

The Resilient Reefs Initiative

December 2019



Objectives for Today

- 1) Introduce the Resilient Reefs Initiative
 - 1) How it came to be
 - 2) How it partners with reef sites
 - 3) How it contributes to RBM
 - 4) Early learnings and challenges
- 2) Hear from Ningaloo Coast—one of the Resilient Reefs' sites—on their work to-date

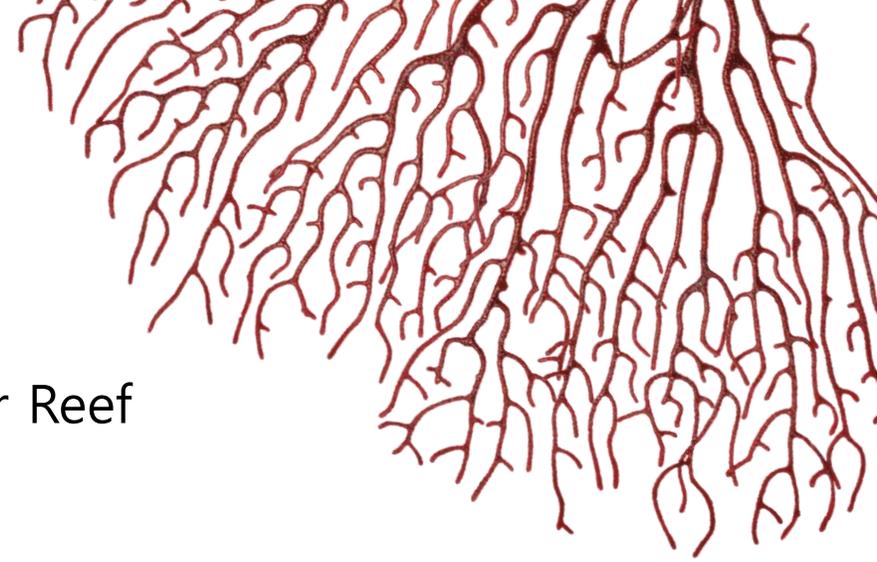
“All World Heritage Marine sites urgently require a comprehensive and sustained program of action aimed at building resilience to give them their best chance to survive in the long-term.”

The Future of the World Heritage Convention for Marine Conservation,
UNESCO World Heritage Marine Centre, September 2016.



The Resilient Reefs Initiative

- Funded by the BHP Foundation and led by the Great Barrier Reef Foundation
- Piloting in 5 World Heritage sites
- Builds reef resilience holistically: looking at the resilience of vital coral reef ecosystems *and* the communities that depend on them
- An intensive capacity building program that leverages local resources and knowledge and draws from global best practices
- Supports communities to take action: developing innovative solutions to protect reefs and their communities against unprecedented pressures and uncertain change



Reef Resilience

The Resilient Reefs initiative defines **reef resilience** as the capacity of reef ecosystems and the individuals, businesses and communities that depend upon them to survive, adapt and recover from the stresses and shocks that they experience.

Image credits: Moore Reef, GBRF; Cebu, [M King for CCRES](#), Bay of Grenville, [TNC](#)



Where We Work



Resilient Reefs

Program Support to Sites



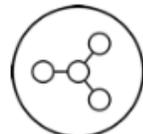
Support in the creation and funding of a new Chief Resilience Office (CRO) position



Support for the development of a holistic Resilience Strategy



Capacity building for local reef managers and stakeholders



Connection to a global Knowledge Network including reef sites and world experts



Initial funding to implement Resilience Actions identified in the Resilience Strategy



The Resilience Strategy

The Resilience Strategy is an evidence-based and community-driven process that identifies actions that will help the reef and community adapt to a changing climate and local stressors.

While each site's Resilience Strategy will look different, they will all share a set of common principles:

- Reflect **holistic** reef resilience for the site's unique context, inclusive of community, governance and the coral reef ecosystem
- Draw on broad, diverse and representative **stakeholder and traditional owner** engagement
- Provide an **accessible** platform for reef resilience advocacy and education by community and stakeholders
- Demonstrate **commitment** from reef management leadership and relevant stakeholders
- Include a clear **implementation** plan for priority resilience actions



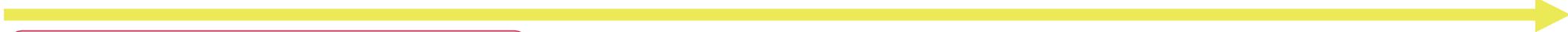
Responding to the Field: Advancing RBM

- “A new priority for reef management, and key component of RBM, is the implementation of strategies to build social adaptive capacity.” – McCleod et al, 2019
- Forthcoming research (TNC, 2020) highlights that the barriers to using resilience assessments to influence management decisions include:
 - › Lack of political or community will
 - › Lack of a management framework
 - › Poor stakeholder engagement
 - › Ineffective communication of results

The Strategy Development Process

Appointment of a
Chief Resilience
Officer

Strategy launch



Plan the process and establish local governance
- Align to site leadership and establish Steering Committee. Look to integrate and institutionalise resilience planning.

