CCRES Tools and Training Guide:

Valuing ecosystems, sustaining business and promoting change
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Introduction

Innovative tools for valuing ecosystems, sustaining business and promoting change

Our coastal ecosystems — coral reefs, mangroves and seagrass beds — provide fish to eat and sell, support tourism and protect the coastline from storms. Coastal communities rely on these ecosystems for their livelihoods and food security. Unfortunately, these ecosystems are under threat from pollution, overfishing, unsustainable development and climate change.

The Capturing Coral Reef & Related Ecosystem Services (CCRES) project is working to ensure the long-term sustainability of these coastal ecosystems with models, tools and knowledge products to support planning.

This guide outlines the suite of CCRES’s innovative tools that demonstrate the link between healthy coral reef, seagrass and mangrove ecosystems, and community wellbeing. These tools can assist managers, policy-makers and planners to strengthen the governance of coastal ecosystems.

The tools have been developed by multi-disciplinary teams that include scientists, policy-makers, businesses and other experts from a range of fields. They are the result of collaboration between leading centres of discovery, learning and engagement in North America, Australia and the East-Asia Pacific region, and specifically alongside partners in Indonesia and the Philippines.

CCRES hopes the tools will be a useful addition to support managers of coastal environments make informed decisions and to guide policy development for the sustainability of coastal environments and communities. Training on the tools is offered to further support the uptake and the professional development of people interested in using them.
The CCRES project has created a suite of tools to help the process of Marine Spatial Planning (MSP) and support two MSP activities.

To develop zoning plans specifically to rebuild and sustain coral reef fisheries, CCRES has developed the ‘Rebuilding reef fisheries with core zones’ toolbox. This also includes tools to help protect biodiversity.

Two additional tools help practitioners map the vulnerability of coral reefs and their role in protecting beaches from erosion.

These tools help managers incorporate the natural ecosystem services provided by coral reefs into MSP and ultimately improve biodiversity conservation and fisheries productivity.
WHAT IS THIS TOOL?

This toolbox includes a set of tools, comprising:

1. Policy guidelines on using no take Marine Protected Area (MPAs) to sustain and rebuild fisheries
2. A tool to optimize MPA placement for both conservation and fisheries
3. A tool to determine the locally optimal size of no-take MPAs
4. Fish SPACE (Fisheries for Sustaining People’s Access through Conservation and Equitable Systems) — a spatial planning tool that highlights the consequences of alternative decisions on total MPA coverage, placement and local size.

WHAT DOES IT DO?

The toolbox enables coastal planners and policymakers to support decisions on the total coverage/number, placement and local size of MPAs, in order to sustain and rebuild fisheries and to protect coastal biodiversity.

HOW DOES IT WORK?

Tools can be accessed through an easy-to-use web-based interface, software and printed materials.

WHEN IS IT USED?

This toolbox supports MSP by assisting users to develop zoning plans specifically to rebuild and sustain coral reef fisheries as well as to help protect biodiversity.

WHO CAN USE IT?

- Policy makers
- Government and NGO planners undertaking MSP
- Researchers studying marine reserve design

AND THE TRAINING?

The training workshop covers:

i) The use of marine reserves to rebuild fisheries and protect biodiversity
ii) Policy perspective: how much area should be designated as core zone to sustain and rebuild fisheries?
iii) How large should local core zones be to protect biodiversity and help rebuild fisheries?
iv) The connectivity of reefs throughout a seascape by ocean currents transporting larval fish
v) Methods to design networks of core zones that are optimised to either rebuild fisheries, protect biodiversity or both
vi) Training on the software to design networks of core zones

It includes sessions dedicated to developing and discussing MPA designs of practical relevance to workshop participants.

Duration: 5 days

Prerequisites: Skills in GIS are desirable
WHAT IS THIS TOOL?

Reef React is a computer software-based simulation model.

WHAT DOES IT DO?

The tool enables users to predict futures of coral reef ecosystems under various climate and management scenarios (e.g. what if we improve water quality but climate change continues at current rates?).

HOW DOES IT WORK?

It is accessed through an easy-to-use web-based interface.

WHEN IS IT USED?

The tool enables modeling of the impacts on coral reef ecosystems of proposed interventions for managing threats to coral reefs, before making a management intervention.

WHO CAN USE IT?

