

ECOSYSTEM-BASED MANAGEMENT TOOLKIT  
FOR PHILIPPINE COASTAL RESOURCE MANAGEMENT:

# REEFGAME

TOOL DEMONSTRATION GUIDE



## ReefGame Tool Demonstration Guide: A Game to Explore Livelihoods & Marine Conservation in Fishing Communities

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# ReefGame Tool Demonstration Guide: A Game to Explore Livelihoods & Marine Conservation in Fishing Communities

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# ReefGame Tool Demonstration Guide: A Game to Explore Livelihoods & Marine Conservation in Fishing Communities

## Introduction to ReefGame

### What is ReefGame?

ReefGame is a linked board game and computer model that can be used to explore alternative and supplemental livelihoods and coral reef conservation in fishing communities. Game-boards represent the coastal area and habitats of the modeled area. While fishers and other stakeholders play the game, a computer model calculates fish catches and the impacts of the players' decisions on marine habitats.



The game setting helps fishers and other stakeholders to engage in lively discussions and reflections about available options to secure both their daily needs and the long-term sustainability of coastal fisheries and coral reefs.

### How has ReefGame been used?

ReefGame was used to generate dialogue and discussion around possible 'ways out' for fishers in depleted fisheries in ten municipalities in the Philippines in several workshops that brought together fishing, government, community, and industry sectors.



Photos by Kenneth Balajadia



### Who can use ReefGame?

ReefGame can be tailored to fit local economic, social and environmental characteristics, by adding or changing roles and interactions. Non-government organization (NGOs), government workers and other stakeholders can use ReefGame in half-day or whole-day workshop with 10 to 30 participants. The aim is to encourage communication between:

- Fishers
- Representatives of local government units (LGUs), and
- Prospective employers, such as resort owners, industry representatives and aquaculture operators



### Learning how to play ReefGame

The following pages give instructions for playing ReefGame.

## ReefGame Instructions

### Overview

This section covers the following:

- Materials needed
  - Game board
  - Computer model\*
- Roles of participants
- Getting started
- Suggested Game Scenarios
- Facilitation & Debriefing

\*Complete instructions for operating the ReefGame computer model are available in the ReefGame Computer Operator's Guide downloadable from <http://philcrm.org> and in the accompanying EBM Toolkit CD.

### Materials needed

To play ReefGame you will need the following materials (included in the ReefGame starter pack and downloadable from <http://philcrm.org>):

- Game board
- ReefGame computer model
- Habitat and livelihood cards
- Participant role-playing profiles (see 'roles' for more information)
- Fisher and fisher's son tokens (10 each)
- Play money



## Game board

The game board represents any coastal area on a grid made up of cells representing sea and land (see Figures 1 & 2). Each box or cell in the grid has a corresponding number, which is used in the computer model. Selected “sea” cells have habitat cards, preferably representing the actual location of mangroves, seagrass and corals in the area of interest. Particular “land” cells have livelihood cards, one for each of the alternative livelihoods available (this can be modified according to locally available opportunities and the imagination of the players and facilitators!).



**Figure 1:** ReefGame board, showing fisher boat tokens, ports (large numbers in the middle of green squares) and habitat cards.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37			
41	42								
51									
61									
71									
81									
91									
101									
111									
121									
131									
141									

**Figure 2:** Schematic ReefGame board colors represent specific cells (green = land, pink = coral, orange = mangrove, yellow = seagrass, blue = sea)

## CASE STUDY: Check your map!



The two municipalities on Lubang Island (Looc and Lubang) played ReefGame using a map representing the whole island. A boundary dispute came up when Lubang’s LGU wanted to set up seaweed farming. Looc’s Bantay Dagat said that the proposed location was in Looc’s municipal waters. The lesson learned here is that when making the game board, both land- and sea-based landmarks must be considered, especially those that are important to the decision process of fishers, stakeholders, and coastal resource managers.

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## ReefGame computer model

The ReefGame computer model calculates:

- a) fish catches, based on habitat, chance, gears and type of boat
- b) illegal fish catches
- c) number of illegal fishers caught, depending on their numbers and the number of Bantay Dagat
- d) fishers' salaries, depending on the alternative livelihood they have chosen
- e) tourism, aquaculture and industry income, depending on season and chance
- f) LGU revenue, depending on tourism arrivals and industry profits (the LGU can also collect extra revenue from players throughout the game)
- g) changes to the environment:

When fish stocks on a coral cell drop below a threshold, the coral dies and is covered by algae. The facilitator will then swap the coral habitat card for an 'algae' card on the game board, as a visual signal of declining reef health.