Engage broadly - ground the strategy in the lived experience of stakeholders and respond to stakeholder needs.

Assess resilience – Review best available science and research, identifying interdependencies between the reef ecosystem, community and governance to assess the current state of site resilience.

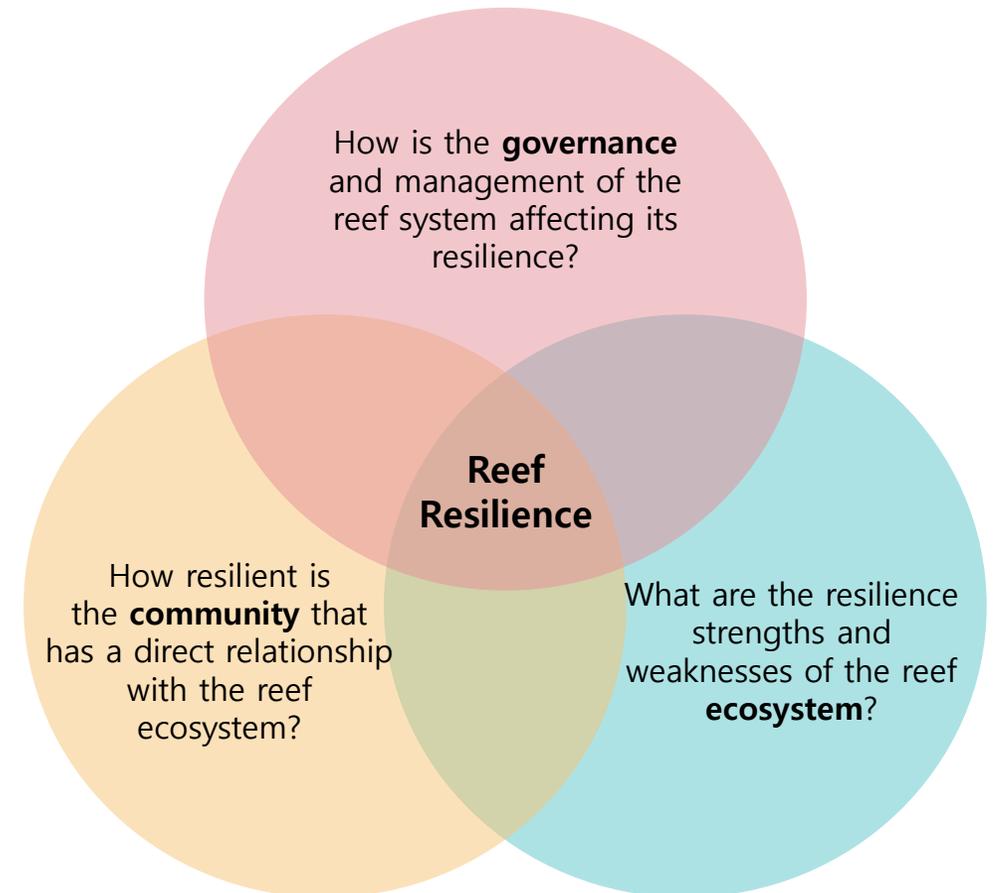
Prioritise resilience challenges – Develop problem statements with input from stakeholders to describe the resilience challenges facing the site.

Develop actions - to directly respond to resilience challenges. Initiate project design, funding and action implementation planning.

Develop the strategy – develop a vision for the future of the reef system, translating the resilience challenges into goals, supported by actions to drive resilience outcomes.

Reef-Community Resilience Assessment

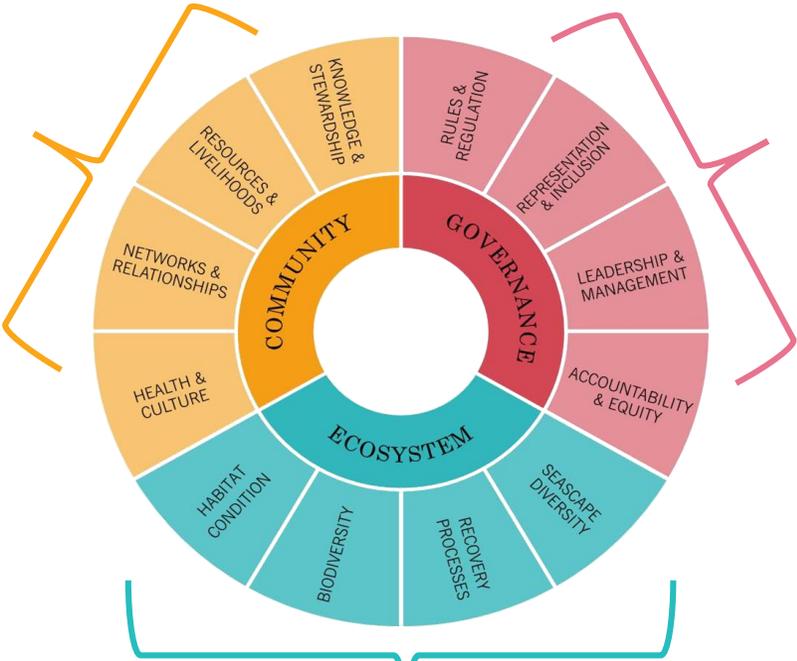
A holistic assessment of the reef site, including its key assets and challenges, primary shocks, stresses and their interdependencies, and how they might effect the reef and reef community over time.



