CCRES

CAPTURING CORAL REEF AND RELATED ECOSYSTEM SERVICES PROJECT

gef

WORLD BANK GROUP

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

THE UNIVERSITY OF QUEENSLAND AUSTRALIA | gciQ Global Change Institute | UC DAVIS | Currie | MSI | UNHAS | LIPI | CCMRS-IPB

EAS CONGRESS 2018

THE EAST ASIAN SEAS CONGRESS

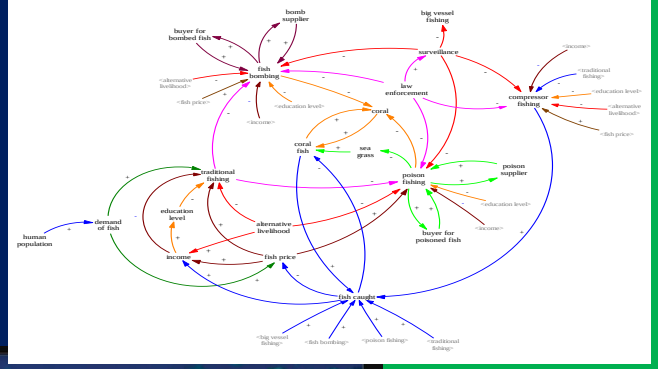
ENGAGEMENT	PROBLEM DEFINITION	SOLUTIONS	OUTCOMES
Community Government	Aspirations for change	Improving livelihood options (current and new)	Greater employment
	Legal obligations	Review & enhance governance	Greater food security
	Issues & factors driving the system	Improved resource management & planning	Healthier ecosystems
	Challenges to overcome	Scalable behaviour change	Social cohesion
	Opportunities		

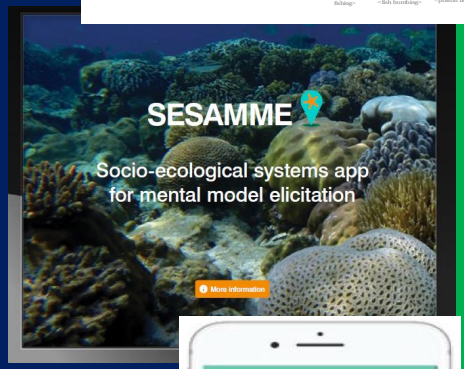
ENGAGEMENT

PROBLEM DEFINITION

SOLUTIONS

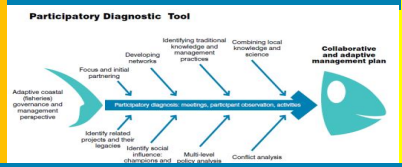
System Simulation Model





Eco-Biz Challenge

FishCollab



Eco-based Business Development

Rebuilding reef fisheries with core zones toolbox

Reef React

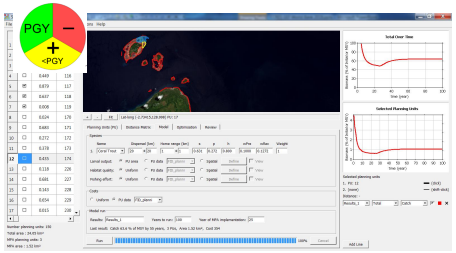
Coastal Protection

Policy brief for seagrass

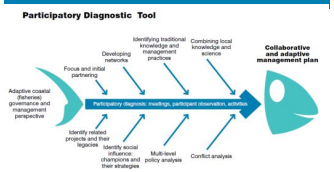
My Future, My Oceans

Systems dynamic decision making

Rebuilding reef fisheries with core zones toolbox

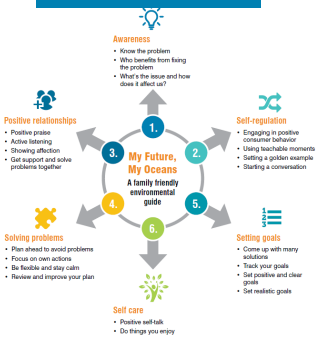


FishCollab



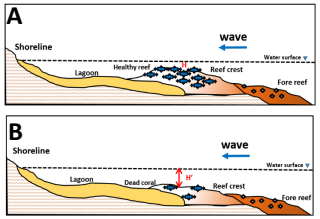
Eco-Biz Challenge

My Future, My Oceans



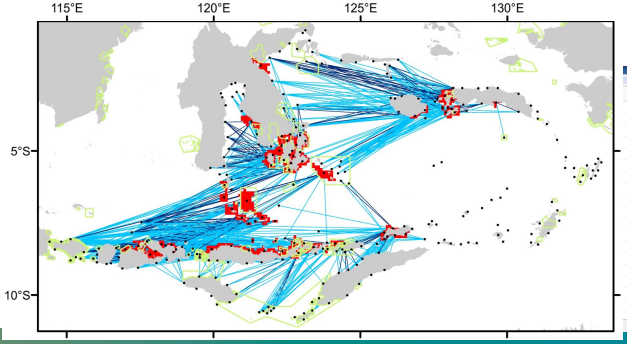
Eco-based Business Development

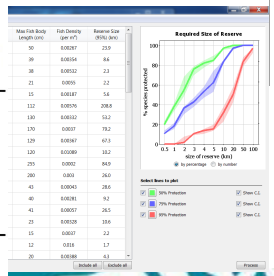
Coastal protection

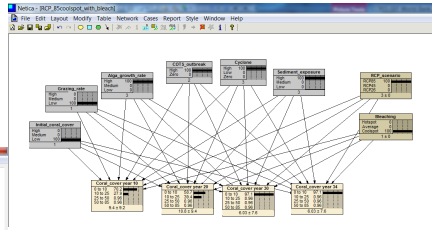


Reef React

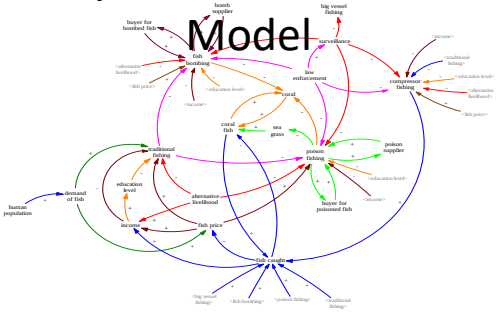
Dynamic larval dispersal







System Simulation Model



CCRES and the SDGs

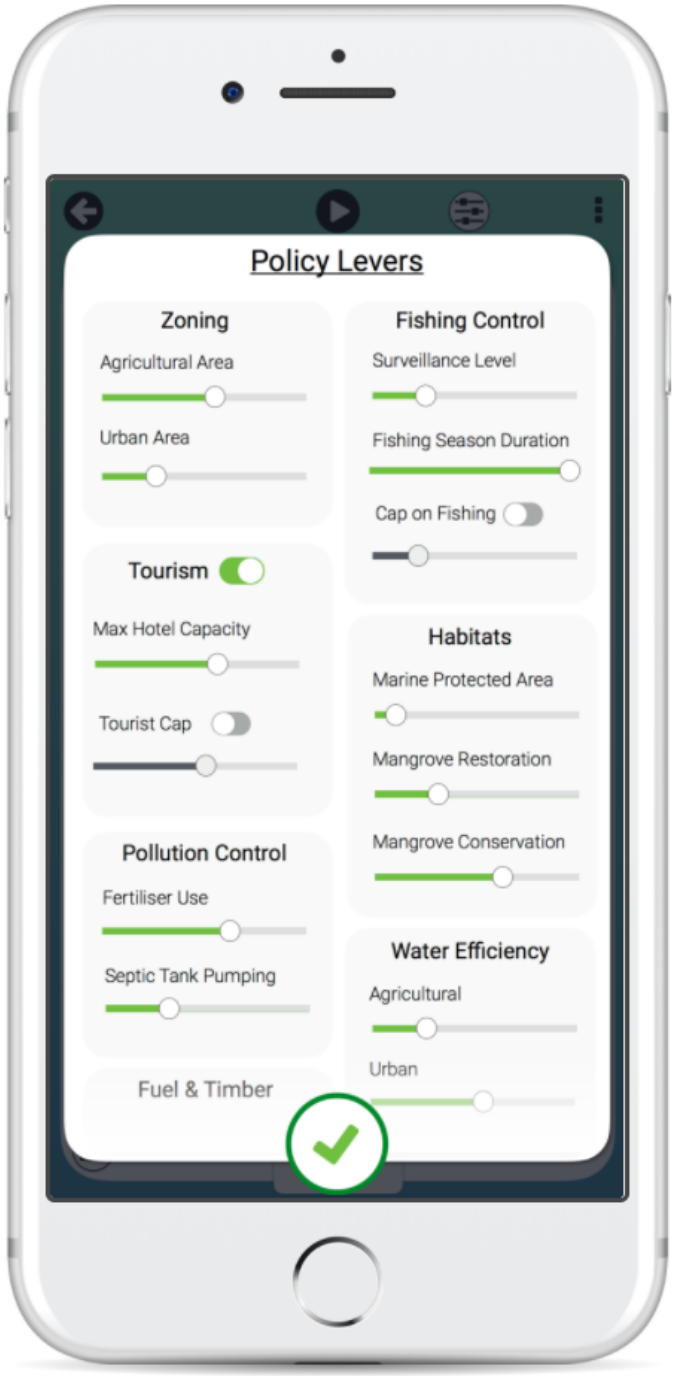
	1 NO POVERTY	2 ZERO HUNGER	5 GENDER EQUALITY	8 DECENT WORK AND ECONOMIC GROWTH	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	17 PARTNERSHIPS FOR THE GOALS
Eco-Biz Challenge	✓	✓	✓	✓	✓		✓	
Ecosystem based Business Development (EbBD)	✓	✓	✓	✓	✓		✓	
My Future, My Oceans			✓	✓	✓		✓	
FishCollab	✓				✓		✓	
System Stimulation Model					✓		✓	
SYSTORY					✓		✓	
SESAMME app		✓	✓	✓	✓		✓	
Reef React	✓				✓		✓	
Coastal Protection web tool	✓				✓	✓	✓	
Rebuilding reef fisheries with MPA Toolbox					✓		✓	
CCRES project	✓	✓	✓	✓	✓	✓	✓	✓

