the survey were sent to 31 registered Workshop participants on July 23, 2010 (co-organizers Jerald Ault and Susan Yee, along with NIMBioS affiliates Sharon Bewick, Alan Hastings, and Suzanne Lenhart were not included in the evaluation). Reminder emails were sent to non-responding participants on July 30 and August 4, 2010. By August 14, 2010, 24 of the registered participants had given their feedback, for a response rate of 77%.

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Data Analysis

Data from the electronic surveys included both forced-response and supply-item questions. All data were downloaded from the online survey host into the statistical software package SPSS for analysis. Quantitative data were analyzed using SPSS, while qualitative data were analyzed

¹ From Kirkpatrick, D.L. (1994). *Evaluating Training Programs: The Four Levels*. San Francisco, CA: Berrett-Koehler.

in SPSS Text Analysis for Surveys. Qualitative responses were categorized by question and analyzed for trends.

Evaluation Findings

Respondent Satisfaction

Overall Satisfaction

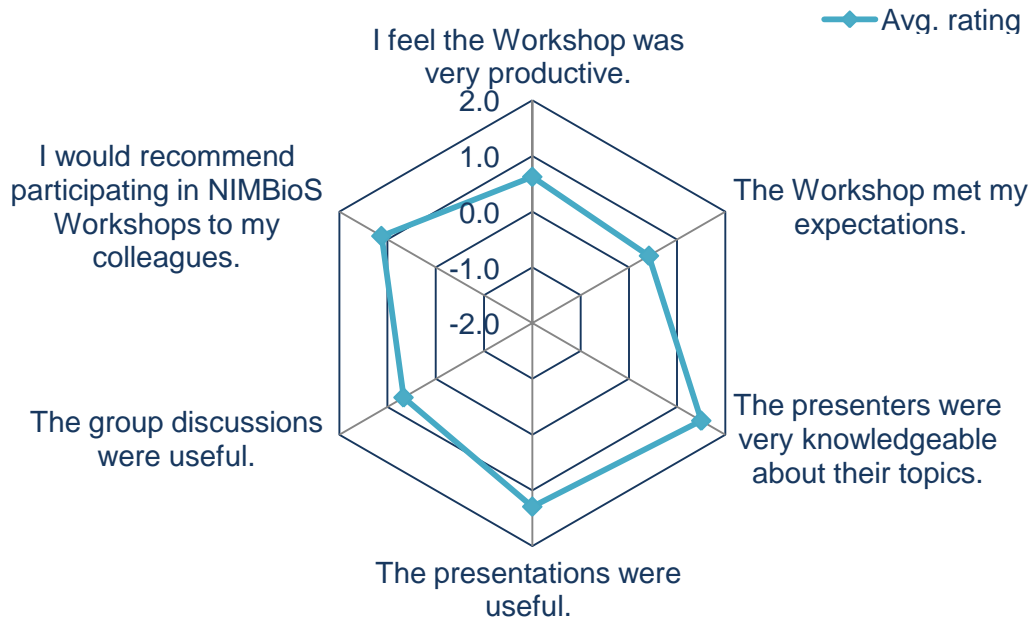
Overall satisfaction with the Workshop was varied among respondents. While the majority indicated they either agreed or strongly agreed that the Workshop was very productive (58%), slightly fewer than half agree that it met their expectations (46%). Most respondents thought the presentations were useful (88%) and that the presenters were very knowledgeable about their presentation topics (96%), while fewer (67%) agreed the group discussions were useful. The majority of the respondents (87%) either agreed or strongly agreed that they would recommend participating in NIMBioS Workshops to their colleagues (Figure 4, answered on a 5-point Likert scale from -2=strongly disagree to 2=strongly agree). Some general participant comments:

“This was overall an excellent experience that allowed me to make valuable contacts and stimulated interesting thought processes. I look forward to participating in the follow-up work discussed.”

“NIMBioS is a superb global resource and the leadership, staff and facilities are world-class. Overall, the organization and its operation are excellent and I see little need to change the current formula. The one change I would recommend is for NIMBioS to make available (perhaps on a case-by-case basis) facilitators who are not only skilled in group dynamics but also knowledgeable about the language and culture of scientific disciplines. This would help focus discussions and 'drive' the group along productive avenues while allowing for creativity and spontaneous emergence of new ideas.”

“It was wonderful to meet some very interesting people. I enjoyed it. I appreciate your hospitality. Thank you.”