These results are displayed on a user interface. The interface should be shown to participants on a projector screen, so that they can see their individual outcomes, as well as those of the other players.

Instructions on how to use the computer model in conjunction with the board game can be found in the ReefGame Computer Operator's Guide, available from the CD and at <http://philcrm.org>.

## Roles of Participants

The following sections give a brief description of each of the roles of the participants /players in ReefGame:

- Fishers
- LGU representatives



- Tourism Operators
- Aquaculture Operators
- Industry
- Banker and/or Fish buyer

Complete profiles and instructions for these can be found in the ReefGame starter pack or at <http://philcrm.org>.

The only essential roles are the **fishers** and the **banker**. Other roles are optional, but add more interest to scenarios and discussions. It is not necessary that the players' roles correspond to their real-life activities. However, if people are role-playing, their decisions may not be realistic. On the other hand, role-playing offers stakeholders a chance to understand the fisheries situation from a different point of view.



### Fishers

Ten players take on the role of fisher and head of family. Each fisher is given a boat, a port (a square on the game board that serves as his “house”) and a fisher profile.

Each fisher’s objective is to earn enough to meet their family’s expenses, through fishing and other livelihood activities. Because each fisher has different assets (type of boat and gear) and family sizes, income generating potential and expenses are different for each fisher. This can help spur discussion about inequality and justice, particularly when playing ReefGame with students.

Fishers can also play in pairs if there are too many participants.

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## Tourism Operators (boats and resorts)

Up to three groups of tourism operators can participate in ReefGame. Each tourism operator aims to be profitable. Whether they are also socially and environmentally responsible depends on individual players. Tourism operators can either be resort owners or tourist boat operators. All tourism operators need to employ at least one fisher to receive visitors. They can decide on the salaries offered.



## Aquaculture Operators

One or two players take on the role of aquaculture operators. Each operator starts with one pen. They can buy more pens, but each pen requires investment (e.g., license to operate from the LGU) and a caretaker. The operators can choose which fishers to hire as their caretakers.



## Industry

One or two players take on the role of industry sector representative. Their role as an employer is to determine which fishers are suitable to hire.



## Fish buyer & banker

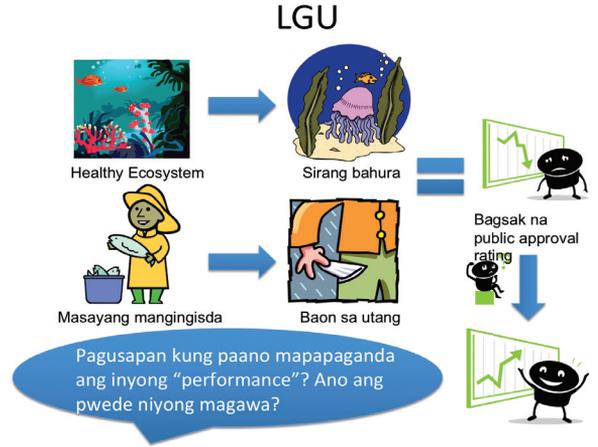
The fish buyer gives fishers their catch income as dictated by the computer model.

The banker accepts the payments of the fishers for their household expenses. The banker is also responsible for giving out salaries for livelihoods not associated with an active role (e.g., tricycle driving, farming, construction, etc.).



**LGU**

Between 1 and 3 people take the role of LGU. The LGU aims to keep a high public approval rating (based on the economic situation of the fishers) and a healthy environment (based on fish stocks and coral health) (see diagram, Figure 3).



**Figure 3.** Diagram showing the role of the LGU

# Getting started

Before organizing a ReefGame workshop, facilitators should decide which local issues they would like to explore. They also need to be familiar with all aspects of playing ReefGame, as laid out in this booklet and in the accompanying ReefGame Computer Operator’s Guide (available in the accompanying CD and at <http://philcrm.org>).

At least two staff is needed to run ReefGame, the **facilitator** or **game master** and the **computer model operator**.

It is important to invite a diverse range of stakeholders to ReefGame workshops. Even if the focus is solely on fishers, care should be taken to include different groups, for example, those who are not involved in local management organisations and recent migrants.