• Government planners undertaking MSP wishing to identify the most vulnerable reefs and those with the greatest current resilience
• NGOs involved in MSP, conservation planning, or coral reef research
• Scientists undertaking monitoring or assessments of coral reefs and or interested in coral reef futures and ecology

AND THE TRAINING?

The training introduces the threats facing coral reefs, including pollution, climate change, cyclones, crown-of-thorns starfish and overfishing, and options for management of these threats.

Duration: 1/2 day

Prerequisites: Skills in GIS are desirable
**WHAT IS THIS TOOL?**

The Coastal Protection tool is a web-enabled model.

**WHAT DOES IT DO?**

The tool enables users to model the ability of coral reefs to protect shorelines and assess which reefs provide the greatest benefits to protecting key coastal infrastructure. Some coral reefs act as coastal breakwaters, reducing the wave energy reaching shore that might cause beach erosion. However, reefs vary a great deal in their ability to provide this function, partly because of their geography but also depending on the ambient wave and wind conditions.

**HOW DOES IT WORK?**

It works through an easy-to-use web-based interface. Users apply the model to coral reefs visible on Google Earth or another GIS system. Using simple measuring tools, such as the width of different reef zones, users will methodically assess which reefs provide the greatest coastal protection.

**WHEN IS IT USED?**

It is used to identify the most important reefs for coastal protection and resilience (as part of MSP), and as part of planning for climate change adaptation and conservation.

**WHO CAN USE IT?**

- Government planners undertaking MSP
- NGOs involved in MSP or conservation planning
- Scientists planning for climate change adaptation or interested in coastal resilience

**AND THE TRAINING?**

The training includes basic information on coastal wave dynamics so users can interact with the model meaningfully. They will then learn how to apply the model to coral reefs visible on Google Earth or another GIS system and assess which reefs provide the greatest coastal protection.
The CCRES project has created three tools for using systems thinking and simulation modelling to address coastal resource management problems. These tools are designed to help stakeholders participate actively in the decision-making process, helping to articulate the issues, identify preferred scenarios for future development, and identify intervention points that will help the community achieve desirable outcomes.

Each tool has a different purpose and is used within a different step of the systems analysis process. These steps are:

**Step 1. Problem articulation:**
In this step the problems are identified. This involves engaging communities and stakeholders to identify problematic trends in resources (such as fisheries) — the amount or health of the resources, and trends in activities that affect those resources. Problems are defined as problematic patterns or trends over time (such as fish catch decline).

**Step 2. System specification:**
In this step the system responsible for creating problematic trends in resources and activities is explored qualitatively. For each problem this involves breaking the system down into activities, resources and pressures. Activities represent things that people do (such as fishing and farming), resources represent things that support these activities (such as fish, coral, land, water, etc.) and pressures represent things that influence trends in either activities or resources (such as population growth, income, pollution, etc.). Then, interactions between these activities, resources and pressures are identified to see how they influence each another. Finally, decisions are chosen. Decisions represent things that might be done to address problematic trends in either activities, resources or pressures. System specification is done in participation with the community, usually within focus group discussions attended by stakeholders that either affect or are affected by the problems.
Step 3. Simulation modelling:
In this step the system is formalised into a quantitative simulation model. This requires building sub-models (the sub-models require input data to run yet they can also be run with estimates if data does not exist) that simulate the activities, resources and pressures within the system, and linking these together to represent interactions among them. The structure of these sub-models is generic and site independent, for example a human population model that simulates births, deaths, immigration and emigration, or a fish population model that simulates fish recruitment, maturation, natural deaths and fish catch. Numbers for these models are then obtained for a site. For example, this might be the initial human population of the site, the birth rate, death rate, immigration rate and emigration rate. Models are then tested before being used in the final step.

Step 4. Policy design and evaluation:
In this step the system simulation model is used to explore the influence of policies and decisions on the behaviour of the system, particularly problematic trends in activities, resources and pressures. The aim is to identify policy combinations that could weaken or reverse the problem trends identified in the problem articulation step. Policy design and evaluation is done in participation with the community, usually within focus group discussions, and attended by stakeholders that either affect or are affected by the problems being looked at.

Tools created by CCRES support different steps within the systems analysis process. These tools are:

1. SESAMME: This is an iPad app designed for use within focus group discussions to assist in the capture of information about activities, resources, pressures and their interactions. It is used in the system specification step of the systems analysis processes and facilitates community engagement.