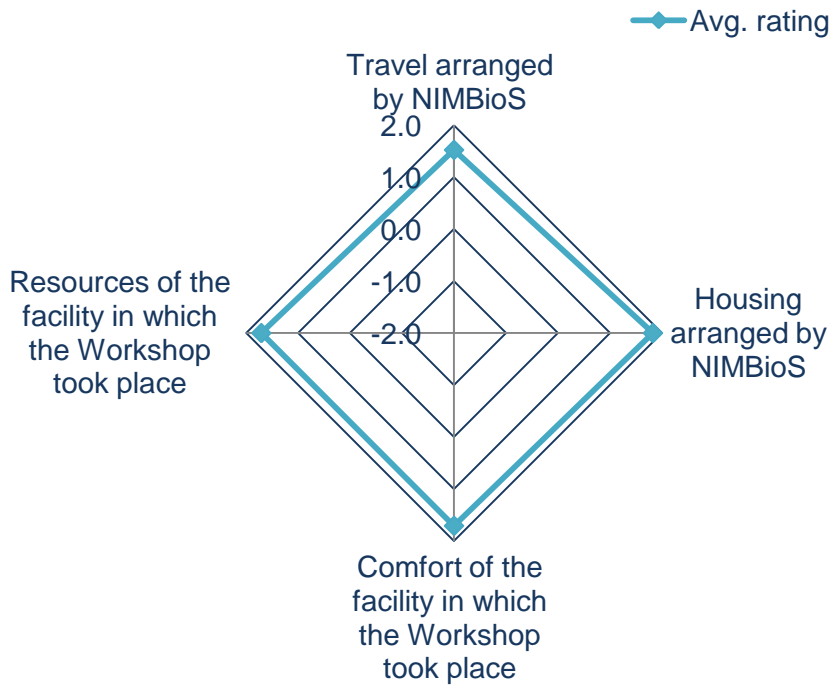
Figure 4. Participant satisfaction with various aspects of the Workshop



Satisfaction with Accommodations

Overall, participants reported being satisfied with the travel, housing, and facility accommodations provided by NIMBioS during the Workshop (Figure 5, answered on a 5-point Likert scale from -2 to 2 for “very dissatisfied” to “very satisfied”).

Figure 5. Participant satisfaction with accommodations



While participants were satisfied overall with the accommodations, several suggestions were offered, including having some time outside during the day, more time between flight connections, and rearranging the seating in the NIMBioS classroom:

“The seating at the conference room at NIMBioS is poor. It would have been much better to have used a ‘round table’. Having a discussion with people seated behind you is not easy...”

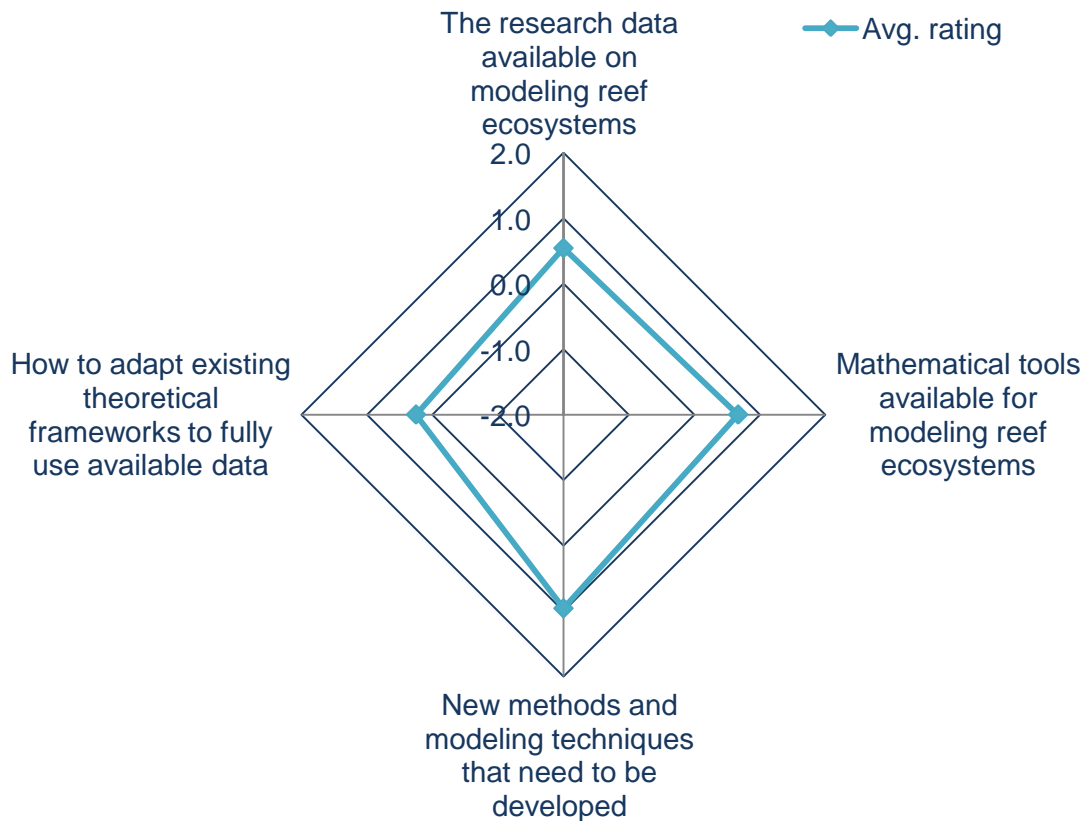
Workshop Content and Format

Participant Learning

Most respondents (92%) said they felt that participating in the Workshop helped them better understand the research going on in other disciplines regarding modeling reef ecosystems. Respondents were asked several questions to gauge their levels of learning about several issues related to the research problem, including learning about the research data available on modeling reef ecosystems, the mathematical tools available for modeling reef ecosystems, new methods and modeling techniques that need to be developed, and how to adapt existing theoretical frameworks to fully use available data.

