CCRES
Capturing Coral Reef and Related
Ecosystem Services Project

CCRES Tools Guide

Marine planning, analysing systems, sustaining business and promoting change

October 2018

Contents

SESAMME Training Puerto
Princesa, Philippines

Front cover:
El Nido from the air
Photo: Google Earth

Marine reserve design workshop hosted by UQ and
the UP Marine Science Institute in Quezon City,
Philippines
Photo: Philippines Country Coordinating Unit

The CCRES systems analysis story
Photo: M Paterson, Graphic: S Pillans

Introduction

Innovative tools for marine planning, analysing systems, 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 include policy briefs; software programs, models and applications (apps); and toolkits to run processes for business development and behaviour change. They can assist managers, policy-makers and planners to strengthen the governance of coastal ecosystems.

A fishing family returns home to their island in South Sulawesi, Indonesia
Photo: M Paterson

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 guide policy development for the sustainability of coastal environments and communities.

DEVELOPING BUSINESSES THAT WORK
IN HARMONY WITH COASTAL ECOSYSTEMS

- Ecosystem-based Business Development
- Eco-Biz Challenge

ENCOURAGING GOVERNMENT &
COMMUNITY TO WORK TOGETHER
TO MANAGE COASTAL ECOSYSTEMS

- FishCollab

FOSTERING SUSTAINABLE BEHAVIOURS
THROUGH UNDERSTANDING BENEFITS
& REMOVING BARRIERS

- My Future, My Oceans

CCRES
Capturing Coral Reef and Related
Ecosystem Services Project

CCRES.NET

Marine Planning

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 Marine Protected Areas (MPA) toolbox*. This includes tools to help protect biodiversity.

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

Policy briefs have also been developed to provide guidance on MPA design, information on the importance of reef coverage and complexity, as well as the role of seagrass in reducing harmful bacteria.

These tools help managers and policy makers incorporate the natural ecosystem services provided by coral reefs into marine planning and ultimately improve biodiversity conservation and fisheries productivity.

Fish school over a healthy reef
Photo: P Mumby

Workshop on Marine Spatial Planning for MPAs hosted by UQ, UniMelb and WWF Indonesia
Photo: P Mumby

THE TOOL:
Rebuilding reef fisheries with Marine Protected Areas (MPA) toolbox

WHAT KIND OF TOOL IS IT?

The toolbox is a set of software and policy tools.

WHAT ARE THE DIFFERENT PARTS TO IT?

- *MPA placement optimization tool—* to optimize MPA placement for both conservation and fisheries (see page 7)
- *MPA size optimization tool* — to determine the locally optimal size of no-take MPAs (see page 8)
- *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 (see page 9)

For MAC

For WIN

Related documents

- *Policy brief: Healthy fisheries through marine reserves* (see page 6)
- *Policy brief: Priority reefs for conservation and fisheries replenishment* (see page 10)
- MPA and Fisheries Simulator

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?

The toolbox can be accessed through an easy-to-use web-based interface, software and printed materials. It supports marine spatial planning by assisting users to develop zoning plans specifically to rebuild and sustain coral reef fisheries, as well as to help protect biodiversity.

WHEN IS IT USED?

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

IN WHAT FORMAT IS IT AVAILABLE?

The toolbox is available as downloadable software applications and PDF files.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

No specific user skills are required to use the policy guidelines. For the software applications, we recommend participation in short training courses (one day each) where possible, however, prior knowledge and expertise required to use the tools are minimal.

WHERE DO YOU ACCESS THE TOOL?

The toolbox is available for download from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The toolbox is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres. net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

For best results, training in use of this tool is recommended. For more information, contact Prof Peter Mumby (**p.j.mumby@uq.edu.au**).

Marine reserves can be used to rebuild and maintain healthy fisheries to support improved food security.
Photo: P Mumby

THE TOOL:

Policy brief: Healthy fisheries through marine reserves

WHAT KIND OF TOOL IS IT?

The tool is a set of policy guidelines.

WHAT DOES IT DO?

The guidelines help policy makers and planners deliver a more reliable food supply to fishing communities in Indonesia and the Philippines by achieving strict no-take Marine Protected Area targets expected to rebuild and maintain healthy fisheries.

HOW DOES IT WORK?