2. System Simulation Model: This is a technical simulation model built using Stock and Flow modelling software. It is used in the simulation modelling step of the systems analysis process and allows the behaviour of the system to be modelled over time.

3. SYSTORY: This is an app for hand phones and tablets to assist in scenario evaluation. It can be used within focus group discussions for community engagement, for teaching or policy assessment. It is used in the policy design and evaluation step of the systems analysis process.

Tourism is a major economic driver but can put pressure on coastal ecosystems

Photo: G Sheehan
WHAT IS THIS TOOL?

SESAMME is an iPad app.

WHAT DOES IT DO?

SESAMME captures information about system components (such as resources, activities, pressures and decisions) from local communities and helps them to visualise how these components interact.

HOW DOES IT WORK?

It is used within focus group discussions according to a script that outlines the discussion procedure.

WHEN IS IT USED?

It is used to assist group discussions about coastal zone management problems (such as fish catch decline) and to visually represent how resources, activities and pressures interact to create the problems identified.

WHO CAN USE IT?

- Government departments and NGOs involved in community engagement
- Educational institutions teaching courses in systems thinking

AND THE TRAINING?

The training workshop covers:

i) Introducing participants to the basic principles of systems thinking

ii) Demonstrating the use of the SESAMME app and the focus group discussion process in which SESAMME is used

iii) Conducting a mock focus group using the SESAMME app

iv) Using SESAMME to analyse focus group discussion results

Duration: 1 day

Equipment: Participants ideally require an iPad
WHAT IS THIS TOOL?

This tool is a technical simulation model of the coastal zone built using Stock and Flow modelling software.

WHAT DOES IT DO?

The tool quantifies interactions between activities on land (such as farming and urban development), activities on water (such as fishing), coastal ecosystems (such as coral reefs and mangroves) and coastal resources (such as fish). It allows the user to simulate the behaviour of the coastal system over time.

HOW DOES IT WORK?

The system model runs in Stella Architect. The user can create an interface to run scenarios and produce graphs for any variable within the model.

WHEN IS IT USED?

The model is intended for technical users, such as governments and universities. It can be used for policy evaluation. For instance, it might be used to assess the impact of land use zoning policies on fish habitat and fish catch, or the impact of fishing management policies (such as a cap on boat numbers) on fish catch and fish price.

WHO CAN USE IT?

- Government departments involved in system simulation for coastal resource management
- Educational institutions conducting research on coastal systems or teaching courses in coastal systems or system dynamics

Duration: 3 days

AND THE TRAINING?

The training workshop introduces participants to:

i) The basic principles of system dynamic modelling

ii) The System Simulation Model built by CCRES

iii) Setting up the model for a new site

iv) Using the model to evaluate scenarios and policies

Equipment: Participants ideally require a laptop PC and a Stella Architect licence
WHAT IS THIS TOOL?
SYSTORY is an app for hand phones and tablets.

WHAT DOES IT DO?
The app helps managers to understand and visualise the dynamics of coastal systems and assess the influence of alternative scenarios on system trajectories over time.

HOW DOES IT WORK?
SYSTORY runs on Apple and Android phones and tablets. It will have both ‘explore’ and ‘experiment’ functions. ‘Explore’ will allow users to explore a story of the system and learn how coastal ecosystems and people interact. ‘Experiment’ will allow users to run simulations for user-defined scenarios and see how these scenarios affect the behaviour of the system.

WHEN IS IT USED?
SYSTORY can be used for policy evaluation, community engagement or teaching. For instance it might be used to assess the impact of land use zoning policies on fish habitat and fish catch, or the impact of fishing management policies (such as a cap on boat numbers) on fish catch and fish price. It might also be used with community groups to explore the advantages and disadvantages of different policies and determine their preferred policies. It might also be used with students to teach them about how coastal systems work, and how they respond to different management scenarios.

WHO CAN USE IT?
- Government departments involved in community engagement and policy evaluation
- NGOs involved in community engagement
- Educational institutions teaching courses in systems thinking or system dynamics

AND THE TRAINING?
The training workshop introduces participants to:
1) The SYSTORY app
2) Its storytelling and scenario analysis capabilities
3) How to set up SYSTORY for use in a new site

Duration: 1 day

Equipment: Participants ideally require an Android or Apple smart phone or tablet
Economic pressures on fishers and their communities contribute strongly to human impacts on coastal ecosystems. These pressures increase with the failure to capture the value that fishers create, as returns are concentrated further along the value chain. Ecosystem problems caused by economic inequities can be solved by remediating these inequities.