Respondents reported varied levels of learning about the topics, with an average of 60% of respondents agreeing that they learned more about the central topics of the Workshop. While the many respondents agreed that they had a better understanding of issues related to modeling reef ecosystems, some respondents said they either did not gain understanding, or felt “neutral” or about the amount of understanding they gained on the topics, while a small number disagreed that they learned anything about these topics (Figure 6).

Figure 6. Participant learning during the Workshop



Workshop Format

Sixty-three percent of respondents felt the Workshop format was effective. Many of those who disagreed that the format was effective felt the Workshop should have had more clearly defined objectives:

[The Workshop format would have been more effective if:]

“The objectives of the Workshop were much narrower. The discussion sections could have one key question and after it people should be requested to reach a conclusion about it. I think that the Workshop could be more productive if from the beginning we may focused in only one service, and then try to model it with all experts (disciplines). This could be a good example for all of us of how to replicate the experience using other reef services.”

“...there was a clearer sense of common objectives.”

“There were a more detailed, focused, presentations and work plan.”

“There had been more focus, and a clearer objective, stated early in the process”

Other respondents felt the format would have been improved by allowing more time to work in small groups:

[The Workshop format would have been more effective if:]

“We had focused more on practical problems related to modeling ecosystem services, with small groups better able to solve these problems.”

“More time to work in smaller groups.”

Most Useful Aspects

Several respondents felt the most useful aspect of the Workshop was the ability network with a diverse group of researchers:

[The most useful aspect of the Workshop was:]

“Networking with fellow scientists and exposure to a modeling/simulation method.”

“The opportunity to meet and talk with others in the coral reef modeling field.”

Opportunity for developing new collaborations, hearing different perspectives from the one I've been following, and 'out of session' discussions.

“...gathering the 'community of practice' in one place and the resulting personal relationships.”

“The opportunity to interact with a group of people with such wide ranging experience and from such different parts of the world. It really did help give a

perspective on what is possible and what is needed to move reef modeling forward.”

Other respondents felt the break-out group discussions were the most useful aspect of the Workshop:

“The breakout groups had the most focused discussions and I benefitted especially from the viewpoints of decision makers and economists.”

“The break-out group discussion was the most useful. It was much easier to participate in a discussion with a smaller group that did not have a handful of people dominating the discussion.”

Still others felt the discussion of available models was the most useful aspect:

“When the entire group met after the break-outs and discussed what models we have available.”

“...Gaining an understanding of existing modeling tools/programs available. Thinking collectively about applied uses of models.”

“Discussion and sharing of different approaches and methods of coral reef modeling.”

Communication

Ninety-six percent of respondents said they were either “very satisfied” or “satisfied” with the opportunities provided during Workshop presentations and discussions to ask questions and/or make comments. Several respondents gave suggestions for facilitating communication among participants during the Workshop, including having smaller group discussion, rearranging the furniture, and having a facilitator to guide discussions:

“In the main room, arrange the tables and chairs in a circle or rectangle, so that people face each other.”

“Break the participants into smaller groups with quite specific objectives to get the most out of the groups.”

“Employ facilitators for each breakout group.”

Progress Toward Goals

Sixty-three percent of respondents agreed that the Workshop made adequate progress toward finding a common language across disciplines for research on the Workshop's topic. Respondent comments indicated that participants felt more focus would have helped in developing a shared language across disciplines:

“In fact, the Workshop organizers missed a superb opportunity to lay out a common language (final/direct ecosystem services) that has already been collaboratively developed by Resources for the Future and the US EPA which

could have served as a useful starting point. Likewise, while invoking 'sustainability' as a theme for the Workshop, this term remained ill-defined and therefore no useful progress was made in identifying ways to incorporate this vital element into ongoing or new research, monitoring, or modeling efforts for coral reef ecosystems. Using skilled scientific facilitators could have helped identify this issue (lack of common language) in advance and, with adequate preparation, significant progress could have been made on both the challenges of developing a common modeling language for reef systems and incorporating 'sustainability' into the work of this 'community of practice..'

"It felt like more could have been accomplished with the time provided. Unfortunately, clear goals were not identified and the breadth of the topic accommodated frequent open-ended discussions that did not seem to yield new insights"

"Yes, however, I think that the Workshop could have been focused more or given more time to really flesh out the topics."

"Qualified yes - I think it highlighted the need for more cross-disciplinary collaboration, but didn't identify any specific actions that need to be done to move towards this goal."

Other participants felt that, while progress was made, more discussions need to be had before a real common language can be defined:

"The Workshop identified issues and began a dialogue. As a first step the focus was necessarily broad, but more progress can/should be made towards a 'common language' by including management, social and economic dimensions."

"I think it was a short period for a rather large task. I really hope the group moves forward with a synthesis paper and further topic-specific working groups."