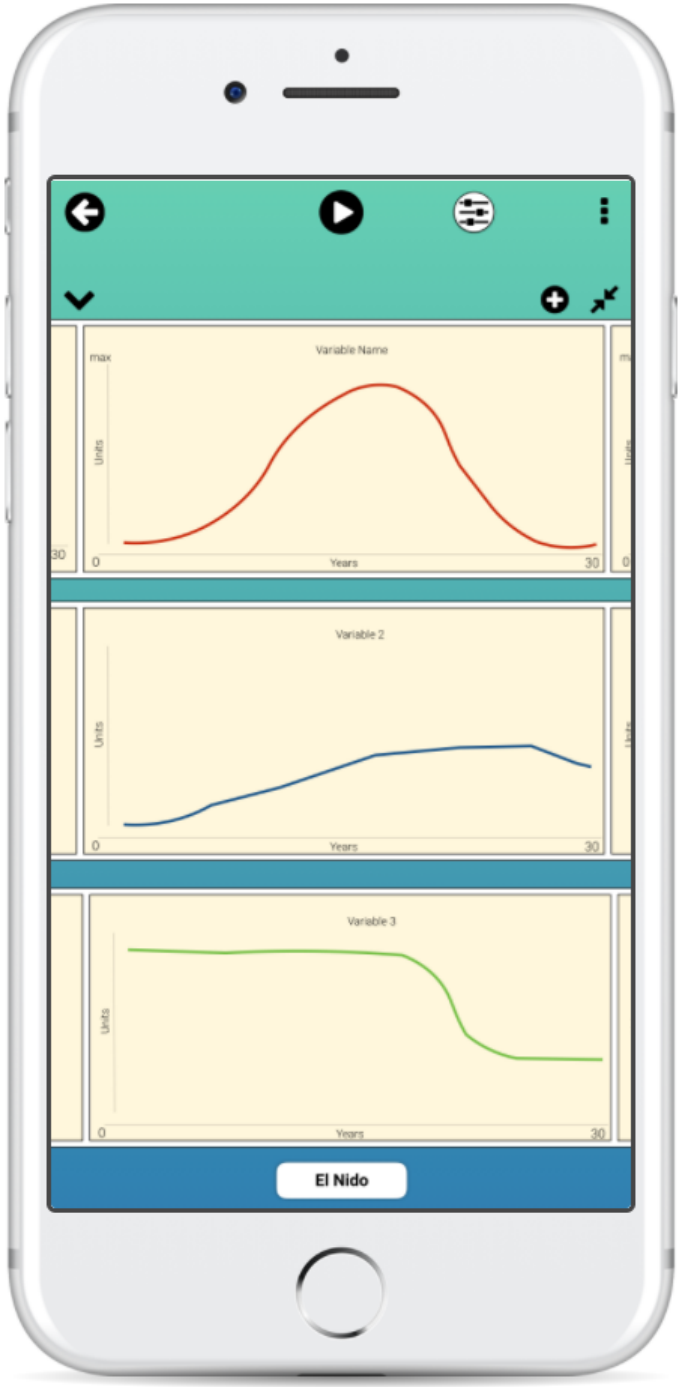
Problems and Challenges

- Analyse, model systems, pressures, resources
- Develop businesses that work in harmony with coastal ecosystems
- Encourage government and community collaboration to strengthen governance
- Plan for healthy reefs and sustainable fisheries through more effective MPAs
- Foster sustainable behaviours through promoting and reinforcing benefits, removing barriers

SYSTORY DEMONSTRATION

Experiment allows you to assess scenarios

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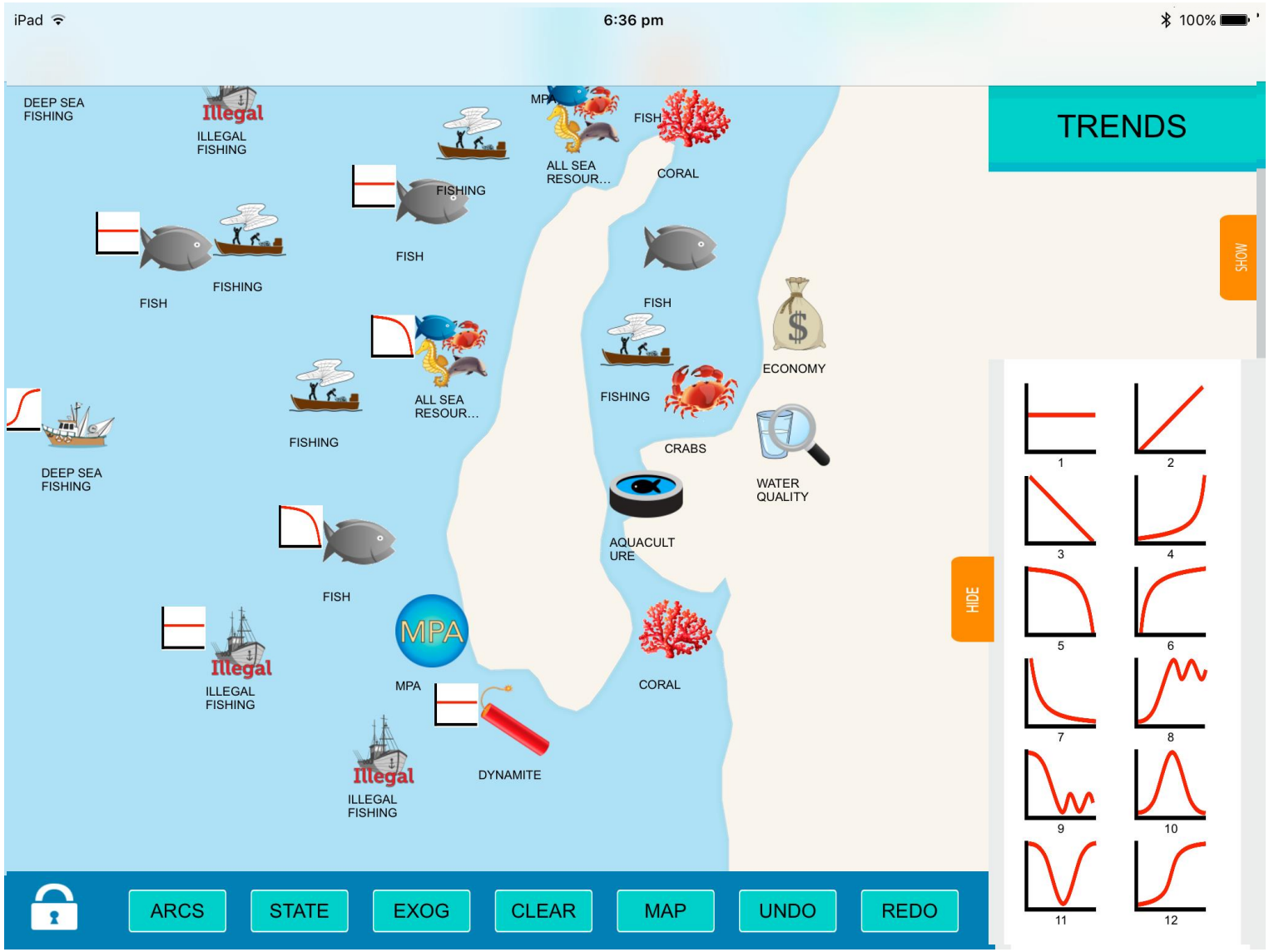
SESAMME DEMONSTRATION
SESAMME
Socio-ecological systems app
for mental model elicitation
Russell Richards
Carl Smith
Novie Setianto
More information
Version beta.1.1A
CCRES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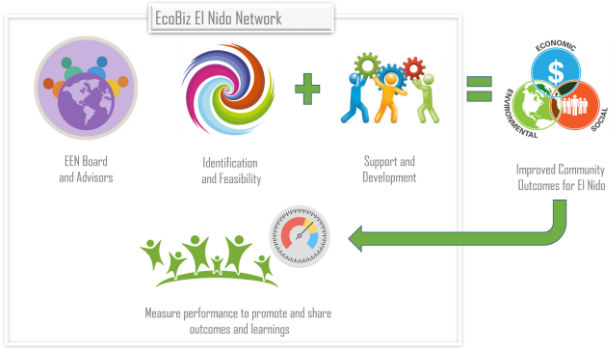
Solutions