Extensive programs have been developed for small and medium sized businesses and entrepreneurs, including over 100 funded by the World Bank across the globe. Two types dominate, those designed to identify new opportunities for existing businesses in a location that can be the vehicle for solving an environmental problem; and those designed to support small businesses and the entrepreneurs that run them.

As part of the CCRES project, two enterprise led ecosystem solutions workshops have been developed focussed on remediating the economic issues causing ecosystem degradation.

The two key tools provide alternative approaches to systematically sourcing and supporting enterprise led solutions to ecosystem problems (identified by other tools within CCRES):

1. Ecosystem based Business Development; and
2. EcoBiz Challenge

The two workshops are designed as part of a toolbox to be used in combination, however each can be undertaken separately.
WHAT IS THIS TOOL?

This tool is a process, delivered via a workshop.

WHAT DOES IT DO?

It matches case studies of successful national business-based solutions to ecosystem problems with local businesses most likely to adopt new solutions to tackle ecosystem problems at the site.

It enables participants to identify and develop business enterprises that share value fairly along the business value chain and don’t cause damage to the coastal environment.

HOW DOES IT WORK?

The EbBD workshop covers five elements in sourcing, matching and implementing business enterprise solutions using examples from other sites:

i) The Global Sustainable Opportunities Database to systematically identify enterprise solutions that have been both environmentally and commercially successful in locations around the world. The workshop expands on the search process used to identify relevant solutions, generate ideas and using structured search functions

ii) Identifying National Success Cases that match the political, cultural, social and environmental context of the specific site

iii) Second tier businesses — The next section of the workshop explains how those businesses that are the most likely adopters of new sustainable opportunities at the site are identified and engaged

iv) The matching process is undertaken in the EbBD practicum, the process of which is outlined within the workshop

v) Embedding the opportunity in the socio-political framework, through government-enterprise partnerships

WHEN IS IT USED?

The workshop is used to identify global and national models of business enterprise that have the potential to be both environmentally and commercially successful in a specific region.

WHO CAN USE IT?

• Local, regional and national government policymakers
• NGOs, national and international agencies
• Social-enterprise and private sector leaders

AND THE TRAINING?

Attending the EbBD workshop will train participants in the process of identifying and developing business enterprises.

Duration: 3 days

Note: All supporting materials are provided under open licence to participants of the EbDB workshop.
WHAT IS THIS TOOL?

This tool is a business competition and development program.

WHAT DOES IT DO?

The tool uncovers the nascent entrepreneurs with new ideas for sustainable enterprises and supports the development and diffusion of their business solutions across a region.

HOW DOES IT WORK?

Individuals directly affected by ecosystem decline often find solutions to help alleviate the problems they face. The EcoBiz Challenge flushes out these solutions and shares them widely.

WHEN IS IT USED?

When new, sustainable enterprises or business solutions developed by a single person, business or village in a locality or a region are rarely being recognised and diffused.

WHO CAN USE IT?

- Local governments
- NGOs
- Chambers of commerce and industry
- Social-enterprises and private sector leaders

AND THE TRAINING?

The training covers:

i) The logic behind the EcoBiz Challenge

ii) Problem identification and designing the EcoBiz Challenge

iii) The planning and logistics for running the competition

iv) How to run the ideas generation, feasibility and business skills workshops

v) Embedding the entrepreneurs in a mentor support framework

Duration: 3 days

Note: All supporting materials are provided under open licence to participants of the EbDB workshop. These include examples of brochures; flyers; the application form; outlines and slide decks for the ideas generation, feasibility, and business skills workshops; engagement briefs; and the implementation strategy.
The CCRES project has developed tools for promoting behaviour change through participatory outreach, decision-support and community empowerment. The use of these behaviour change tools empowers individuals in coastal villages to make healthier choices for their families and their environment, and enables communities and government to collaborate more effectively to strengthen the management and governance of coastal ecosystems.
WHAT IS THIS TOOL?

FishCollab is a diagnostic and planning toolkit, consisting of a set of linked frameworks, principles and strategies, designed to assist governments, communities and NGOs to work together to improve coastal management, or to engage communities.