Ninety-two percent of respondents agreed that participating in the Workshop helped them better understand the research going on in disciplines other than their own regarding modeling reef ecosystems:

"I think that put together people from different disciplines is very important to solve complex questions. The point of view of mathematicians and managers during the Workshop help me to understand the different dimensions we need to deal with in order to preserve the reefs, but also may me think that we should focus our research in a more practical way, perhaps providing the information they need."

"It was helpful to understand more fully what modelers might need to move forward with models addressing ecosystem services."

“As an ecologist who does a bit of modeling, mixing with mathematicians and modelers was very useful. To complete the multidisciplinary nexus however, it would have been great to hear of the priority / generic needs of reef managers, and particularly economists and social scientists engaged with some aspect of reef management.”

Several noted, however, that more focused presentations would have been helpful:

“The Workshop could have had a little more guidance and the topics to be discussed could have been better aligned with the expertise in the room.”

“I think further Workshops/working groups need to be held to work on - and produce - specific outcomes and/or address a more specific research question. This Workshop was somewhat abstract and more conceptual than I would have liked.”

“I feel that that the Workshop needed more focused presentations and a final set of agreed objectives for future work. It was enjoyable and I met some talented scientists.”

“The Workshop participants were excellent, as were the facilities. The presentations, while of high quality, often failed to translate directly into productive discussions. The breakout groups were largely unfocused, both because the 'charge' to the group was far too open-ended, the self-selection process used to divide the group failed to generate useful synergies, and the lack of skilled facilitators in each group allowed the discussions to wander, all with the net result that the subgroups produced little of lasting value (with the possible exception of the math group on the last day). These comments are offered as constructive criticism with the firm belief that each of the listed 'problems' is easily soluble in the hands of a skilled facilitator. Notwithstanding the above comments, the Workshop did offer a good opportunity for one-on-one discussions and self-organization of small-group follow-on activities.”

Impact on Future Research Plans

Several respondents said they felt that the exchange of ideas that took place during the Workshop would (or potentially would) initiate and/or influence their future research. Some participant comments:

“I am now aware about what type of information modelers need, so my research could be a little re-oriented to provide part of the data they require.”

“There had been a number of ideas presented and I have yet to digest some of them. It seems that some ideas/tools presented do provide facilities that I have not thought of and yes, it might influence my research plans.”

“Although I already have certain research interests in relation to coral reef modeling, the Workshop highlighted particular aspects and tools that I could delve into more.”

In addition to new ideas for research, several respondents also said that they developed unanticipated plans for collaborative research with other Workshop participants, while others said the potential for collaboration was present:

“The primary benefit of participation was the networking. On the final day of the meeting, a group of us are actively working on a NIMBioS working group proposal for submission. In addition, I met a researcher from another institution that I plan to collaborate with on a coral reef predator-prey dynamic study.”

“I have a number of ideas to move ecological modeling forward and one of them was the application of semantic web technologies to existing (agreed-upon) conceptual models. This was presented and discussed in details with some colleagues and they have just communicated with me for another presentation to wider audience.”

“Several participants developed plans to adapt existing models to use directly to support management decision making in a new Adaptive Management Program in Kenya's marine parks.”

“Useful contacts were made with several participants with whom I had not met previously. With at least three of those folk, an intent and focus for future interaction / work was defined along three independent lines.”

Suggestions for Future Workshops

Respondents were asked several questions soliciting suggestions for future Workshops. The majority of respondents indicated that they felt the Workshop could have been improved by having more focus:

“We spent a lot of time on circular discussions about broad topics. More structure or focus through directed hypotheses or modeling approaches may have presented a clearer path to relevant products.”

“Better definition of initial questions to help structure group discussions.”

“More focus, because there were too many topics to discuss and we never get a final conclusion after all. The Workshop should be focus in few and concrete ideas to develop.”

“Perhaps having more managers in the discussion would be useful. Also, setting a specific objective to be accomplished by the end of the Workshop might help focus progress a bit.”

“The discussion lacked focus at times. While this can be helpful and, at very least, might be regarded as a small price to pay when embarking on a broad initial dialogue, having clearer predefined outcomes / deliverables might have helped this. Agreeing on the focus issues on which to deliver defined outcomes would require an initial discussion on day 1, or online prior to the meeting.”

Several respondents felt that less time devoted to large discussion groups would have been beneficial.

“The open discussion groups were at times too large; it was difficult for everybody to participate in the conversation.”

“Less time spent in discussions with the entire group of participants.”

Several would have liked to have seen facilitators helping to guide the discussion as well:

“There seems to be a lack of decision makers; would be great to have a presentation from a decision maker about the process of making a decision and where and how models figure in this process. Also, it seems to me that a significant number of discussion points focus on fundamental questions such as what is sustainability and what is a model. In this respect, I think an expert in the philosophy of science, and who has experience in modeling and/or ecology, would be a valuable addition to the Workshop. This kind of stuff should be meat and drink for them.”

“There were far too many people (especially younger participants) who said little, especially in the plenary sessions. A skilled facilitator would have helped draw them out...”

“1) use of professional scientific facilitators to help plan and execute the Workshop, 2) clearer 'charge' statements to the subgroups...”