The policy brief is used to set targets for large-scale marine spatial planning as well as small-scale MPA design. It is a part of the *Rebuilding reef fisheries with Marine Protected Areas (MPAs) toolbox*.

WHEN IS IT USED?

It is used to design and implement Marine Protected Areas specifically when there is little information about the status of fish populations and fisheries.

IN WHAT FORMAT IS IT AVAILABLE?

The guidelines are presented in a PDF file.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

No specific user skills are required.

WHERE DO YOU ACCESS THE TOOL?

The tool is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres. net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No.

Healthy reef, Palawan.
Photo: P Mumby

THE TOOL:
MPA placement optimization tool

WHAT KIND OF TOOL IS IT?

The tool is a software program.

WHAT ARE THE DIFFERENT PARTS TO IT?

It is a single, stand-alone software program with supporting materials including a user guide, a scientific paper and a policy brief.

WHAT DOES IT DO?

The Marine Protected Area (MPA) placement tool helps users optimize larval dispersal around MPAs in order to achieve flexible management objectives, including both biodiversity conservation and fishery benefits. It does this by generating an input file for the popular Marxan software.

HOW DOES IT WORK?

The tool is used as part of the *Rebuilding reef fisheries with Marine Protected Areas (MPAs) toolbox*. Priority MPA locations identified by the tool are likely to harbour fish populations that are self-replenishing, supported by the influx of larvae from other areas, and/or sending larvae to other areas most important for fisheries or threatened by other disturbances.

WHEN IS IT USED?

The tool is used to maximize the expected effectiveness of MPAs for both biodiversity conservation and fisheries management.

IN WHAT FORMAT IS IT AVAILABLE?

It is a software program available for installation as an executable file.

WHO IS THE TARGET END-USER?

- Policy makers
- Government and NGO planners undertaking marine spatial planning
- Researchers studying MPA design

WHAT USER SKILLS ARE REQUIRED?

Ideally, users will have a basic understanding of marine population dynamic processes. However, prior knowledge or expertise is not necessary as a software user guide, a scientific paper and a policy brief are made available alongside the tool.

WHERE DO YOU ACCESS THE TOOL?

The tool is available for download from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is open-access and is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

A user guide and scientific paper are available to support users.

For best results, training in use of this tool is recommended. For more information, contact Prof Peter Mumby (**p.j.mumby@uq.edu.au**).

⬇ DOWNLOAD

Fishermen in El Nido, Philippines
Photo: T Gililand

THE TOOL:

MPA size optimization tool

WHAT KIND OF TOOL IS IT?

The tool is a software program.

WHAT ARE THE DIFFERENT PARTS TO IT?

It is a single, stand-alone software program, with supporting materials including a user guide, a scientific paper and a policy brief.

WHAT DOES IT DO?

It helps users optimize decisions on the size of local MPAs by calculating the proportion of the possible maximum number of individuals of each target species that will be effectively protected in MPAs of various conceivable sizes.

HOW DOES IT WORK?

The tool is used as part of the *Rebuilding reef fisheries with Marine Protected Areas (MPAs) toolbox*. Users can access a database on common target species or upload their own species list with information on home ranges, densities, and/or maximum lengths in order to calculate MPA effectiveness for various MPA sizes.

WHEN IS IT USED?

The tool is used to help users establish effective MPAs for their local fishery species.

IN WHAT FORMAT IS IT AVAILABLE?

It is a software program available for installation as an executable file.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

Ideally, users will have a basic understanding of reef fish biology. However, prior knowledge or expertise is not necessary a software user manual, summary and scientific paper are made available alongside the tool.

WHERE DO YOU ACCESS THE TOOL?

The tool is available for download from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is open-access and is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

A user guide, a scientific paper and a policy brief are available to support users.

For best results, training in use of this tool is recommended. For more information, contact Prof Peter Mumby (**p.j.mumby@uq.edu.au**).

↓ DOWNLOAD

Reef fish for sale
Photo: A Hooten

THE TOOL:
Fish SPACE
(Fisheries for Sustaining People's Access through Conservation and Equitable Systems)

WHAT KIND OF TOOL IS IT?

The tool is a software program.

WHAT ARE THE DIFFERENT PARTS TO IT?