EcoBiz Challenge - Local solutions for local problems



Some of the Eco-Biz Challenge Ideas

Plate to garden to plate compost and fertiliser

One Student, One Mangrove

Coconut Eco-Charcoal to replace mangrove charcoal

Native nursery to reduce take from forest

Marine sanctuary ecotourism

Giant bamboo plantation to replace illegally logged timber

Plastic recycling and upcycling women's cooperative

Mangrove ecotourism

Mangrove seedling nursery

Eco-fuel switching for inboard engines

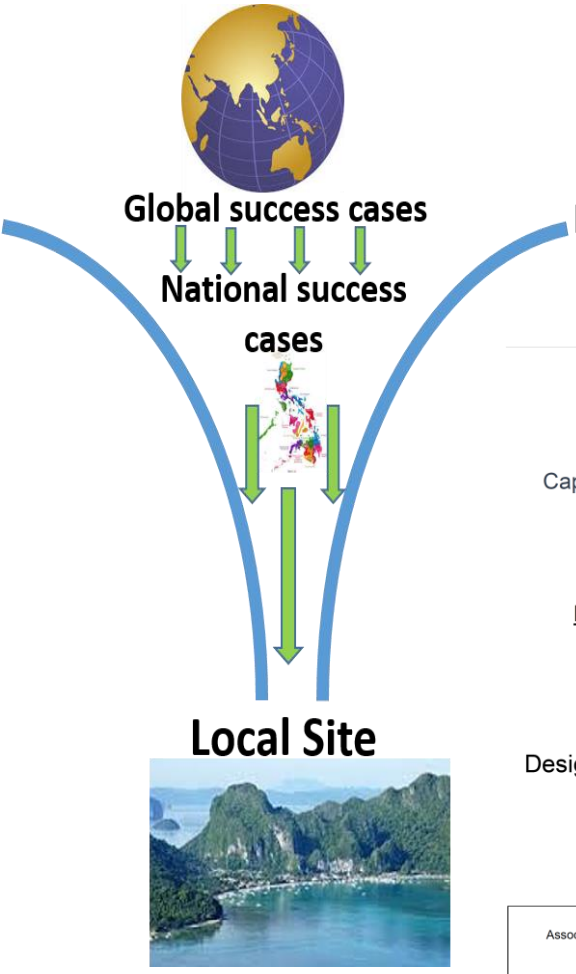
Sustainable handicrafts

Homestay/tour operator

Ecofriendly diving tours

Global and national solutions for local problems – Indonesia

Global Case Study Repository



Identify those businesses most likely to adopt the opportunities

CCRES

Capturing Coral Reef and Related Ecosystem Services Project

Business Development Indonesia (BDI)

DATA COLLECTION

Design Framework and Research Instrument

Selayar

UQ	LIPI
Associate Professor Damian Hine Dr Anya Phelan	Professor Agus Eko Nugroho Bintang Dwitya Cahyono Nur Hadiati Endah Panky Febiyansah

August, 2016

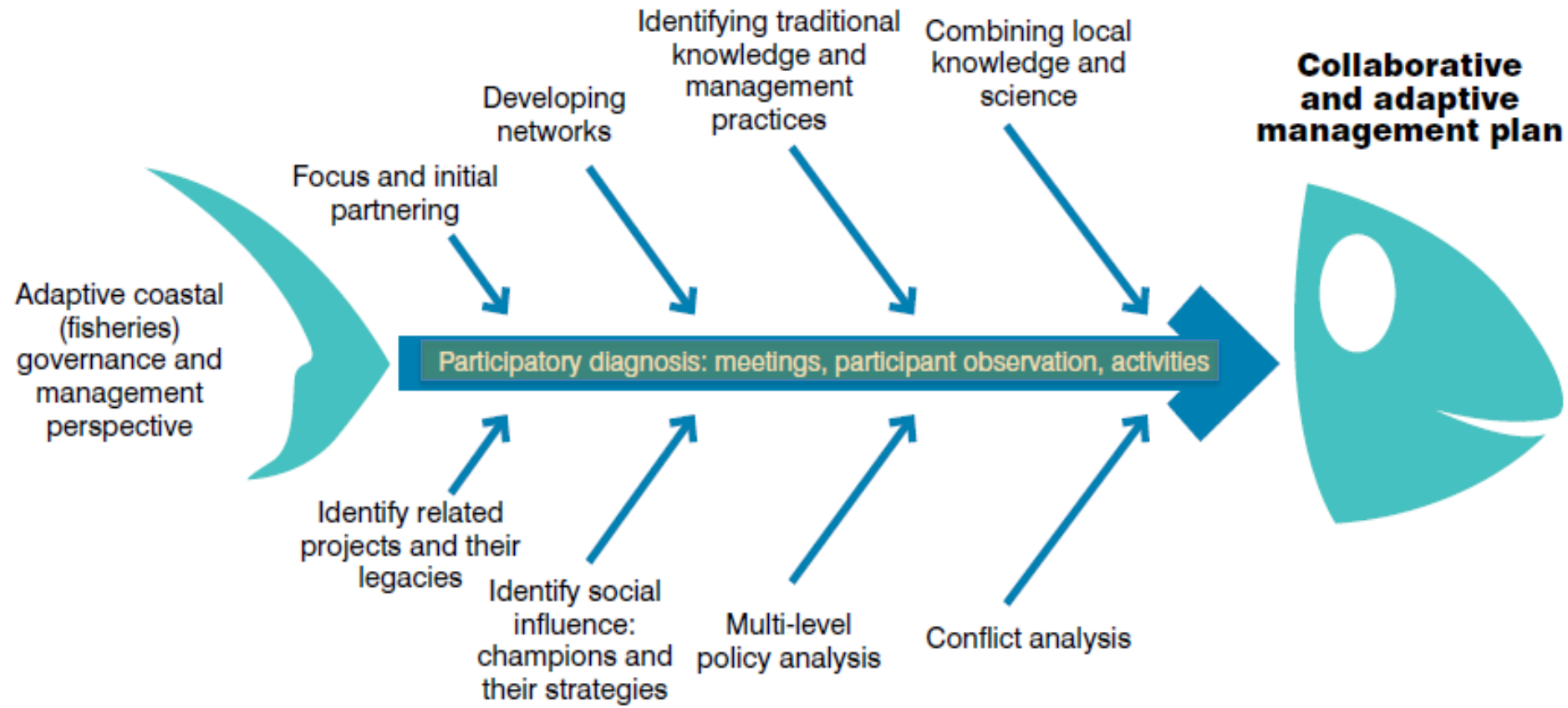
Develop and run the Ecosystem based Business Development workshop.

Purpose: Match national success cases with likely adopters of new opportunities and ecosystem solutions

Solutions

FishCollab toolkit components

Participatory Diagnostic Tool



Solutions

Marine resource management

1. Rebuilding reef fisheries toolkit
2. Reef vulnerability and projections
3. Mapping coastal protection
4. Policy brief: importance of seagrass

How much area to protect?

PLOS | BIOLOGY

RESEARCH ARTICLE

Marine Reserve Targets to Sustain and Rebuild Unregulated Fisheries

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1 Marine Spatial Ecology Lab and Australian Research Council Centre of Excellence for Coral Reef Studies, The University of Queensland, St Lucia Campus, Brisbane, Queensland, Australia, 2 School of Biological Sciences, The University of Queensland, St Lucia Campus, Brisbane, Queensland, Australia, 3 Oceans Program, World Wildlife Fund (WWF), Washington, D.C., United States of America, 4 Australian Research Council Centre of Excellence for Environmental Decisions, The University of Queensland, St Lucia Campus, Brisbane, Queensland, Australia, 5 School of BioSciences, The University of Melbourne, Melbourne, Victoria, Australia

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Abstract

Overfishing threatens the sustainability of coastal marine biodiversity, especially in tropical developing countries. To counter this problem, about 200 governments worldwide have committed to protecting 10%–20% of national coastal marine areas. However, associated impacts on fisheries productivity are unclear and could weaken the food security of hundreds of millions of people who depend on diverse and largely unregulated fishing activities. Here, we present a systematic theoretic analysis of the ability of reserves to rebuild fisheries under such complex conditions, and we identify maximum reserve coverages for biodiversity conservation that do not impair long-term fisheries productivity. Our analysis assumes that fishers have no viable alternative to fishing, such that total fishing effort remains constant (at best). We find that realistic reserve networks, which protect 10%–30% of fished habitats in 1–20 km wide reserves, should benefit the long-term productivity of almost any complex fishery. We discover a "rule of thumb" to safeguard against the long-term catch depletion of particular species: individual reserves should export 30% or more of locally produced larvae to adjacent fishing grounds. Specifically on coral reefs, where fishers tend to overexploit species whose dispersal distances as larvae exceed the home ranges of adults, decisions on the size of reserves needed to meet the 30% larval export rule are unlikely to compromise the protection of resident adults. Even achieving the modest Aichi Target 11 of 10% "effective protection" can then help rebuild depleted catch. However, strictly protecting 20%–30% of fished habitats is unlikely to diminish catch even if overfishing is not yet a problem while providing greater potential for biodiversity conservation and fishery rebuilding if overfishing is substantial. These findings are important because they suggest that doubling or tripling the only globally enforced marine reserve target will benefit biodiversity conservation and higher fisheries productivity where both are most urgently needed.

Citation: Krueck NC, Ahmadia GN, Possingham HP, Riginos C, Treml EA, Mumby PJ (2017) Marine Reserve Targets to Sustain and Rebuild Unregulated Fisheries. PLoS Biol 15(1): e2000537. doi:10.1371/journal.pbio.2000537

Received: July 11, 2016

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Published: January 5, 2017

Data Availability Statement: Averaged reserve coverage target results are contained in the Supporting Information (S2 Table). Raw results files are available from the Zenodo database (DOI: 10.5281/zenodo.166183).

Funding: Australian Research Council http://www.arc.gov.au/ (grant number LP120200345). This work was supported by an Australian Research Council Linkage Project co-funded by the World Wildlife Fund (WWF) Indonesia (awarded to RIM, EAT, HPP, and CR). The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. World BankGEF (Capturing Coral Reef & Related Ecosystem Services). This work was also

Even 10% core zone helps rebuild fisheries (UN Aichi target)

Size of reserves to be effective?