Conclusions and Recommendations

Overall, participants had varied opinions of the success of the Workshop, although the majority felt it was successful. While the majority indicated they either agreed or strongly agreed that the Workshop was very productive, slightly fewer than half agree that it met their expectations. Respondents were overall satisfied with the travel, housing, and other amenities offered by NIMBioS.

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- Consider adding more breakout discussion time, and discuss the structure and objectives of the breakout groups prior to forming the groups.

Appendix A

List of Participants

Participants

Last name	First name	Institution
Acosta Moreno	Luis Alberto	Pontificia Universidad Javeriana
Armsworth	Paul	University of Tennessee Knoxville
*Ault	Jerald	University of Miami
Ban	Stephen	James Cook University
Bernard	David	United States Environmental Protection Agency
Bewick	Sharon	University of Tennessee Knoxville
Bode	Michael	University of Melbourne
Cantrell	Robert Stephen	University of Miami
Donahue	Megan	University of Hawaii Manoa
Franklin	Erik	University of Hawaii Manoa
Fung	Tak	Queen's University Belfast
Gayanilo	Felimon	University of Miami
Hastings	Alan	University of California Davis
Hearn	Clifford	Working Science Consultancies
Hochberg	Eric	Nova Southeastern University
Hudon	Ali	Nova Southeastern University
Johnson	Craig	University of Tasmania
Knowland	Cheryl	University of Liverpool
Koksal	Semen	Florida Institute of Technology
Lenhart	Suzanne	University of Tennessee Knoxville
Maina	Joseph	Macquarie University
McMurray	Steven	University of North Carolina Wilmington
Melbourne-	Jessica	University of Tasmania

Thomas		
Muller	Erinn	Florida Institute of Technology
Neilan	Rachael Miller	Louisiana State University Baton Rouge
O'Leary	Jennifer	University of California Santa Barbara
Ruiz	Carlos	University of Cape Town
Sanchirico	James (Jim)	University of California Davis
Spencer	Matthew	University of Liverpool
Toews	Carl	Duquesne University
Weiss	Howie	Georgia Institute of Technology
Widman	Elizabeth	University of Warwick
Yakob	Laith	University of Queensland
*Yee	Susan	United States Environmental Protection Agency
Yñiguez	Aletta	University of the Philippines Diliman
Ziegler	Tracy	Everglades National Park

* **Organizer**

Appendix B

Reef Ecosystem Workshop Evaluation Survey

Modeling Reef Ecosystems Workshop Survey

Thank you for taking a moment to complete this survey. Your responses will be used to improve the Workshops hosted by the National Institute for Mathematical and Biological Synthesis. Information supplied on the survey will be confidential, and results will be reported only in the aggregate.

Workshop Evaluation

Please check the appropriate box to indicate your level of agreement with the following statements about this Workshop: (Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied)

- I feel the Workshop was very productive.
- The Workshop met my expectations.
- The presenters were very knowledgeable about their topics.
- The presentations were useful.
- The group discussions were useful
- I would recommend participating in NIMBioS Workshops to my colleagues.

Please check the appropriate box to indicate your level of agreement with the following statements. As a result of participating in this Workshop, I have a better understanding of: (Strongly agree, Agree, Neutral, Disagree, Strongly disagree)

- The research data available on modeling reef ecosystems
- Mathematical tools available for modeling reef ecosystems
- New methods and modeling techniques that need to be developed
- How to adapt existing theoretical frameworks to fully use available data

Do you feel participating in the Workshop helped you better understand the research going on in disciplines other than your own regarding reef ecosystems?

- Yes
- No
- Comments:

Do you feel the Workshop made adequate progress toward finding a common language across disciplines for research on the Workshop's topic?

- Yes
- No
- Comments:

Do you feel that the exchange of ideas that took place during the Workshop will influence your future research? Please explain:

Did you develop unanticipated plans for collaborative research with other Workshop participants? Please explain:

What do you feel was the most useful aspect of the Workshop?

What would you have changed about the Workshop?

How do you feel about the format of the Workshop?

This was a very effective format for achieving our goals

This was not a very effective format for achieving our goals ->

The Workshop format would have been more effective if:

Please indicate your level of satisfaction with the Workshop accommodations:
(Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied, Not applicable)

Travel arranged by NIMBioS

Housing arranged by NIMBioS

Comfort of the facility in which the Workshop took place

Resources of the facility in which the Workshop took place

Please indicate any changes NIMBioS can make to improve the resources and/or accommodations available to Workshop participants:

Communications Evaluation

NIMBioS is currently exploring innovative avenues for communication among its Workshop participants. Your responses to the following questions will allow us to better understand the communication needs of our scientific communities.

How satisfied were you with the opportunities provided during Workshop presentations and discussions to ask questions and/or make comments?

Very satisfied

Satisfied

Neutral

Dissatisfied

Very Dissatisfied

Please indicate any suggestions you have for facilitating communication among participants during the Workshop:

Appendix C

Open-ended Survey Responses

Do you feel that participating in the Workshop helped you better understand the research going on in disciplines other than your own regarding reef ecosystems? (n=10)

I think that put together people from different disciplines is very important to solve complex questions. The point of view of mathematicians and managers during the Workshop help me to understand the different dimensions we need to deal with in order to preserve the reefs, but also may me think that we should focus our research in a more practical way, perhaps providing the information they need.