The tool includes the Fish SPACE software, user guide and spatial data preparation manual. The software includes a friendly user interface that allows users to upload their data (e.g. maps, fishers), run simulations, and visualise changes in the fish stock and fishing activity in map and graph formats. Users can also save the information for reporting.

The user guide provides instructions on how to use and interpret the outputs of the tool. The spatial data preparation manual presents how the map data are processed for use in the Fish SPACE software.

WHAT DOES IT DO?

Fish SPACE allows users to explore and communicate the impact of marine reserve and fisheries management decisions by running simulations for a particular area and fishery.

HOW DOES IT WORK?

Users can upload and plug in their data and evaluate different marine reserve design decisions, and fisheries management options, such as catch quotas, to see how these impact the status of the fish stock and its effect on fish catch.

WHEN IS IT USED?

Fish SPACE can be used to communicate, for example, when existing marine reserve policies need to be reviewed, and during community participatory decision-making exercises. This will allow audiences to understand why existing policies are insufficient to support the fishery. Users can also explore complementary fisheries management options (e.g. introducing catch quotas to reduce fishing pressure) in combination with different marine reserve scenarios.

IN WHAT FORMAT IS IT AVAILABLE?

Fish SPACE is available as a Mac and a Windows software application.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

Some experience in GIS and coral reef fisheries is required to be able to prepare the data, use the tool, and understand its outputs. It is recommended that users implement Fish SPACE with composite teams including experienced GIS staff, conservation and fisheries managers and planners, among others.

WHERE DO YOU ACCESS THE TOOL?

The tool is available for download from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is open-access and is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

Training in data preparation and tool use is required, but a data preparation manual and user guide are available for individual study. For more information contact Dr Vera Horigue, University of the Philippines Marine Science Institute (**vera.horigue@googlemail.com**).
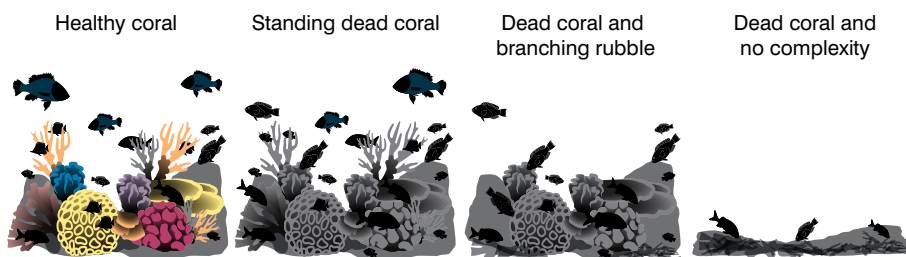
⬇ **DOWNLOAD**

MAC Installer   WIN Installer

Related documents

Fish biomass and productivity of reefs changes with different reef states.

Healthy coral   Standing dead coral   Dead coral and branching rubble   Dead coral and no complexity

THE TOOL:

Policy brief: Priority reefs for conservation and fisheries replenishment

WHAT KIND OF TOOL IS IT?

The tool is a policy brief.

WHAT DOES IT DO?

The brief contains guidelines for prioritising which reefs are best suited to marine biodiversity conservation, compared with those best used for reef fisheries.

WHEN IS IT USED?

The brief can be used when there is a need to determine which reefs should be protected to allow conservation of biodiversity and replenishment of fisheries, and which are suitable for general fishing.

IN WHAT FORMAT IS IT AVAILABLE?

The policy brief is presented in a PDF file.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

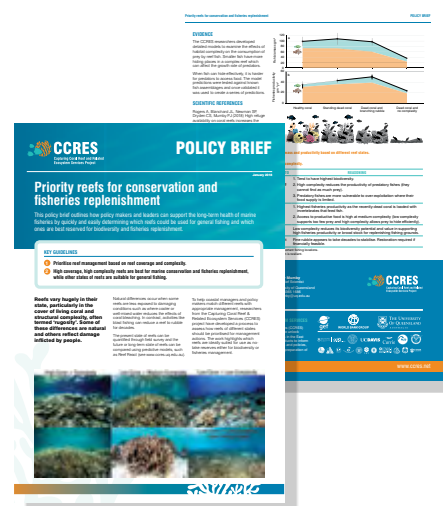No user skills are required.