WHO CAN USE IT?

- District government officials — fisheries and other divisions
- Local NGOs, community workers
- Extension workers

AND THE TRAINING?

This training adopts an adult learning style, with discussion and workshopping. Participants bring their own experience to the shared learning. The local level training workshop covers:

i) Learning about ecosystem-based coastal management and the toolkit
ii) Holding community/group meetings, verifying with participant observation, supporting the target community’s experimental actions
iii) Identifying stakeholders and network development strategies
iv) Exploring, recording, traditional knowledge and practices
v) Analysing policy, incorporating science and resolving conflict
vi) Learning from village-level and district-level champions about their strategies

After the workshop, participants apply the toolkit in their work or community contexts and can attend a “recall day” facilitated by specially-trained local mentors to share their experiences and results.

National level, introductory course

A second national level workshop allows senior managers to learn the key components and principles of FishCollab, and NGO workers who are already experienced in participatory methods to adapt the FishCollab procedures and philosophies for use in their existing practice.

Duration: 4.5 days, including an optional field trip which is under consideration.
WHAT IS THIS TOOL?

‘My Future, My Oceans’ is a tool for promoting behaviour change for use by villages and government which seek to foster sustainable behaviours in coastal households of Indonesia.

WHAT DOES IT DO?

The process of personal development empowers individuals in coastal villages to adopt behaviours that lead to healthier families, happier lives and a cleaner environment.

WHEN IS IT USED?

It is used when there is a need to promote sustainable behaviours — waste management, fisheries practices, healthier choices.

WHO CAN USE IT?

• Government officials involved in community empowerment and enhancing capacity
• NGOs involved in community engagement
• Other professionals working in community engagement or empowerment

AND THE TRAINING?

A three-day course trains facilitators to deliver workshops with village ‘heroes’ in communities. It comprises four modules (or blocks) for empowering positive behaviours, followed by a day dedicated to designing, delivering and evaluating a specific program.

Day 1
Block 1: My village
• Building blocks for a happy, healthy and productive life
• Having a safe, healthy environment

Block 2: My actions
• Doing your best
• Being a village hero
• Setting goals

Day 2
Block 3: My family
• Building positive relationships

Block 4: My future
• Solving problems

Facilitators will also be equipped with the core skills and competencies necessary to confidently deliver the program on their own. In essence, the workshop will provide a safe environment with productive feedback to practice their delivery of content and the ability to coordinate activities. This includes exercises, guidance, mentoring from previous facilitators and Q & A with trainers.

Day 3

On the third day participants are assisted to tailor the program to their own local community. This includes techniques for evaluating and reporting outcomes from using the tool.

Duration: 3 days
Training in CCRES Tools

The CCRES project is running workshops to train coastal managers, policymakers, NGOs, scientists and planners in how to use the CCRES tools that assist the users to strengthen the management of coastal ecosystems.

The training enables the participants to use CCRES tools and enhance their skills for:

- **Planning coastlines**, using marine spatial planning (MSP) tools (Rebuilding reef fisheries with marine reserves toolbox), Fish SPACE, Reef React, Coastal Protection), frameworks and methods to support both biodiversity conservation and fisheries productivity
- **Analysing systems**, including modelling coastal social ecological systems (System Simulation Model) and evaluating scenarios as part of policy design and assessment (SYSTORY)*
- **Developing businesses** that harness local entrepreneurship (EcoBiz) and emerge as sustainable ecosystem-based enterprises (EbBD)
- **Engaging stakeholders** in strengthening community-based coastal governance (FishCollab) and capturing the system drivers (SESAMME)*
- **Promoting behaviours** that foster sustainable marine resource use across multiple levels of governance (FishCollab) and in coastal households (My Future, My Oceans).

* Note: These workshops enable participants to use tools to identify pathways to improve the management infrastructure, decide what is appropriate (in terms of interventions), identify critical bottlenecks/issues, priority behaviours to change, opportunities to target enterprise. They also help define appropriate expectations for Marine Spatial Planning (MSP).
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Capturing Coral Reef and Related Ecosystem Services (CCRES) is a regional technical support project that seeks to unlock the value of ecosystems for coastal communities in the East Asia-Pacific region. CCRES will develop knowledge products — which inform the design of global, regional and national projects, plans and policies — and technical models and planning tools which assist with preparation of community-based coastal resource management plans.

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