It was helpful to understand more fully what modelers might need to move forward with models addressing ecosystem services.

The Workshop could have had a little more guidance and the topics to be discussed could have been better aligned with the expertise in the room.

I think further Workshops/working groups need to be held to work on - and produce - specific outcomes and/or address a more specific research question. This Workshop was somewhat abstract and more conceptual than I would have liked.

I feel that that the Workshop needed more focused presentations and a final set of agreed objectives for future work. It was enjoyable and I met some talented scientists.

The Workshop participants were excellent, as were the facilities. The presentations, while of high quality, often failed to translate directly into productive discussions. The breakout groups were largely unfocused, both because the 'charge' to the group was far too open-ended, the self-selection process used to divide the group failed to generate useful synergies, and the lack of skilled facilitators in each group allowed the discussions to wander, all with the net result that the subgroups produced little of lasting value (with the possible exception of the math group on the last day). These comments are offered as constructive criticism with the firm belief that each of the listed 'problems' is easily soluble in the hands of a skilled facilitator. Notwithstanding the above comments, the Workshop did offer a good opportunity for one-on-one discussions and self-organization of small-group follow-on activities.

It was nice to see what others are working on and there is no exchange to warm handshakes with colleagues working on the same topic. It will not surprise me to see new collaborative projects emerging from the interactions.

Very productive on a personal level, although I'm less sure whether the group as a whole achieved its objectives

Absolutely. It was very useful to listen to the challenges and solutions that researchers are implementing in other parts of the world.

As an ecologist who does a bit of modeling, mixing with mathematicians and modelers was very useful. To complete the multidisciplinary nexus however, it would have been great to hear of the priority / generic needs of reef managers, and particularly economists and social scientists engaged with some aspect of reef management.

Do you feel the Workshop made adequate progress toward finding a common language across disciplines for research on the Workshop's topic? (n=13)

That would be a very difficult task and I doubt that it was achieved by the Workshop.

Informal discussions with other participants, particularly economists, were quite informative.

I think there is still a bit of a divide between people with a mathematics background and those without, and decision makers and modelers.

I was expecting to learn a bit more from the mathematicians about the limitations that exist when we try to build and to run a successful model. Also I was expecting than resource managers telling us what they need and what processes we are missing to provide more accurate data and predictions. I consider the language from different disciplines was not a barrier during the sections.

In fact, the Workshop organizers missed a superb opportunity to lay out a common language (final/direct ecosystem services) that has already been collaboratively developed by Resources for the Future and the US EPA which could have served as a useful starting point. Likewise, while invoking 'sustainability' as a theme for the Workshop, this term remained ill-defined and therefore no useful progress was made in identifying ways to incorporate this vital element into ongoing or new research, monitoring, or modeling efforts for coral reef ecosystems. Using skilled scientific facilitators could have helped identify this issue (lack of common language) in advance and, with adequate preparation, significant progress could have been made on both the challenges of developing a common modeling language for reef systems and incorporating 'sustainability' into the work of this 'community of practice.

Would have been beneficial to have more people directly involved in reef management as part of the Workshop.

It felt like more could have been accomplished with the time provided. Unfortunately, clear goals were not identified and the breadth of the topic accommodated frequent open-ended discussions that did not seem to yield new insights.

Yes, however, I think that the Workshop could have been focused more or given more time to really flesh out the topics

Qualified yes - I think it highlighted the need for more cross-disciplinary collaboration, but didn't identify any specific actions that need to be done to move towards this goal.

This is a tough problem. I think more presentations might have served to guide discussions in a more pointed way.

It is difficult to assess this since it was not specifically addressed.

The Workshop identified issues and began a dialogue. As a first step the focus was necessarily broad, but more progress can/should be made towards a 'common language' by including management, social and economic dimensions.

I think it was a short period for a rather large task. I really hope the group moves forward with a synthesis paper and further topic-specific working groups.

Do you feel that the exchange of ideas that took place during the Workshop will influence your future research? (n=11)

I am now aware about what type of information modelers need, so my research could be a little re-oriented to provide part of the data they require.

The Workshop helped clarify what is really needed in terms of a workable model.

Clifford Hearn's may well influence future US EPA work on hydrodynamic monitoring and modeling of reef systems.

Made me much more aware of other approaches to the problem

Although I already have certain research interests in relation to coral reef modeling, the Workshop highlighted particular aspects and tools that I could delve into more.

There had been a number of ideas presented and I have yet to digest some of them. It seems that some ideas/tools presented do provide facilities that I have not thought of and yes, it might influence my research plans.

I will likely modify the scope and methods of my PhD based on discussions from this Workshop.

Not unless we are about to establish some further communication channels.

I was introduced to a novel system of coral reef modeling and simulation that may influence the way that I analyze similar problems.

Discussion about dealing with uncertainty in models, and in having models speak more directly to measureable ecosystem services will influence ongoing work.