WHERE DO YOU ACCESS THE TOOL?

The tool is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/ terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No.

DOWNLOAD

Seagrass meadows play a critical role in keeping marine ecosystems healthy by reducing pathogenic bacteria.
Photo: M Hein

THE TOOL:

Policy brief: Reduced pathogenic bacteria through seagrass protection

WHAT KIND OF TOOL IS IT?

The tool is a policy brief.

WHAT DOES IT DO?

This policy brief helps policy makers and leaders make informed decisions about managing seagrasses, by demonstrating the value of seagrasses which can reduce bacteria pathogenic to humans and marine life by up to 50 per cent.

WHEN IS IT USED?

The brief is used when policy makers and planners want a simple guide to understanding the benefits of seagrass for supporting human and marine life health.

IN WHAT FORMAT IS IT AVAILABLE?

The policy brief is presented in a PDF file.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

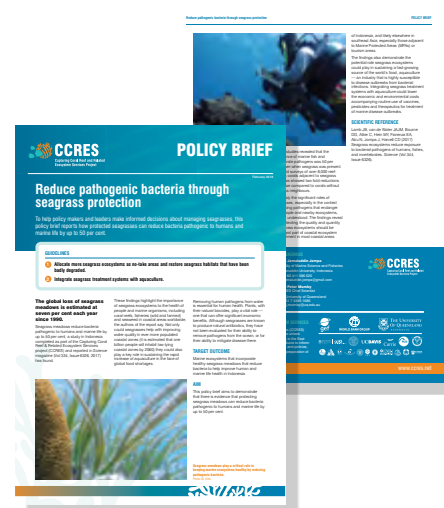No specific user skills are required.

WHERE DO YOU ACCESS THE TOOL?

The tool is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/ terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No.

**Coral reefs will react to
different pressures**
Photo: P Mumby

THE TOOL:
Reef React

WHAT KIND OF TOOL IS IT?

Reef React is a web based tool which uses a Bayesian Belief Network (BBN).

WHAT ARE THE DIFFERENT PARTS TO IT?

- Free Netica software to build a network and capture different drivers influencing coral reef dynamics
- A model to predict probability of coral reef cover in each percentage category and measure mean of coral reef cover in given years for different climate scenarios
- A user guide

WHAT DOES IT DO?

Reef React assists users to predict alternate futures for coral reef ecosystems under various climate and human use scenarios to help guide policy and management interventions to reduce negative impacts.

HOW DOES IT WORK?

Reef React is accessed through free Netica software and an easy-to-use web-based interface. The tool enables modelling of the impacts on coral reef ecosystems of proposed interventions for managing threats to coral reefs, before making a management intervention.

WHEN IS IT USED?

Reef React is used when decisions are required on how best to manage threats to coral reef ecosystems.

IN WHAT FORMAT IS IT AVAILABLE?

Reef React is available as a Netica file (.neta) and an easy-to-use web-based interface. A user guide is available in a PDF file.

WHO IS THE TARGET END-USER?

- 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

WHAT USER SKILLS ARE REQUIRED?

General skill in GIS is required to use Netica, however, prior knowledge and expertise required to use the tool is minimal.

WHERE DO YOU ACCESS THE TOOL?

Reef React is available for download from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

Reef React is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres. net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

Reef React is easy to use but training in GIS or the use of Netica may be helpful.

NETICA

USER GUIDE AND EXAMPLE DATA

El Nido from the air ▸
Photo: Google Earth

THE TOOL:
Coastal Protection

WHAT KIND OF TOOL IS IT?

Coastal Protection is a web-based tool which uses a Bayesian Belief Network (BBN).

WHAT ARE THE DIFFERENT PARTS TO IT?

- A PowerPoint introduction to coastal processes
- Coastal Protection Models: User Guide
- The REEFTOP hydrodynamics Baysian Belief Network (BBN)
- The SHORELINE BBN

Note: There are sub-models for wave height, wave forces, and shoreline position

WHAT DOES IT DO?

Coastal Protection enables users to assess the ability of coral reefs to protect shorelines from coastal erosion, and determine which reefs best protect key coastal infrastructure and communities. This information helps to guide management decisions. The tool also provides information on how wave conditions and wave forces on corals will change with sea level rise or loss of reef elevation, and how the shoreline might recede behind fringing reefs.