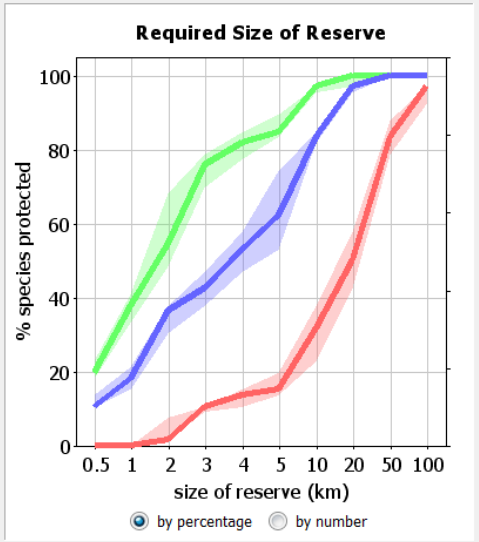
Downloadable & customisable software tool

MPA Size for Fish Protection

File Options Help

		Species	Mean Home Range (m)	Max Fish Body Length (cm)	Fish Density (per m²)	Reserve Size (95%) (km)
1	☑	Acanthurus blochii	1000	50	0.00267	23.9
2	☑	Acanthurus chirurgus	60	39	0.00354	8.6
3	☑	Acanthurus lineatus	5	38	0.00532	2.3
4	☑	Acanthurus nigrofuscus	5	21	0.0055	2.2
5	☑	Amblygobius phalaena	5	15	0.00187	5.6
6	☑	Aprion virescens	12000	112	0.00576	208.8
7	☑	Bolbometopon muricatum	2500	130	0.00332	53.2
8	☑	Caranx ignobilis	3950	170	0.0037	79.2
9	☑	Caranx melampygus	3275	129	0.00367	67.3
10	☑	Caranx sexfasciatus	376	120	0.01089	10.2
51	☑	Carcharhinus amblyrhynchos	4275	255	0.0002	84.9
52	☑	Carcharhinus melanopterus	1100	200	0.003	26.0
11	☑	Cephalopholis cruentata	64	43	0.00043	28.6
12	☑	Cephalopholis cyanostigma	50	40	0.00281	9.2
25	☑	Cephalopholis fulva	100	41	0.00057	26.5
13	☑	Chaetodon auriga	394	23	0.00328	10.6
14	☑	Chaetodon kleinii	2	15	0.0037	2.2
54	☑	Chaetodon multicinctus	15	12	0.016	1.7
17	☑	Chaetodon ornatissimus	12	20	0.00388	4.3

Add species | Remove species | Include all | Exclude all

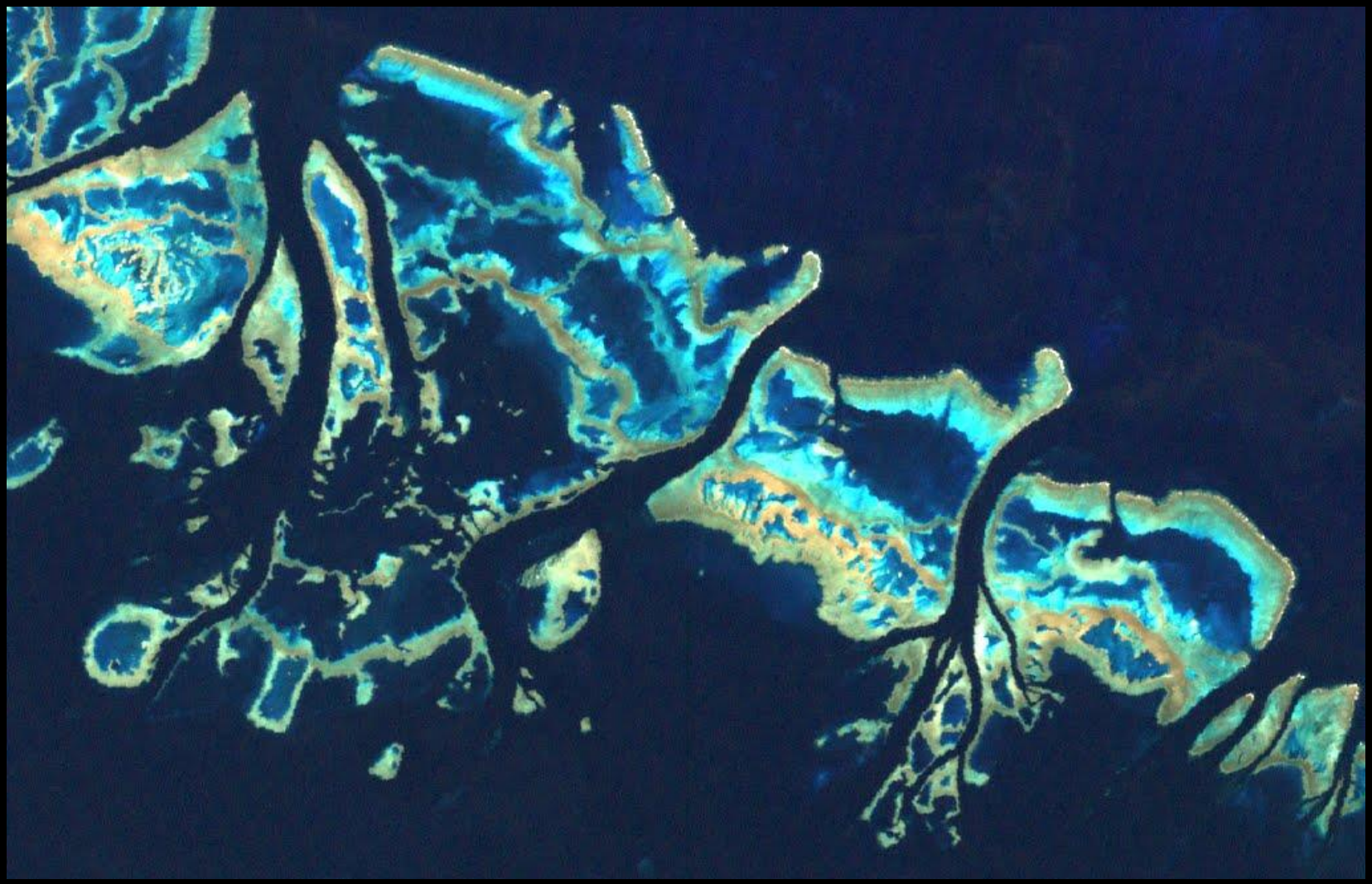


Select lines to plot

- ☑ 50% Protection — ☑ Show C.I.
- ☑ 75% Protection — ☑ Show C.I.
- ☑ 95% Protection — ☑ Show C.I.

Process

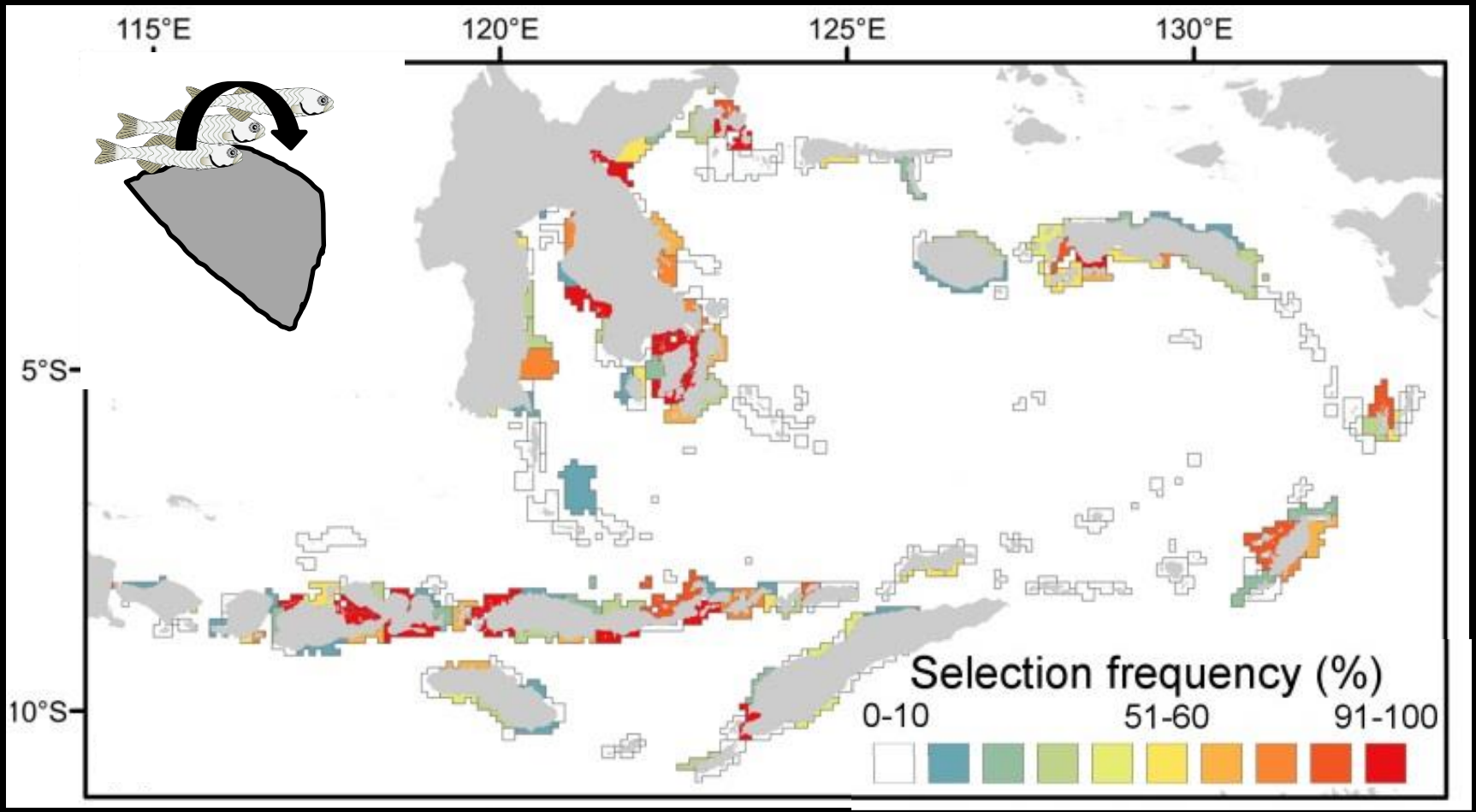
Where to protect?