I got the impression that decision makers are happy with practical but imperfect models, so in the future, I will not try to make my models close to perfection before letting decision makers know about them.

Did you develop unanticipated plans for collaborative research with other Workshop participants? (n=15)

The primary benefit of participation was the networking. On the final day of the meeting, a group of us are actively working on a NIMBioS working group proposal for submission. In addition, I met a researcher from another institution that I plan to collaborate with on a coral reef predator-prey dynamic study.

I will be in contact with one of the scientist in order to do a collaborative research in connectivity.

Several participants developed plans to adapt existing models to use directly to support management decision making in a new Adaptive Management Program in Kenya's marine parks.

I have spoken to a few people who may be useful collaborators in the future. Nothing certain yet.

Useful contacts were made with several participants with whom I had not met previously. With at least three of those folk, an intent and focus for future interaction / work was defined along three independent lines.

Some ideas which we might pursue

A small collection of us is putting together a proposal for a working group.

There were possible collaborations over similar focal aspects in coral reef ecosystem modeling. We have said we would get in touch regarding this.

I have modified my plans for my Ph.D. thesis based on the presentations at the Workshop; I am hoping to collaborate with at least one of the Workshop participants to develop new applications for the CORSET model.

I have a number of ideas to move ecological modeling forward and one of them was the application of semantic web technologies to existing (agreed-upon) conceptual models. This was presented and discussed in details with some colleagues and they have just communicated with me for another presentation to wider audience.

definitely, with Paul Armsworth, Jim Sanchirico, Megan Donahue and others

Too early to say.

The work of Craig Johnson is of interest to US EPA and vice versa; there is a possibility that joint work may result.

A discussion with another participant revealed useful similarities between our topics.

I found a number of people who were interested in lending their expertise in my current attempts at functional group classification of reef organisms.

What do you feel was the most useful aspect of the Workshop? (n=22)

The breakout groups had the most focused discussions and I benefitted especially from the viewpoints of decision makers and economists.

The break-out group discussion was the most useful. It was much easier to participate in a discussion with a smaller group that did not have a handful of people dominating the discussion.

smaller group discussions

When the entire group met after the break-outs and discussed what models we have available.

Interacting with ecologists and modelers from diverse parts of the world and with diverse backgrounds. Gaining an understanding of existing modeling tools/programs available. Thinking collectively about applied uses of models.

Discussion and sharing of different approaches and methods of coral reef modeling

The interaction and the interchange of ideas.

Meeting other scientists with different ways of looking at the problem

discussions with peers, presentations, working groups

Interaction with colleagues working on the same topic and exchanging notes.

Learning what other research groups were undertaking.

getting a broader understanding of the viewpoints on the problem from the policy side

The presentations.

Airing of some of the problems and differences between the sub-disciplines in Coral Reef Science.

Networking with fellow scientists and exposure to a modeling/simulation method by an Australian colleague.

The opportunity to meet and talk with others in the coral reef modeling field.

Opportunity for developing new collaborations, hearing different perspectives from the one I've been following, and 'out of session' discussions.

Networking opportunities with colleagues.

networking

1) the 'survey' of world-wide work on modeling reef ecosystems (the 'state of the art'), 2) gathering the 'community of practice' in one place and the resulting personal relationships

Bringing together the variety of participants

The opportunity to interact with a group of people with such wide ranging experience and from such different parts of the world. It really did help give a perspective on what is possible and what is needed to move reef modeling forward.

What would you change about the Workshop? (n=22)

I think the ability to tailor the goals of the Workshop based on the expertise in the room would have been very beneficial.

Less time spent in discussions with the entire group of participants

The open discussion groups were at times too large; it was difficult for everybody to participate in the conversation.

longer Workshops

We spent a lot of time on circular discussions about broad topics. More structure or focus through directed hypotheses or modeling approaches may have presented a clearer path to relevant products.

Better definition of initial questions to help structure group discussions.

More focus, because there were too many topics to discuss and we never get a final conclusion after all. The Workshop should be focus in few and concrete ideas to develop.

Perhaps having more managers in the discussion would be useful. Also, setting a specific objective to be accomplished by the end of the Workshop might help focus progress a bit.

The discussion lacked focus at times. While this can be helpful and, at very least, might be regarded as a small price to pay when embarking on a broad initial dialogue, having clearer predefined outcomes / deliverables might have helped this. Agreeing on the focus issues on which to deliver defined outcomes would require an initial discussion on day 1, or online prior to the meeting.

During the larger group discussions I believe the moderators should have focused the group better. It was unclear what our goals and objectives were and we ended up talking in circles often.

A bit more structure and facilitation of discussion, and longer time frame to go from general ideas into the detailed aspects

I would identify specific deliverables (e.g., a manuscript) at the outset of the Workshop, and set specific milestones/goalposts to work toward (along with a specific timeline of actions).

focus

More focused group discussions.

More focused presentations and detailed planning.

More focus. It was entirely unclear what outcome the organizers had in mind.

I would have several more initial presentations to guide discussion.

I would have included a few more presentations on the types of models available for coral reef managers, with info on their uses/drawbacks/missing pieces.