HOW DOES IT WORK?

Coastal Protection 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?

Coastal Protection is used to identify the most important reefs for coastal protection and resilience as part of marine spatial planning, and as part of planning for climate change adaptation and conservation.

IN WHAT FORMAT IS IT AVAILABLE?

Coastal Protection is available as a web-based BBN via the CCRES portal and via the free version of Netica, (a BBN software tool), with supporting PDF documents.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

Undergraduate or higher level degree qualifications are required, and a general ability to use Google Earth or other GIS. Use of the results to make informed decisions to guide management practices or for risk assessment requires some undergraduate level coastal processes knowledge.

WHERE DO YOU ACCESS THE TOOL?

Coastal Protection is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

Coastal Protection is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No. The user guide is intended to provide the guidance required.

⬇ DOWNLOAD

Systems Analysis

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 a 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 that simulate the activities, resources and pressures within the system, and linking these together to represent interactions among them. The sub-models require input data to run yet they can also be run with estimates if data does not exist.

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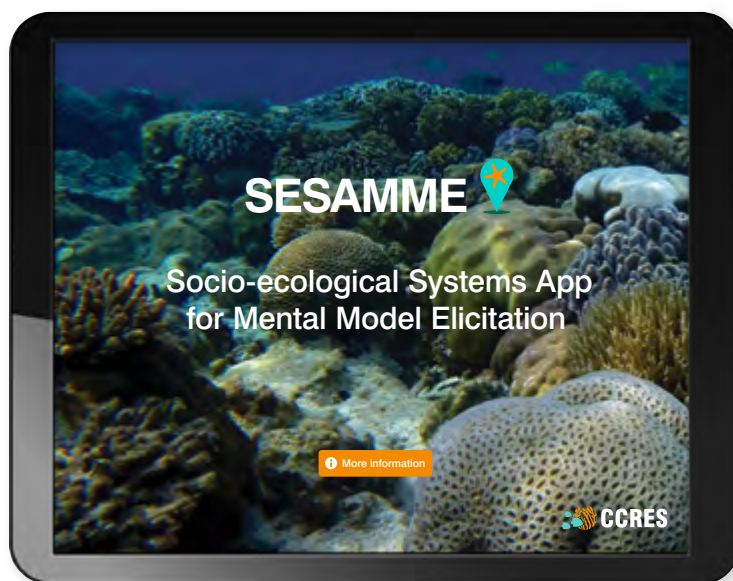
2. *System Simulation Model:* This is a technical simulation model built using Stock and Flow modelling software. It is used in the simulation modelling step of the systems analysis process and allows the behaviour of the system to be modelled over time.

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

The SESAMME app allows
discussion and analysis of coast
management problems ▶

THE TOOL:
SESAMME

SESAMME 📍

Socio-ecological Systems App
for Mental Model Elicitation

ℹ More information

CCRES

WHAT KIND OF TOOL IS IT?

SESAMME is an application (app) for
Apple iPhones, iPads, Android phones
and tablets, Windows PCs and Apple
Mac computers. *SESAMME* stands for
Socio-Ecological App for Mental Model
Elicitation.

WHAT ARE THE DIFFERENT PARTS TO IT?

SESAMME consists of an app and a set
of scripts which outline the process to
follow in focus group discussions.

WHAT DOES IT DO?

SESAMME captures information,
including past and future trends, and
the current state of 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?

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

WHEN IS IT USED?

SESAMME 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.

IN WHAT FORMAT IS IT AVAILABLE?

SESAMME is available as an app
for Apple iPhones and iPads. From
December 2018, it will also be available
as an app for Android phones and
tablets, as well as Windows PCs and
Apple Mac computers.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

No specific user skills are required. Good
facilitator skills are useful.

WHERE DO YOU ACCESS THE TOOL?

For Apple iPhones and iPads, download
SESAMME from the Apple App store.
From December 2018, for Android
phones and tablets, download *SESAMME*
from the Google Play store; and for
Windows PCs and Apple Mac computers,
download *SESAMME* from the CCRES
website **www.ccres.net**. Scripts for
guiding focus group discussions can be
downloaded from the CCRES website.

WHAT IS THE COST OF USING THE TOOL?