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Facilitators should also be prepared to deal with potential conflicts between the different stakeholders, as ReefGame often touches on sensitive local issues, such as illegal fishing and restriction on gears and/or fishing areas on conservation grounds.

At the beginning of a ReefGame workshop, participants need to be assigned roles, and told about their specific tasks and objectives. Each participant should be well-briefed about their role and understand what they have to do in the game.

## Case study: The Importance of Clear Explanations



In Lubang Island, Occidental Mindoro and Puerto Galera, Oriental Mindoro, fishers had a hard time internalizing their role in the first few rounds of ReefGame. They were basing their decisions on their real life situations like what gear and type of boat they have in reality rather than on the profiles given them for the game.

In contrast, ReefGame in El Nido, Palawan, involved much more role-playing. Fishers and LGU played themselves, but local NGOs played the resort owners, and some fisher roles were taken up by representatives from government agencies. After clear instructions from facilitators, players internalized their roles well.

## Facilitator's tip

**TIP**

Ensure that all players have understood their roles before beginning to play. Talking them through their profiles can help where some participants may have difficulty reading the profiles provided. It is better if the profiles are written or explained in the local dialect – the profiles provided in the EBM Toolkit are in Filipino. These can be modified as necessary.



# Suggested Game Scenarios

The game has four successive phases. Each phase introduces new interactions and decisions for the players.

1. Fishing only
2. Alternative livelihoods
3. Household strategy
4. Management interventions

These scenarios can be adapted to fit local issues and concerns. In addition, there are extra scenarios, described at the end of this section, which can be introduced at any time. The following section introduces each scenario. Each scenario has facilitator tips and case studies.

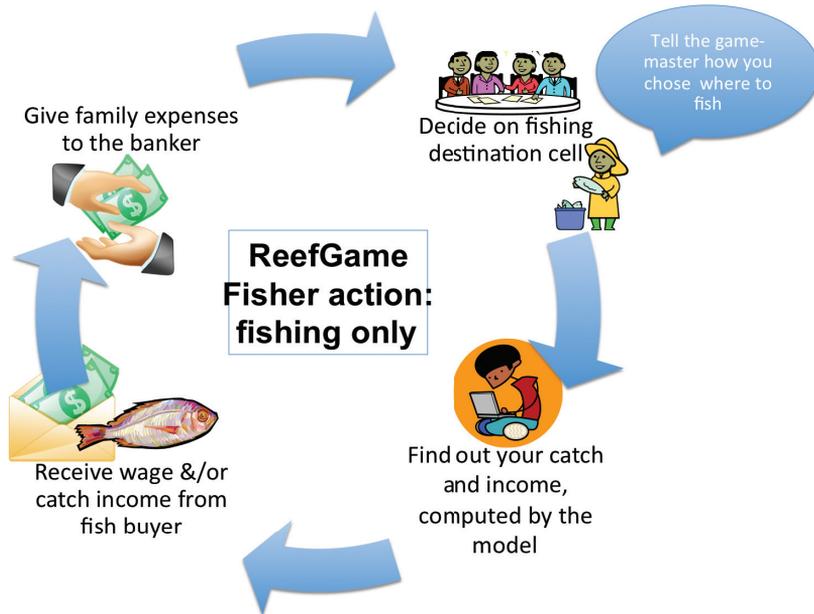
## 1. **Fishing only (~rounds 1 to 4):**

Fishers can only choose “sea” cells as a destination. Initial rounds familiarize the players with the game, and allow them to see changes in volumes and composition of catches.

To reach their goal, each fisher decides at the beginning of each round where to go fishing on the game board. The computer operator will enter in the cell number of their fishing destination into the model.

Then, the computer model calculates individual catches and incomes. Fishes are divided into two types: higher value, ‘big’ fish and lower value, ‘small’ fish. Each type of fish has a fixed value. Using the results from the model, each fisher collects the value of their catch from the banker.

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## Why use play money instead of just writing down values?

When players have play money, they can lend to each other, or alternatively, form partnerships when opportunities for investment arise. Play money also makes it obvious who is 'doing well' (or not), which is an important discussion point (Who is rich? Who is poor? Why?).