There seems to be a lack of decision makers; would be great to have a presentation from a decision maker about the process of making a decision and where and how models figure in this process. Also, it seems to me that a significant number of discussion points focus on fundamental questions such as what is sustainability and what is a model. In this respect, I think an expert in the philosophy of science, and who has experience in modeling and/or ecology, would be a valuable addition to the Workshop. This kind of stuff should be meat and drink for them.

Employ facilitators for each breakout group

1) use of professional scientific facilitators to help plan and execute the Workshop, 2) clearer 'charge' statements to the subgroups, 3) re-arrange the main room so there is less of a focus on the "talking head" at the front of the room and more on group dialog (U-shape), 4) evening events - continue the discussions informally over, 5) perhaps adopt a Dahlem-style format - position papers developed in advance, presentation, group discussion, revision, final 'draft' --> BOOK [the current structure does not emphasize the need for the group to actually produce something for which they will collectively be held accountable]

Participants: more people with knowledge of ecosystem services might have helped us reach the group objectives

The Workshop format would have been more effective if: (n=7)

The objectives of the Workshop were much narrower. The discussion sections could have one key question and after it people should be requested to reach a conclusion about it. , I think that the Workshop could be more productive if from the beginning we may focused in only one service, and then try to model it with all experts (disciplines). This could be a good example for all of us of how to replicate the experience using other reef services.

First, the layout of the chairs and tables in the main room was not good. People were not facing each other and had to twist and turn all the time. Far better to have a circular or rectangular arrangement of tables and chairs - this is the case for all previous Workshops I have been to. I think this contributed to the lack of discussion on some points. , Second, I think the break-out groups were much more effective in terms of detailed discussion, so there should have been a break-out group on the afternoon of the 2nd day. I understand this was shelved because it was close to 5pm, but I think it should have went ahead even if it meant going past 6pm. , Third, I'd like to have seen more presentations by economists, decision-makers and mathematicians, on top of the ones we did have.

we had focused more on practical problems related to modeling ecosystem services, with small groups better able to solve these problems

More time to work in smaller groups.

there were a clearer sense of common objectives

More detailed, focused, presentations and work plan.

There had been more focus, and a clearer objective, stated early in the process.

Please indicate any changes NIMBioS can make to improve the resources and/or accommodations available to Workshop participants: (n=11)

half-and-half with the coffee instead of 2% milk

Nothing at all. I would like to thanks Jennifer for all the arrangements she did. She was great.

Many flight connections were very tight, particularly for international flights - the slightest delay would likely have resulted in missed connection. Fortunately it didn't eventuate!

None, NIMBioS was great!

I think it would be good if NIMBioS could arrange to reimburse participants (especially international ones) immediately at the Workshop, which is typical of conference travel awards that I've had. For some of us, we are shouldering these huge amounts personally (and considering that these are quite large sums to participants from developing countries), thus getting reimbursements asap would be much appreciated. Also, mailing of checks to certain countries means either a much longer time before the money is obtained, or the check being lost completely.

happy

It would be good to have some time (15 minutes even) outside during the day.

I think that the hotel was fine but I would have preferred formal arrangements for meals. That is a much better way of integrating participants. The seating at the conference room at NIMBioS is poor. It would have been much better to have used a 'round table'. Having a discussion with people seated behind you is not easy. The Workshops organized by my company have video recording of all sessions with immediate playback. All participants should have microphones.

(see earlier comment re) arrangement of the plenary room), overall - nearly perfect!!!

None. Certainly don't change the IT staff. I've never seen such a high level of help and friendliness.

It was all great. Thank you.

Please indicate any suggestions you have for facilitating communication among participants during the Workshop: (n=4)

Perhaps a second organized social event in the evening.

In the main room, arrange the tables and chairs in a circle or rectangle, so that people face each other.

There were far too many people (especially younger participants) who said little, especially in the plenary sessions. A skilled facilitator would have helped draw them out., (also see earlier comments on facilitation and room layout)

Break the participants into smaller groups with quite specific objectives to get the most out of the groups.

Please use this space for any additional comments: (n=7)

I would like to thank NIMBioS Director and all the staff for the invitation to attend this workshop. I hope to continue the interaction with the group, and may be able to participate in future collaborative research.

This was overall an excellent experience that allowed me to make valuable contacts and stimulated interesting thought processes. I look forward to participating in the follow-up work discussed.

Useful Workshop. I hope it proves to be the instigator of some focused working groups.

Thanks for organizing these Workshops!

I enjoyed the stay and interactions with colleagues.

It was wonderful to meet some very interesting people. I enjoyed it. I appreciate your hospitality. Thank you.

NIMBioS is a superb global resource and the leadership, staff and facilities are world-class. Overall, the organization and its operation are excellent and I see little need to change the current formula. The one change I would recommend is for NIMBioS to make available (perhaps on a case-by-case basis) facilitators who are not only skilled in group dynamics but also knowledgeable about the language and culture of scientific disciplines. This would help focus discussions and 'drive' the group along productive avenues while allowing for creativity and spontaneous emergence of new ideas.