SESAMME is available free of charge,
under the user agreement and stated
terms and conditions (see **www.ccres.net/
terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No. The app contains a 'help' function
for users.

⬇ **DOWNLOAD**

> The System Simulation Model can be used to see the impact of different activities on coastal ecosystems, including seagrass
> Photo: G Sheehan

THE TOOL:

System Simulation Model

WHAT KIND OF TOOL IS IT?

The tool is a technical simulation model of the coastal zone built using Stock and Flow modelling software (Stella Architect).

WHAT ARE THE DIFFERENT PARTS TO IT?

The *System Simulation Model* consists of a downloadable file that can be opened in Stella Architect software, and an Excel spreadsheet containing data for the model, and a user guide.

WHAT DOES IT DO?

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

WHEN IS IT USED?

The *System Simulation 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.

IN WHAT FORMAT IS IT AVAILABLE?

The *System Simulation Model* consists of a Stella Architect file, an Excel spreadsheet and a PDF of a user guide.

WHO IS THE TARGET END-USER?

- 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

WHAT USER SKILLS ARE REQUIRED?

An understanding of Stella Architect is required to use the *System Simulation Model*. If users seek to modify the tool, an understanding of system dynamics modelling is required.

WHERE DO YOU ACCESS THE TOOL?

The *System Simulation Model* can be downloaded from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The *System Simulation Model* is available free of charge, under the user agreement and terms and conditions on CCRES website (**www.ccres.net/ terms**), however users must hold a licence for Stella Architect — visit (**www.iseesystems.com**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

Users may require technical training in systems dynamic modelling and Stella Architect. If users want to modify the *System Simulation Model*, training in systems dynamic modelling is required.

⬇ DOWNLOAD

> ▶
> **The SYSTORY app allows creation of different scenarios for coastal ecosystems**

THE TOOL:
SYSTORY

WHAT KIND OF TOOL IS IT?

SYSTORY is an application (app) for Apple iPhones, iPads, Android phones and tablets, Windows PCs and Apple Mac computers.

WHAT ARE THE DIFFERENT PARTS TO IT?

SYSTORY has two parts — an 'explore' function and an 'experiment' function.

WHAT DOES IT DO?

SYSTORY assists 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 has both 'explore' and 'experiment' functions. 'Explore' allows users to explore a story of the system and learn how coastal ecosystems and people interact. 'Experiment' allows 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 can 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 can be used with community groups to explore the advantages and disadvantages of different policies and determine their preferred policies. It can also be used with students to teach them about how coastal systems work, and how they respond to different management scenarios.

IN WHAT FORMAT IS IT AVAILABLE?

SYSTORY is available as an app for iPhones, iPads, Android phones and tablets. From December 2018, it will also be available for Windows PCs and Apple Mac computers.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

No specific user skills are required.

WHERE DO YOU ACCESS THE TOOL?

For Apple iPhones and iPads, download *SYSTORY* from the Apple App store and for Android phones and tablets, download *SYSTORY* from the Google Play store. From December 2018, for Windows PCs and Apple Mac computers, download *SYSTORY* from the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

SYSTORY is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No. *SYSTORY* contains a 'help' function for users.

⬇ **DOWNLOAD**

Business Development

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 remedying 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 tools have been developed focussed on remedying the economic issues causing ecosystem degradation.

The two 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 (EbBD) program; and

2. Eco-Biz Challenge business plan competition

The two tools are designed to be used in combination, however each can be undertaken separately.

Dried fish are an important industry in Palawan, Philippines
Photo: G Sheehan

EcoBiz Challenge semi-finalists,
Selayar, Indonesia
Photo: D Hine

THE TOOL:

Ecosystem-based Business Development (EbBD) Approach for Coastal Communities

WHAT KIND OF TOOL IS IT?

This is a process which can be delivered by a workshop.

WHAT ARE THE DIFFERENT PARTS TO IT?

The *EbBD* approach contains a comprehensive slide pack and supporting materials to direct users through the process for a nominated site or location.

WHAT DOES IT DO?

The *EbBD* approach uses ecosystem services and biodiversity as part of an overall sustainable development strategy to help support sustainable livelihoods and local economic development in low resource coastal communities. It steps participants through a thinking process designed to help identify enterprise-led solutions that share value along the supply chain and do not cause damage to the environment.