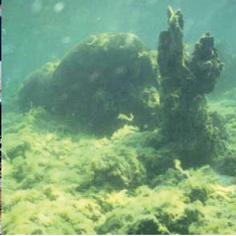
After fisher players receive their gross earnings, they pay the banker the corresponding family expenses. These are listed in their profile. The family expenses represent the money spent for daily subsistence of the family. This value is dependent on the number of household members.



## What are the signs of overfishing?



coral



algae

The ReefGame computer model calculates when coral dies due to decreasing fish stocks on coral cells. The corresponding coral habitat card is swapped for an 'algae' card (depicting dead coral, covered with macroalgae) on the game board, as a visual signal of reef degradation. This mechanism prompts discussion about the links between fishing activities and coral reef health. An expert may be invited to explain and answer questions regarding this issue or phenomenon.

## Case study:



In Lubang Island, Oriental Mindoro, some of the corals turned into algae in the first rounds of ReefGame. One fisher from Lubang appealed to the other players on their board if they could agree to stop fishing on coral reefs for some time. He said they should protect the reefs and allow them to recover first. Other fishers understood his sentiment but they still opted to fish on coral reefs. Subsistence of the family would always come first, and since coral reefs give the fishers a bigger catch, they would still continue to fish there. Having no options for other sources of income also hinders them from choosing fishing grounds where they would catch relatively fewer fish. At the end of the round, the fisher who appealed not to fish on corals decided to fish on coral reefs too. This shows the influence of group decisions on an individual fisher's decision. Even if one fisher realizes the need for the protection of resources, if he is alone in the effort, he would choose to remain competitive and fish in areas that would also give him a large catch.

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## Facilitator's tips

### TIP

During these rounds, players should begin to think about what is happening to their environment, e.g., why and how fish catches are changing, and why they are different from each other (e.g., having different gears / boats) and compare this with their own experiences. To help them do this:

- Involve the LGU – try to encourage discussions for potential solutions, ‘what is happening and what could/ should be done to improve the situation?’
- Encourage the interest and participation of the tourism participants
- Ask the fishers about their strategies and decision-making processes – e.g., how do they decide where to fish? Where do they fish and why?
- Ask participants ‘why is this happening?’, if coral turns to algae
- Have ‘ask the expert’ portion, where a marine scientist can explain why corals die when they are overfished (and other reasons why corals might die)

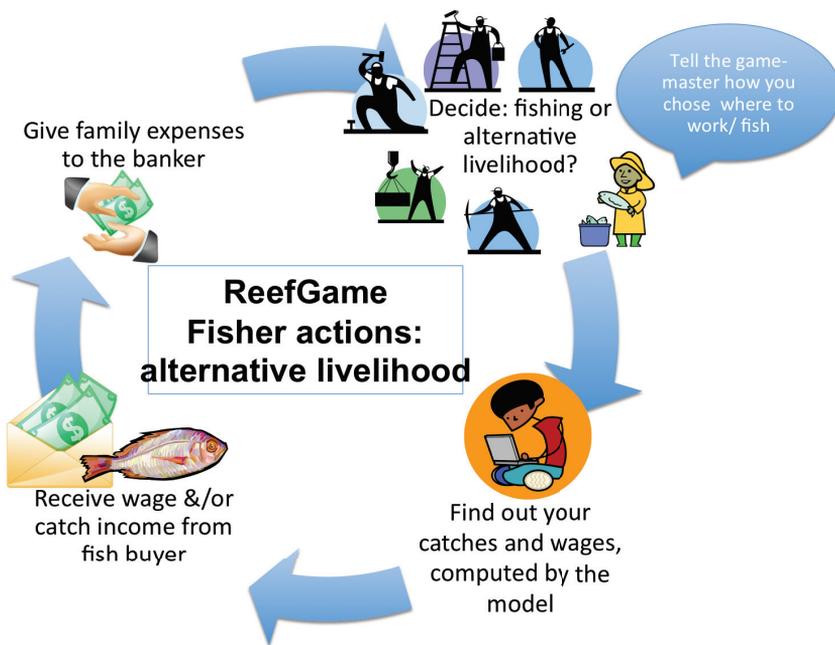
## 2. Alternative livelihoods (~rounds 5 to 7):

Participants can decide either to continue fishing or to explore alternative livelihoods. Pre-programmed options are: fish pen caretaker, construction worker, ferry crew, taxi/tricycle driver, unskilled tourism worker, and farm worker. These can be added to or modified according to locally available opportunities and the imagination of the players and facilitators! Appropriate salaries can be negotiated with players or decided by the facilitators.