Krueck NC, Ahmadia GN, Green A, Jones GP, Possingham HP, Riginos C, Treml EA, **Mumby PJ** (2017) Incorporating larval dispersal into MPA design for both conservation and fisheries. **Ecological Applications** 27: 925-941

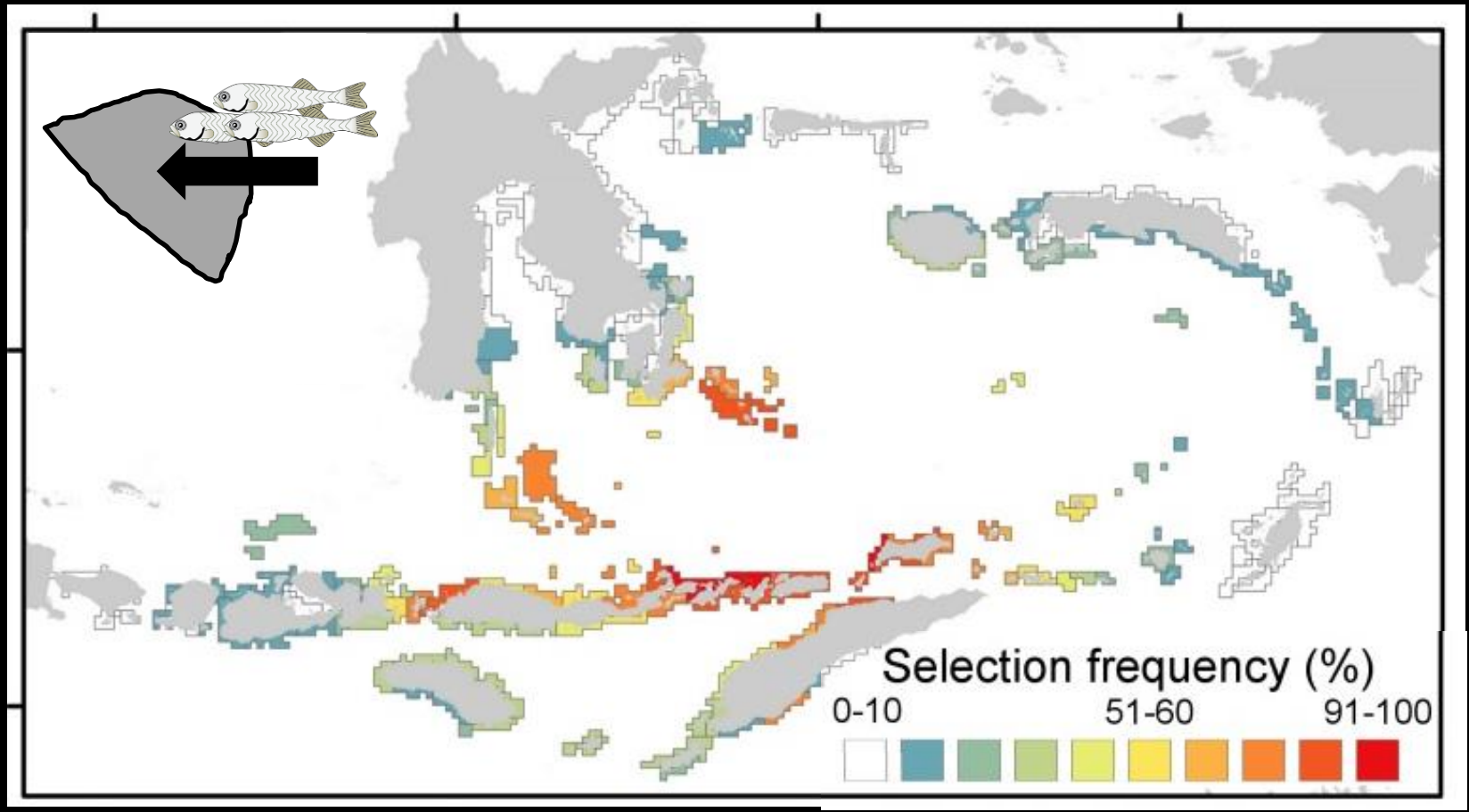
Using dispersal data for MPA design

Retention: Larvae stay at home



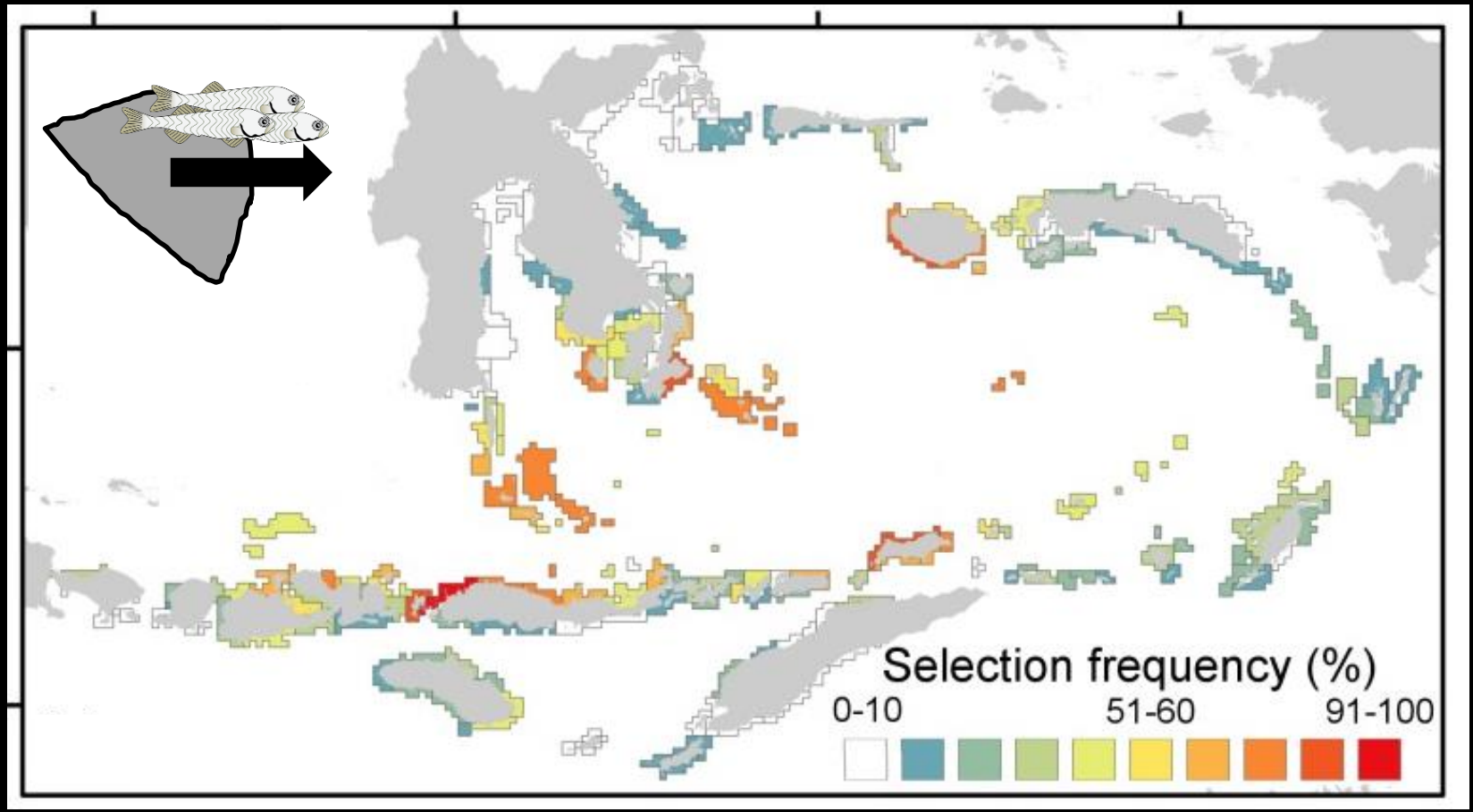