HOW DOES IT WORK?

The *EbBD process* facilitates the sourcing, matching and implementing of business enterprise solutions for a particular site using successful national or global examples from other sites. The process identifies:

- Local environmental and social challenges
- Regional and/or global business success stories which have addressed similar challenges
- Likely adopters of similar business solutions
- Complementary industry sectors that support ecosystem services
- Pathways to sustainable livelihoods

WHEN IS IT USED?

The *EbBD* approach is used when there is a need to increase the local capacity for knowledge and business skills to help address local economic and environmental challenges.

IN WHAT FORMAT IS IT AVAILABLE?

The CCRES *EbBD process* is presented in PowerPoint and PDF files.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

Desired skills and background for end-users includes basic knowledge of fundamental business principles and sustainable development.

WHERE DO YOU ACCESS THE TOOL?

The *EbBD process* is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The tool is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL/TRAINING SUPPORT REQUIRED?

No.

Welcoming participants to the EcoBiz Challenge workshop in Selayar, Indonesia
Photo: A Phelan

THE TOOL:
Eco-Biz Challenge

WHAT KIND OF TOOL IS IT?

The *Eco-Biz Challenge* is business plan competition, including business skills training, to encourage businesses that are environmentally and socially sustainable.

WHAT ARE THE DIFFERENT PARTS TO IT?

- A business plan competition
- Business skills training
- A Facilitators' Kit containing all materials needed to deliver the competition and the business skills training (background, logistics, training and participants' materials)

WHAT DOES IT DO?

The *Eco-Biz Challenge* identifies local entrepreneurs and assists them in starting or expanding businesses that support the local economy, as well as ecosystem services. It expands the pool of local talent, knowledge and creativity to find and incubate eco-friendly business ideas, and boost enterprise development.

HOW DOES IT WORK?

Applicants submit a business concept summary which outlines their proposed business idea. The idea must operate in the local area, employ local residents, and be environmentally sustainable. The top 25% applicants will be selected as semi-finalists and will receive a three-day business plan training course. The semi-finalists will then be required to submit a formal proposal. Winners are selected and receive a one-time equity grant to start or expand their business concepts and mitigate start-up risks.

WHEN IS IT USED?

The *Eco-Biz Challenge* is used when there is a need to encourage enterprise development and sustainable livelihoods to address economic and environmental challenges.

IN WHAT FORMAT IS IT AVAILABLE?

The Facilitators' Kit is presented as PowerPoint, Word and PDF files.

WHO IS THE TARGET END-USER?

- Local governments
- NGOs
- Chambers of commerce and industry
- Social-enterprise and private sector leaders
- Universities and institutes

WHAT USER SKILLS ARE REQUIRED?

People running the *Eco-Biz Challenge* should have facilitation skills, and introductory knowledge of business and economic theory.

WHERE DO YOU ACCESS THE TOOL?

The *Eco-Biz Challenge* is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

The *Eco-Biz Challenge* is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**).

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

No.

Behaviour Change

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.

Children collecting plastic inspired by 'My Future, My Oceans' Selayar, Indonesia
Photo: P Bradley

A participant in the "My Oceans, My Future" program from Bontolebang village arriving with a wheelbarrow load of plastic rubbish
Photo: P Bradley

THE TOOL:

My Future, My Oceans

WHAT KIND OF TOOL IS IT?

My Future, My Oceans is a process for fostering sustainable behaviours in low-resource coastal households.

WHAT ARE THE DIFFERENT PARTS TO IT?

- Participant workbook
- Facilitator guidebook
- Training PowerPoint slides
- Planning simulation activity
- Project coordinator guidebook (English only)

Materials are available in English and Bahasa Indonesia.

WHAT DOES IT DO?

My Future, My Oceans is a low-cost process of behavioural diagnosis and capacity enhancing. The tool empowers individuals in coastal villages to adopt behaviours that lead to healthier families, happier lives and a cleaner environment.

HOW DOES IT WORK?

The process comprises training of facilitators to deliver workshops, running of workshops to empower villagers, and the evaluation of outcomes. The process is supported by practitioner materials, including a project coordinator guidebook, facilitator handbook and participant workbook.

WHEN IS IT USED?