Depending on the other roles being played, fishers may need to negotiate whether they can be employed. For example, if fishers want to work in a resort, they will need to convince the tourism operators that they have the necessary skills to work there. Operators should carry out mini-interviews and negotiate appropriate salaries.



Fishers can also invest in an outboard motor to improve their fishing capacity (if they have non-motorized boats in the beginning of the game), or buy a fish pen to develop an aquaculture business. The LGU can charge for boat and fish pen licenses. Fishers cannot fish and look after their aquaculture pen at the same time.



### Case study: Participation in alternative livelihoods



In Puerto Galera, Oriental Mindoro, the most popular livelihoods were those associated with the tourism industry. However, fishers only wanted to shift from fishing if they were guaranteed high incomes, and would often combine alternative livelihoods and fishing, alternating each round. LGUs and local NGOs can use these dynamics to explore how they can best support fishers to move out of depleted fisheries.

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## 3. Household strategy (~rounds 8 to 11):

Each pair is given an extra token and asked to determine the activities for another breadwinner in the household (could be a spouse or child). This allows participants to diversify their strategies. Adding 10 extra actors also mimics population increase, adding further stress on fish stocks.

### Extra variations:



Fishers can set up micro-business enterprises. Facilitators should encourage players to ‘pitch’ their idea, either to other players, or to the LGU. In addition to giving permission, the LGU can also collect business permit fees.

Fishers may also send their ‘child’ (the extra breadwinner) to school or college. The costs for this can be decided by the facilitator or negotiated with players. Other items can also be available for purchase, for example mobile phones and motorbikes.

### Case study: Micro-enterprises



In Batangas City, fishers set up a number of micro-enterprises, including goat and chicken farms and grocery or “sari-sari” stores. This generated discussion about the role that entrepreneurship can play in securing alternative livelihoods for the fishers.

Towards the end of the game, the facilitator told the fishers that their sons had all been killed in an epidemic. In response, a fisher set up a funeral parlor. This may seem like a joke, but it started a conversation about exploiting the economic opportunities that are locally available and demonstrated the ingenuity of the fishers in seeking to create extra income for their families.



## Case study: Fisher spending



In Lubang Island, Oriental Mindoro, to explore how fishers spend the income they got, aside from their daily subsistence needs, they were offered different items like education for their children, boat, fishing gears, cell phone, and motorcycle. They could ask for any item they want, and the game master would set a price for it. Two fishers invested in their children's education, one was the basnig fisher who got an average of P1250 per round, a lot more than the other fishers. The other players were also contemplating sending their children to school, but they claimed they did not have enough money. One fisher said the priority is of course to feed their family. Facilitators noticed that fishers in this area preferred to save up, and hypothesized that this was because of the relative isolation of Lubang. Fishers could then use their savings as a buffer against poor fishing seasons, for example.

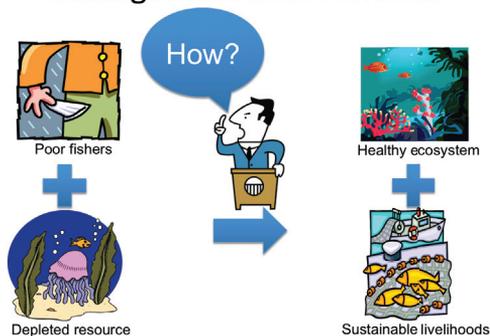
### 4. Management Initiatives (~round 12):

During this round the LGU players lead consultations and decision-making about management initiatives to maintain and enhance the marine environment.

Some suggestions for management interventions are:

- Marine protected area establishment
- Gear restrictions
- New livelihood programs and training
- Open and closed seasons
- User fees or environmental fee

### Management interventions



This is an opportunity for players to discuss and learn about sustainable financing mechanisms. Fishers can be asked to contribute to the costs of fisheries management, for example through donations, licenses or user fees.

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## Facilitator's tips



### TIP

- There should always be a cost to the LGU for management interventions – this can be decided by you or negotiated with the players.
- Encourage LGU to facilitate negotiations, not dictate.
- Encourage fishers and other players to confront the LGU if they are not consulted about changes on their access to the fishery.
- This scenario helps address issues of marine stewardship, access rights, justice and sustainable financing. Try to make sure that these issues are discussed and negotiated as openly as possible.