Using dispersal data for MPA design

Import: Larvae arrive from other locations

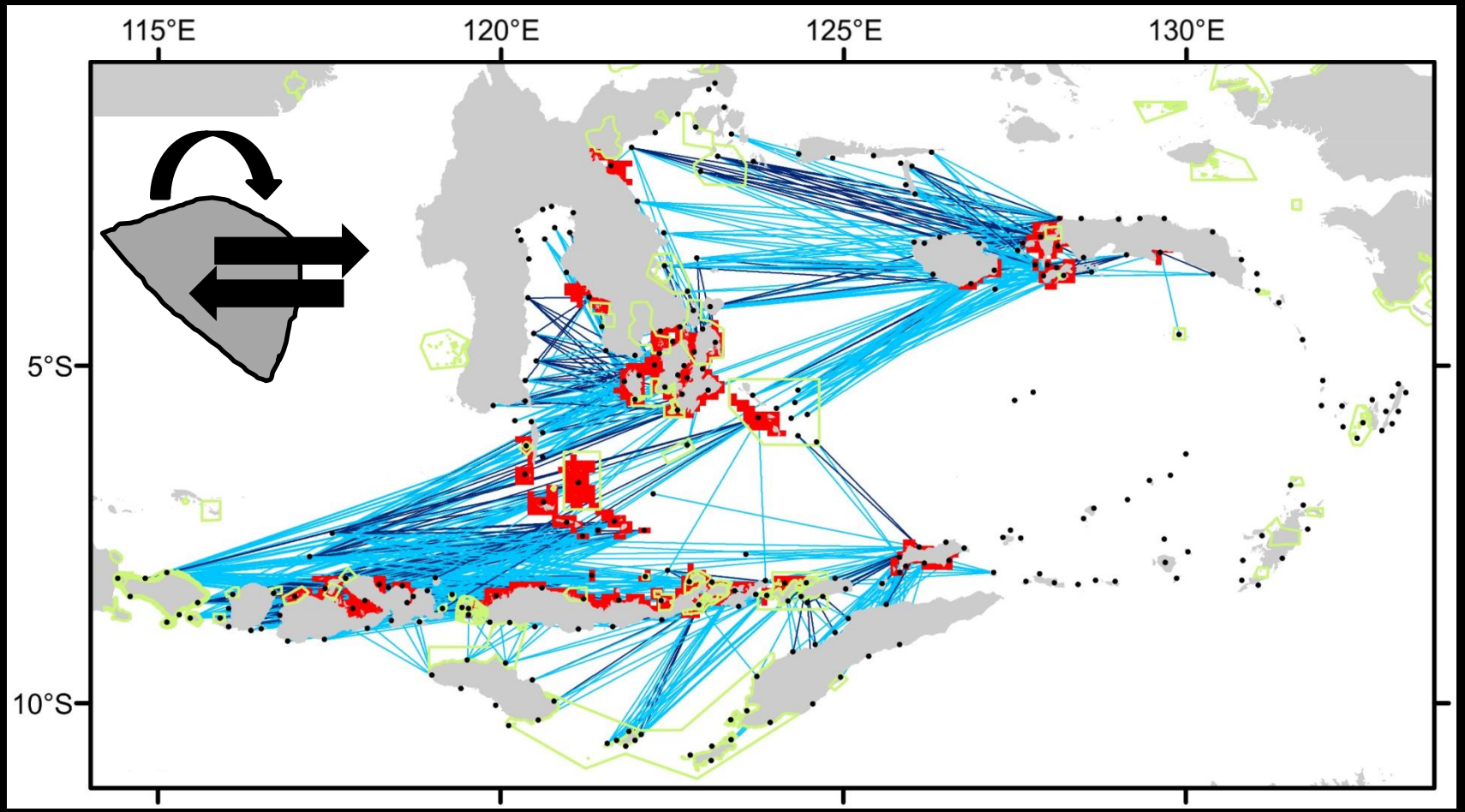


Using dispersal data for MPA design

Export: Larvae leave to other locations



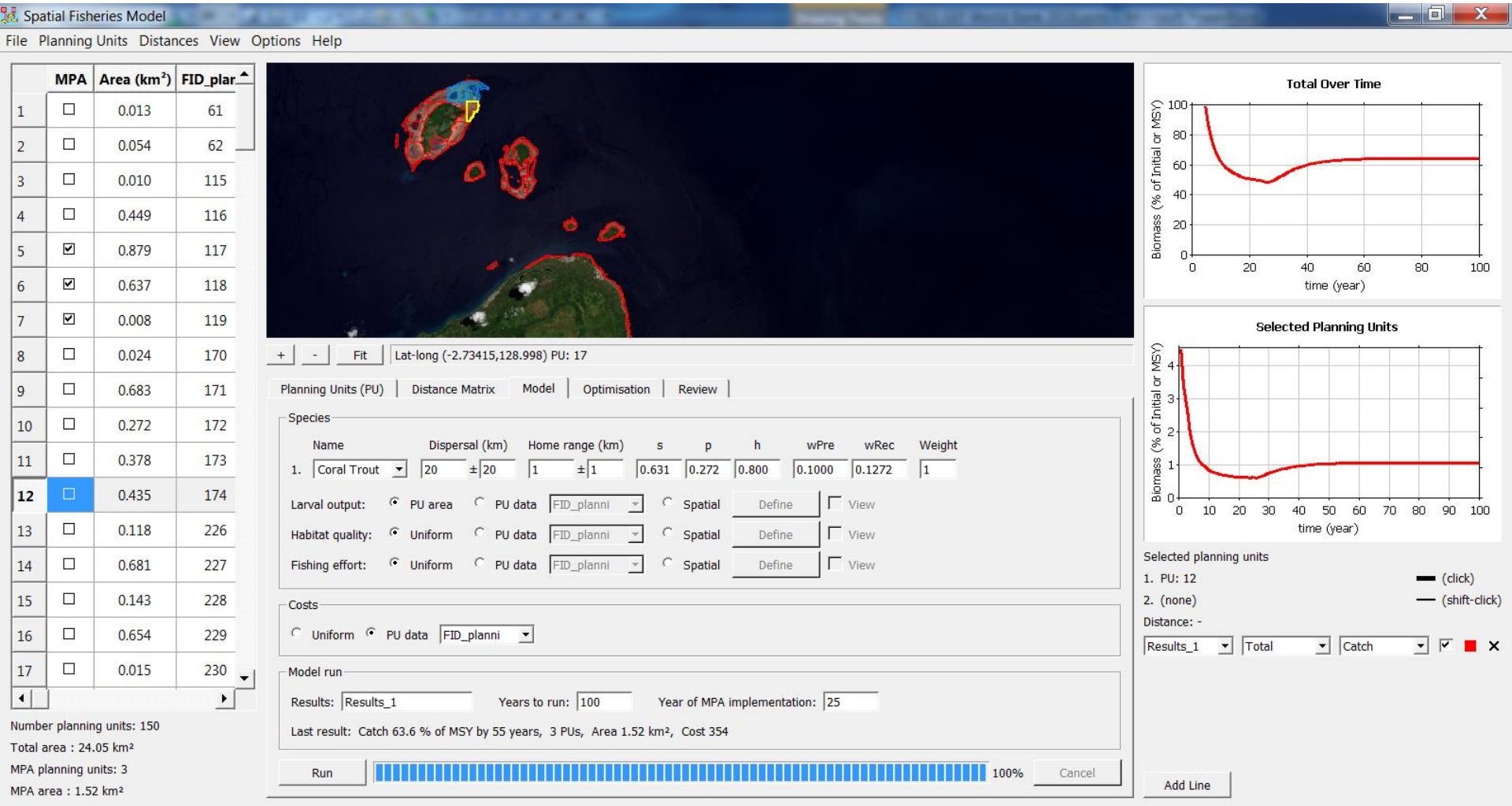
Best MPA network design for Sunda Banda



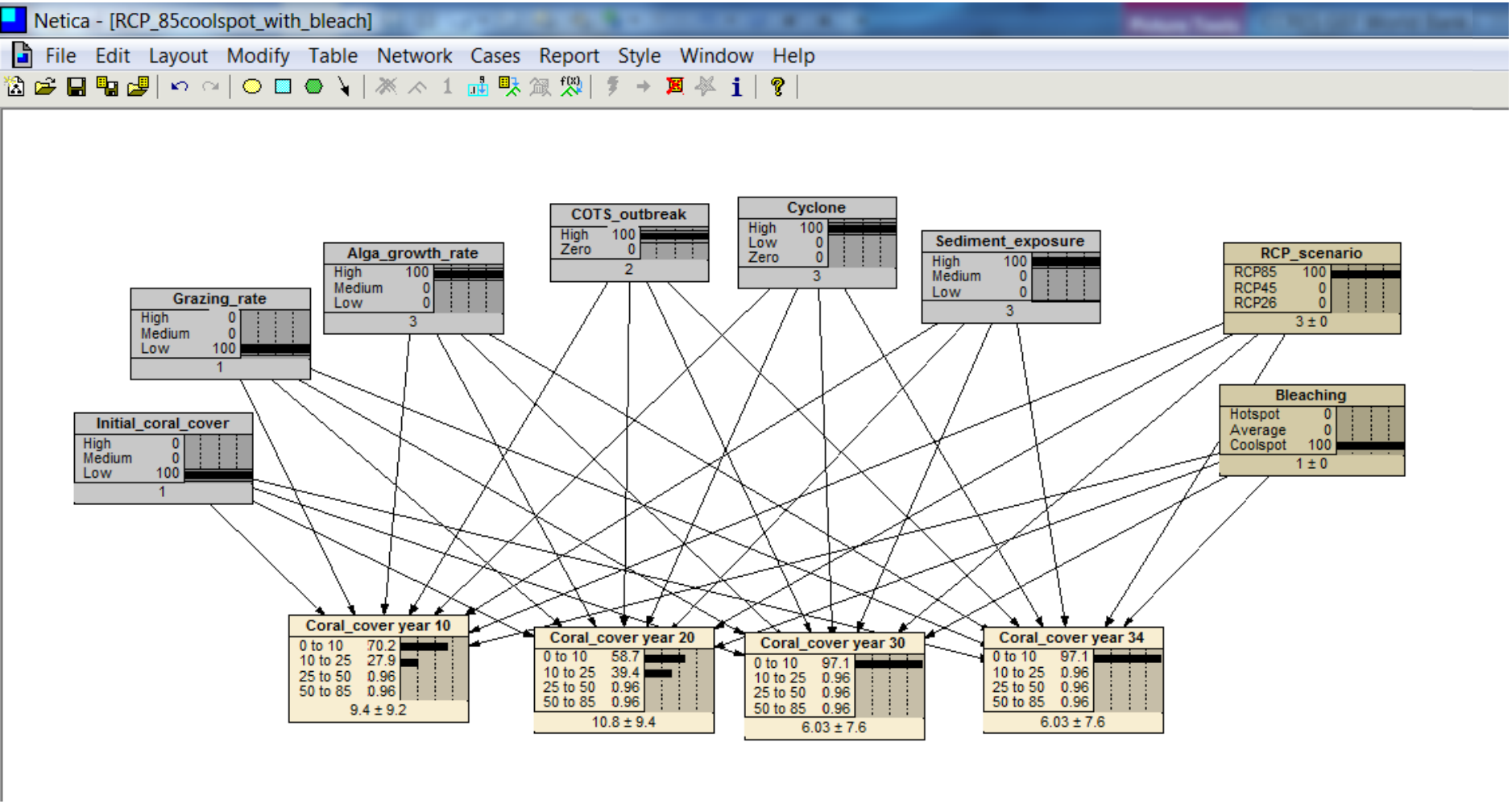
Reserve design tool to rebuild fisheries