My Future, My Oceans is used when there is a need to promote sustainable behaviours, for example waste management, fisheries practices and healthier choices.

IN WHAT FORMAT IS IT AVAILABLE?

My Future, My Oceans comprises a set of materials presented in PDF and PowerPoint files.

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

There are no specific skills required for using *My Future, My Oceans*.

WHERE DO YOU ACCESS THE TOOL?

My Future, My Oceans is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

My Future, My Oceans is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/terms**). Users will need to budget to cover materials, training and implementation costs.
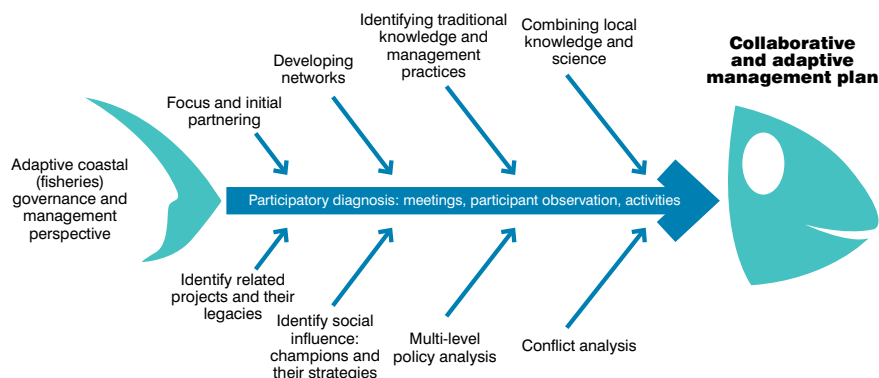
IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

For best results, training in use of this tool is recommended. For more information, contact Erik Simmons (**e.simmons@uq.edu.au**).

⬇ DOWNLOAD

A participatory diagnostic tool for strengthening coastal governance by communities

THE TOOL:

FishCollab

Source: Design — 24Point0.com.
Content — Helen Ross, Dedi Adhuri, Ali Yansyah Abdurrahim

WHAT KIND OF TOOL IS IT?

FishCollab is a participatory diagnostic and planning process.

WHAT ARE THE DIFFERENT PARTS TO IT?

The tool comprises:

- A user guide
- A guide to 'champions' and their strategies

WHAT DOES IT DO?

FishCollab assists governments, communities and NGOs to work together to improve coastal management. It enables users to identify key stakeholders, develop networks (find and develop cooperation with relevant and committed parties), analyse policy, analyse and reduce conflict, and identify opportunities and challenges using local knowledge and science.

HOW DOES IT WORK?

Two publications support use of *FishCollab*:

1. A guide to the tool, comprising:
   - The participatory diagnosis procedure, with advice on how to apply each component, and how the development team applied each component during research in Selayar.
   - A set of principles for any good participatory process.

- A set of success factors for enabling adaptive coastal governance, found during the tool development process at Selayar.
- Suggestions towards measurement.

2. A guide to 'champions', comprising:
   - A set of profiles for individual 'champions' at village and island level and the strategies they use to mobilise change within communities or government and NGO work.

WHEN IS IT USED?

FishCollab is used when governments, communities and NGOs want to work together to create a shared commitment to coastal management (fisheries) planning. It enables collaboration between these parties to foster sustainable coastal resource use and livelihoods, across multiple levels of formal and customary governance.

IN WHAT FORMAT IS IT AVAILABLE?

FishCollab is presented as PDF files (viewed using Acrobat Reader).

WHO IS THE TARGET END-USER?

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

WHAT USER SKILLS ARE REQUIRED?

No specific user skills are required to use *FishCollab*. Facilitation and social research skills would be an advantage.

WHERE DO YOU ACCESS THE TOOL?

FishCollab is accessed via the CCRES website (**www.ccres.net**).

WHAT IS THE COST OF USING THE TOOL?

FishCollab is available free of charge, under the user agreement and stated terms and conditions (see **www.ccres.net/ terms**) including observation of copyright and due acknowledgement of CCRES.

IS TECHNICAL TRAINING OR SUPPORT REQUIRED?

The need for training or support depends on how experienced the user is, with participatory philosophies and methods in general, and in the field of coastal/ fisheries management.

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.