Reef & Community Resilience Assessment Tool (sample inputs)

Demographic, economic and cultural profile and trends

Traditional Owners' perspectives



Reef management plans and actions

Political and regulatory profile and trends

Site-specific economic assessment of a reef system

Site-specific climate risk assessments

Coral reef ecosystem health / resilience assessments

Reef monitoring and assessments

Reef & Community Resilience Assessment Tool (sample outputs)

Status of reef resilience <i>Example outputs only</i>		
Dimension	Attribute	Status
Ecosystem	Habitat condition	Poor
	Biodiversity	Threatened
	Recovery processes	Average
	Seascape diversity	Good
Community	Knowledge & stewardship	Good
	Resources & livelihoods	Threatened
	Networks & relationships	Poor
	Health & culture	Average
Governance	Rules & regulation	Threatened
	Representation & inclusion	Average
	Leadership & management	Poor
	Accountability & equity	Good

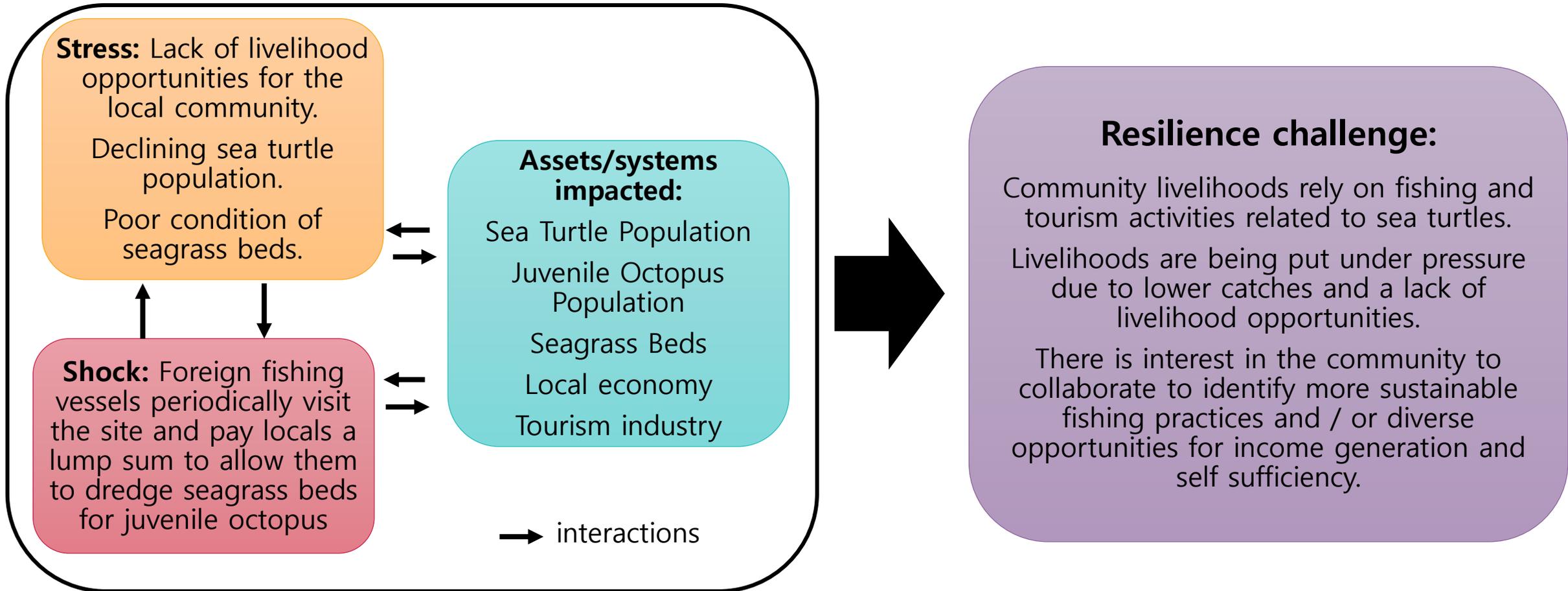
Key management plans or programs supporting reef resilience
Example outputs only

- Management Plan
- Coastal Hazards Adaptation Plan
- Fisheries Management Plan
- Beach Clean Up Program
- Traditional Owners Advisory Group

Gaps
Example outputs only

- No local micro financing available to support local fishers to
- Reef management plan actions include conservation actions only
- Traditional Owners Group has no influence in strategic land

Identifying Where to Focus



Taking Action

Each site will identify and design a **unique set of solutions** based on their threats and opportunities.