- Requires: GIS (free), Marxan (free), 3 days training or self-teach
- Utilised by WWF-Indonesia to plan reserve networks in 17 regions
- COREMAP-CTI
- Trained 90+ users so far (another 90 to go)

Training software in reserve design



Reef React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10 to 25 27.9
25 to 50 0.96
50 to 85 0.96
9.4 ± 9.2
Coral_cover year 20
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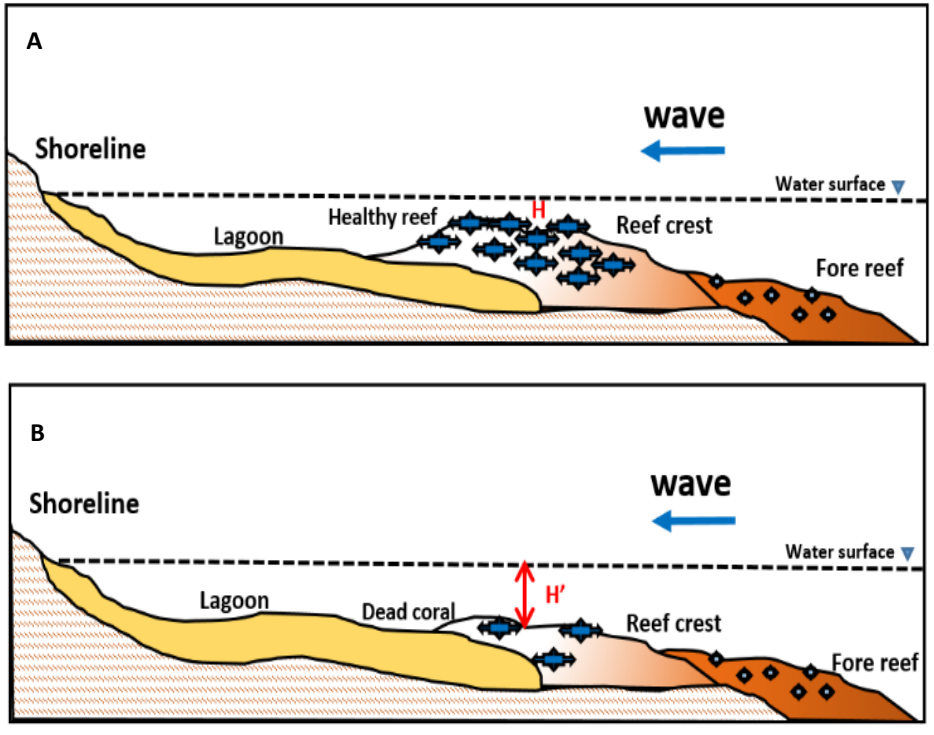
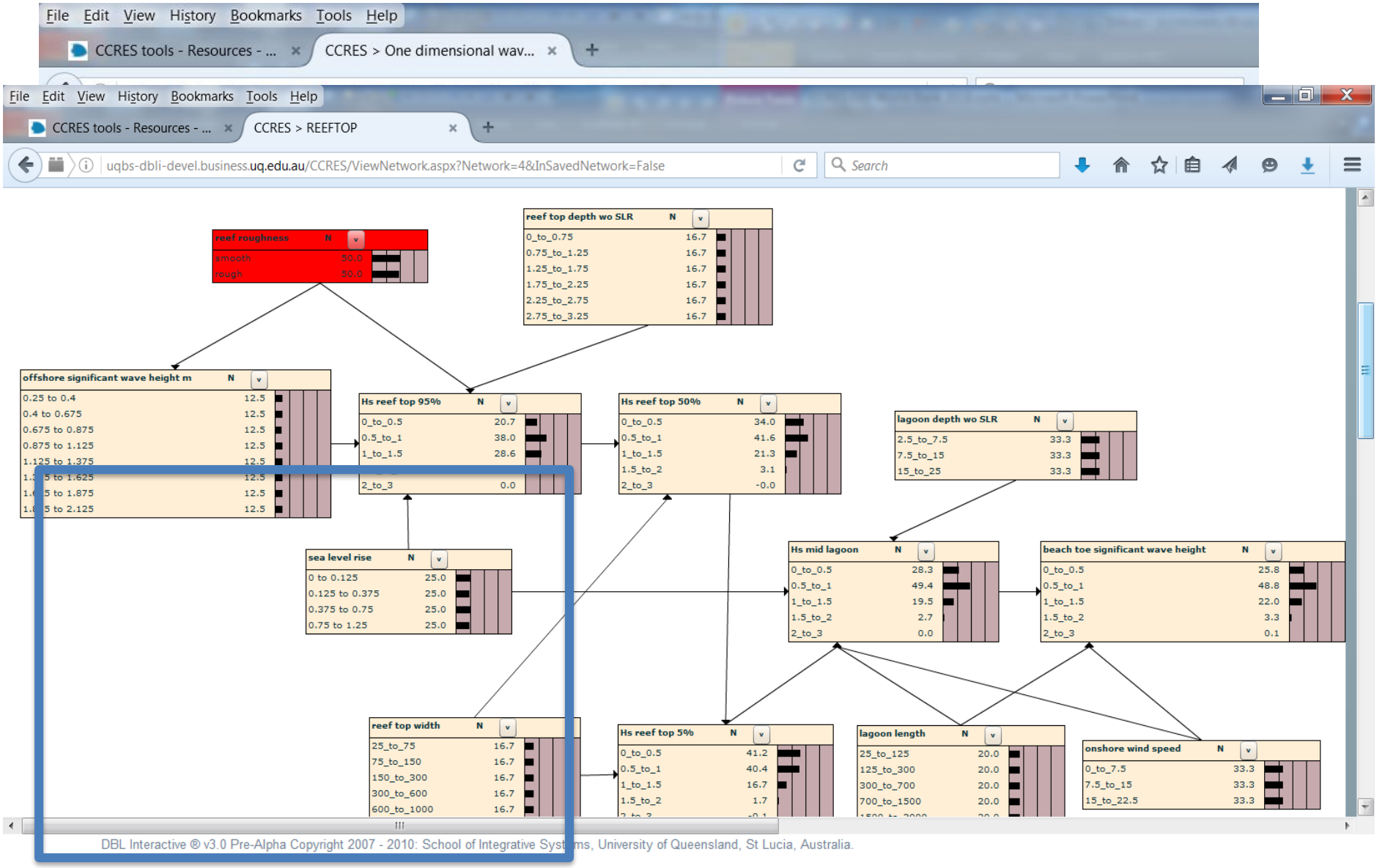
10 to 25 39.4
25 to 50 0.96
50 to 85 0.96
10.8 ± 9.4
Coral_cover year 30
0 to 10 97.1
10 to 25 0.96
25 to 50 0.96
50 to 85 0.96
6.03 ± 7.6
Coral_cover year 34
0 to 10 97.1
10 to 25 0.96
25 to 50 0.96
50 to 85 0.96
6.03 ± 7.6

Mapping key protective reefs

Protection of coastal infrastructure

Tools to factor in the importance of reefs in protecting the shoreline especially under sea level rise