## Case study: Exploring Sustainable Financing and Ring Fencing



In Masinloc, Zambales, fishers chose to donate a portion of their income to help set up a Marine Protected Area (MPA). In return, fishers wanted to have first access to the buffer area outside their MPA, as they hoped that the ‘spillover effect’ would increase their catches. This shows two things. Firstly, fishers are willing to contribute to conservation efforts, especially if their access rights are protected or enhanced. Secondly, where NGOs or LGUs may see MPAs as primarily for conservation, fishers tend to expect a pay-off in the form of increased catches. As this might not always be realistic, MPA implementation may need to be accompanied with other livelihood enterprises such as hatcheries.

In Puerto Galera, Oriental Mindoro, the environmental fee rate was based on the real amount collected for user fees at the Batangas Port. The total amount received by the LGU was dependent on the number of tourist arrivals. They used these funds to set up several Marine Protected Areas during the management intervention scenario.



## Extra Scenarios

These extra scenarios can be introduced to generate additional discussion.

### *Illegal Fishing*

Facilitators can introduce illegal fishers. The computer operator can set the number of illegal fishers between 0 and 10. The level set should reflect the proportionate number of fishers intruding into municipal waters. Fishers can also work as part time bantay dagat. This scenario can be used to spur discussion on how to control encroachment, and the impact of illegal fishing on the marine environment.

### *Tourism seasonality*

Tell your computer operator if you want to implement the high or peak season (suggestion: approximately once every 3 rounds).

### *Pollution / global financial crisis / natural disaster*

Problem with sewage, rubbish, red tides, the world financial markets or natural disasters (e.g., typhoons: no tourists arrive). This scenario can be used to encourage discussion of the dangers and vulnerabilities of tourism development.

In addition to these pre-designed scenarios, other scenarios can also be implemented based on suggestion from participants, for example by adding other livelihood choices or changing wages, fishing costs or fish prices.

## Facilitation and Debriefing

Facilitators should make sure that participants have a structured opportunity to reflect on and share their experience within the game setting, connect this with their real life context, and derive new knowledge and understanding from these comparisons. Allowing participants to discuss the activities at different points in the game (e.g., after each new scenario is introduced) gives both facilitators and participants a chance to ‘digest’ or ‘process’ what is happening in a step-wise fashion. This will reduce the chance of recasting, forgetting or ignoring initial impressions in evaluating the lessons and worth of the activity. This is particularly important with ReefGame, as it is usually played over a number of hours.

Facilitators need to make sure that all participants in ReefGame get a chance to share their opinions and ideas. More articulate and confident players, such as those with a higher level of education, can tend to dominate discussions. It is the facilitators’ role to ensure that everybody has a voice.

The facilitators should hold group round-tables between each round so participants could discuss and justify their decision-making processes. In addition, before changing scenarios, the group can be asked to reflect on: i) the strategies they developed and why these were successful or not; and ii) the changes in the marine environment. A final debriefing stage can be dedicated to collectively analyze and evaluate the activity, group sharing and individual learning, and to discuss the potential for real-life application of the lessons learnt.



Some suggested questions to evaluate the activity are:

- Did you enjoy the workshop and why?
- What did you learn?
- What can be applied in real life?
- What would you have done differently?
- What recommendations would you make to the government (LGU, provincial, national)?

Depending on the audience, facilitators can also introduce discussions about characteristics of marine commons management, such as

- free riders – people who benefit from the sacrifices of others, without contributing themselves, e.g., those who do not contribute to the cost of establishing an MPA, but expect to benefit from spillover effects;
- rule-breakers; e.g., fishing inside the MPA; and
- the impact of power dynamics, for example between richer and poorer fishers, between employers and employees, and the fishers and government representatives.

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Deborah is a PhD student at the Fenner School of Environment and Society, ANU College of Medicine, Biology and Environment at The Australian National University (ANU). She graduated with a BA/BSc(Hons) from ANU after completing a thesis focusing on using visual tools, including participatory models and board games, for coral reef and coastal management in the Philippines. Through her PhD, Deborah will continue to examine the utility and potential benefits of using creative techniques to explore alternative livelihood options and locally-based stewardship arrangements in artisanal reef fisheries, as well as the nexus between art and science. She is completing six months at the University of the Philippine's Marine Science Institute as part of the Australian Government's Endeavour Research Fellowship program.

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