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1.625 to 1.875 12.5
1.875 to 2.125 12.5
Hs reef top 95% N
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Hs reef top 50% N
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2_to_3 -0.0
lagoon depth wo SLR N
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15_to_25 33.3
sea level rise N
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Hs mid lagoon N
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2_to_3 0.1
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75_to_150 16.7
150_to_300 16.7
300_to_600 16.7
600_to_1000 16.7
Hs reef top 5% N
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1.5_to_2 1.7
lagoon length N
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7.5_to_15 33.3
15_to_22.5 33.3
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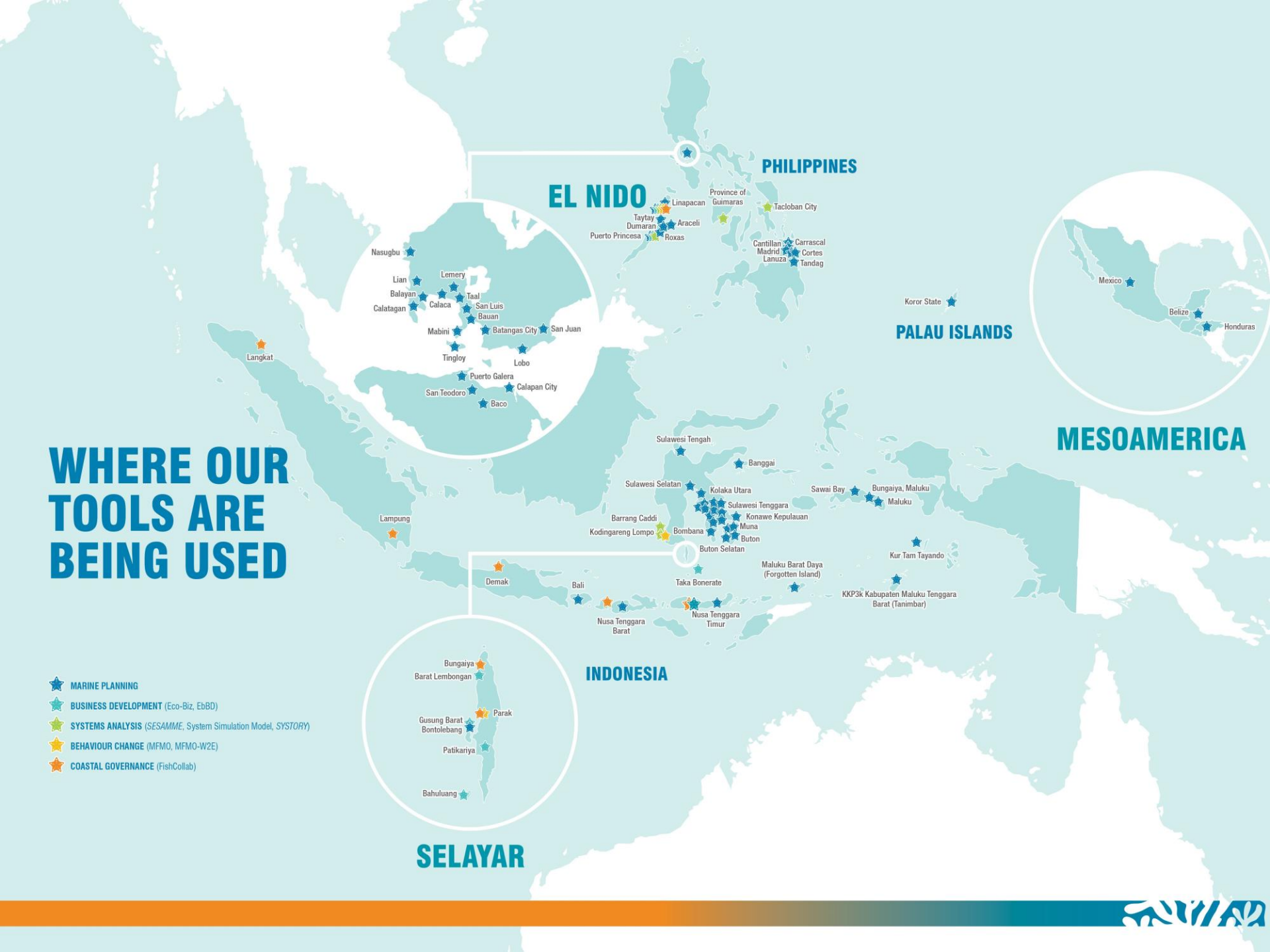
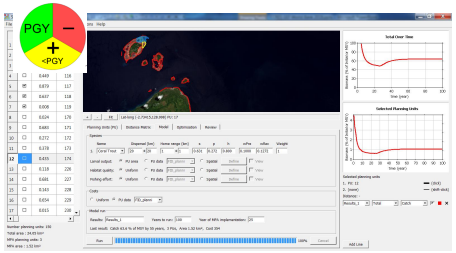
Solutions

My Future, My Ocean

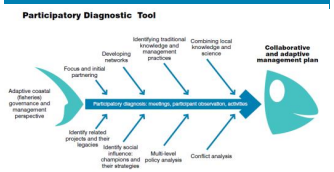

WHERE OUR TOOLS ARE BEING USED
MARINE PLANNING
BUSINESS DEVELOPMENT (Eco-Biz, EbBD)
SYSTEMS ANALYSIS (SESAMME, System Simulation Model, SYSTORY)
BEHAVIOUR CHANGE (MFMO, MFMO-W2E)
COASTAL GOVERNANCE (FishCollab)
PHILIPPINES
EL NIDO
Linapacan
Province of Guimaras
Tacloban City
Taytay
Dumaran
Araceli
Puerto Princesa
Roxas
Cantillan
Carrascal
Madrid
Cortes
Lanuza
Tandag
Nasugbu
Lian
Lemery
Balayan
Calaca
Taal
Calatagan
San Luis
Bauan
Mabini
Batangas City
San Juan
Tingloy
Lobo
Puerto Galera
San Teodoro
Calapan City
Baco
Langkat
PALAU ISLANDS
Koror State
MESOAMERICA
Mexico
Belize
Honduras
Sulawesi Tengah
Banggai
Sulawesi Selatan
Kolaka Utara
Sawai Bay
Bungaiya, Maluku
Maluku
Sulawesi Tenggara
Konawe Kepulauan
Barrang Caddi
Kodingareng Lompo
Bombana
Muna
Buton
Buton Selatan
Lampung
Kur Tam Tayando
Maluku Barat Daya (Forgotten Island)
Demak
Taka Bonerate
Bali
KKP3k Kabupaten Maluku Tenggara Barat (Tanimbar)
Nusa Tenggara Barat
Nusa Tenggara Timur
INDONESIA
Bungaiya
Barat Lembongan
Parak
Gusung Barat
Bontolebang
Patikariya
Bahuluang
SELAYAR

Systems dynamic decision making

Rebuilding reef fisheries with core zones toolbox

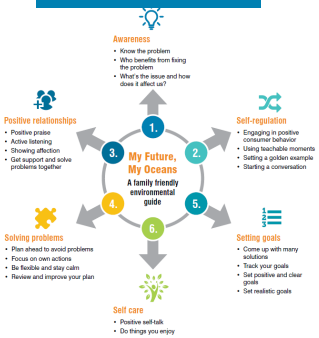


FishCollab



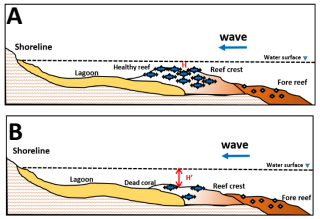
Eco-Biz Challenge

My Future, My Oceans



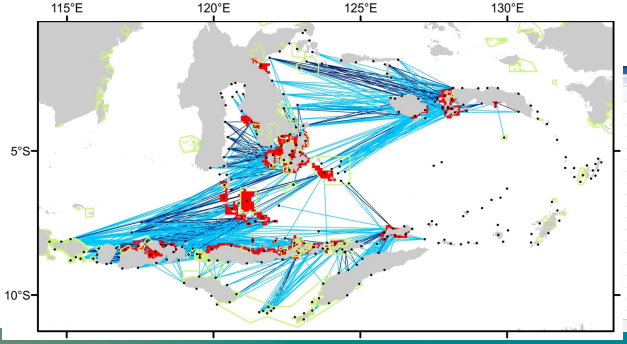
Eco-based Business Development

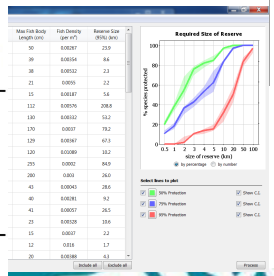
Coastal protection

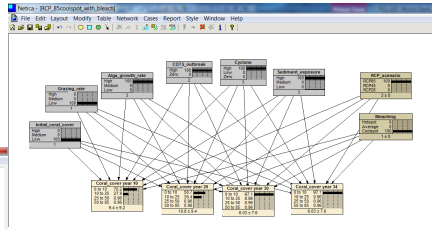


Reef React

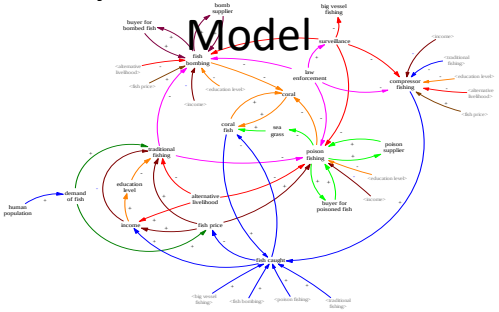
Dynamic larval dispersal







System Simulation Model

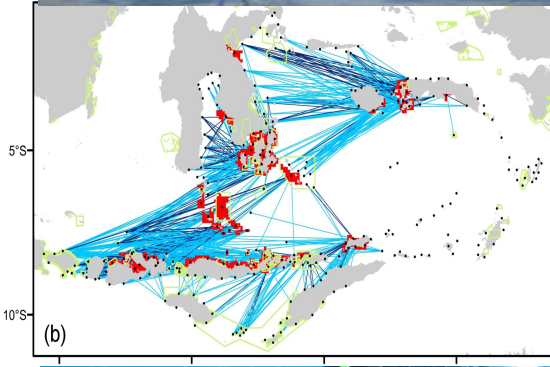


Speed dating

Group 1: Marine planning

Prof. **Carlie Dario** and **Vera Horigue**, University of Philippines Marine Science Institute (UPMSI)

Tools: Marine reserve guidelines toolbox



Speed dating

Group 2: System Analysis

Benjamin Adriano, Jr., (PCSD), and **Gianina Decano,** Palawan State University (PSU)

Tools: SESAMME, SYSTORY

Speed dating

Group 3: Business Development

Damian Hine, UQ, and **Eva Marie Ponce de Leon,** PSU

Tools: Ecosystem-based Business Development (EbBD), Eco-Biz Challenge

Speed dating

Group 4: Behaviour change

Dedi Adhuri, Indonesian Institute of Sciences (LIPI)

Erik Simmons, The University of Queensland (UQ)

Tools: My Future, My Oceans. FishCollab

FishCollab

Integration

Parak village, Indonesia

- MPA toolbox
- FishCollab
- My Future, My Oceans
- EbBD-Waste2Enterprise

CCRES

CAPTURING CORAL REEF AND RELATED ECOSYSTEM SERVICES PROJECT

gef

WORLD BANK GROUP

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

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EAS CONGRESS 2018

THE EAST ASIAN SEAS CONGRESS