In many cases, these solutions will require **coordination and new kinds of partnerships** with agencies and community groups; they will not be implemented solely by the reef management authority.

The Resilient Reefs initiative has an **Implementation Fund (AUD \$5 million)** to help sites implement actions in their strategy.



Resilient Reefs

Early Challenges

- Partnering with sites to take on issues outside their jurisdictional authority and partner with new organizations
- Identifying and accessing the right (and right amount of) data for resilience assessments
- Building on existing planning processes in a way that adds value and doesn't replicate
- Getting through the process in 9 months
- Ensuring this process is embedded into management decisions, not seen as a one off



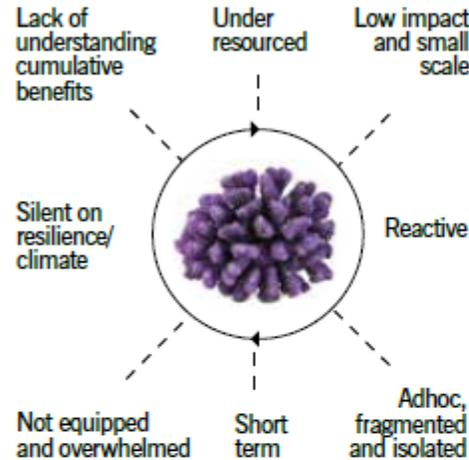
Resilient Reefs

The Impact We Seek



Resilient Reefs

Barriers to managing for resilience



Current state

Shocks and stresses compromise the ability of reefs and their associated communities to thrive;

Change at 3 levels

Reef managers



Reef community



Global knowledge network



Change pathways

- 1) Build capacity of reef managers to be agents of change and institutionalize resilience planning.
- 2) Empower and equip local communities to take action.
- 3) Implement solutions that have a measurable impact on reefs and reef communities.
- 4) Foster global network of reef resilience leaders and inspire others to build reef resilience.

Reefs and reef communities that will survive, adapt and thrive

Shared responsibilities

Robust and replicable model

Strong community buy in

Community of practice

Empower communities

Build capacity of reef management

Catalyse global movement for resilient reefs and reef communities

Intended future

World's most enigmatic coral reefs are managed to maintain biodiversity, ecosystem function and social value to associated communities in the long term and inspire similar approaches across coral reefs globally;

Resilient Reefs Update: Ningaloo



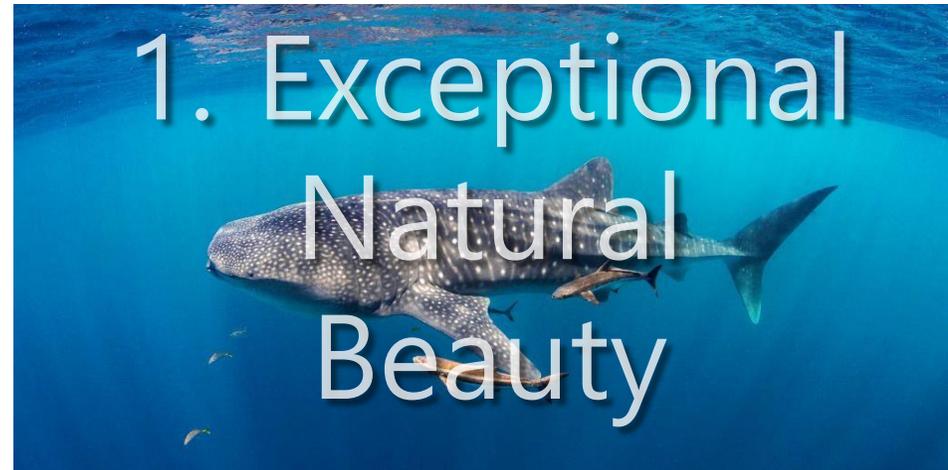
Ningaloo Coast World Heritage Area

- **Marine** component:
 - One of the longest near-shore reefs in the world (almost 300km)
 - Annual whaleshark aggregation and humpback resting grounds
 - Unusual diversity of marine turtles
- **Terrestrial** component:
 - Network of underground caves and water courses

OUTSTANDING UNIVERSAL VALUES:



1. Exceptional Natural Beauty

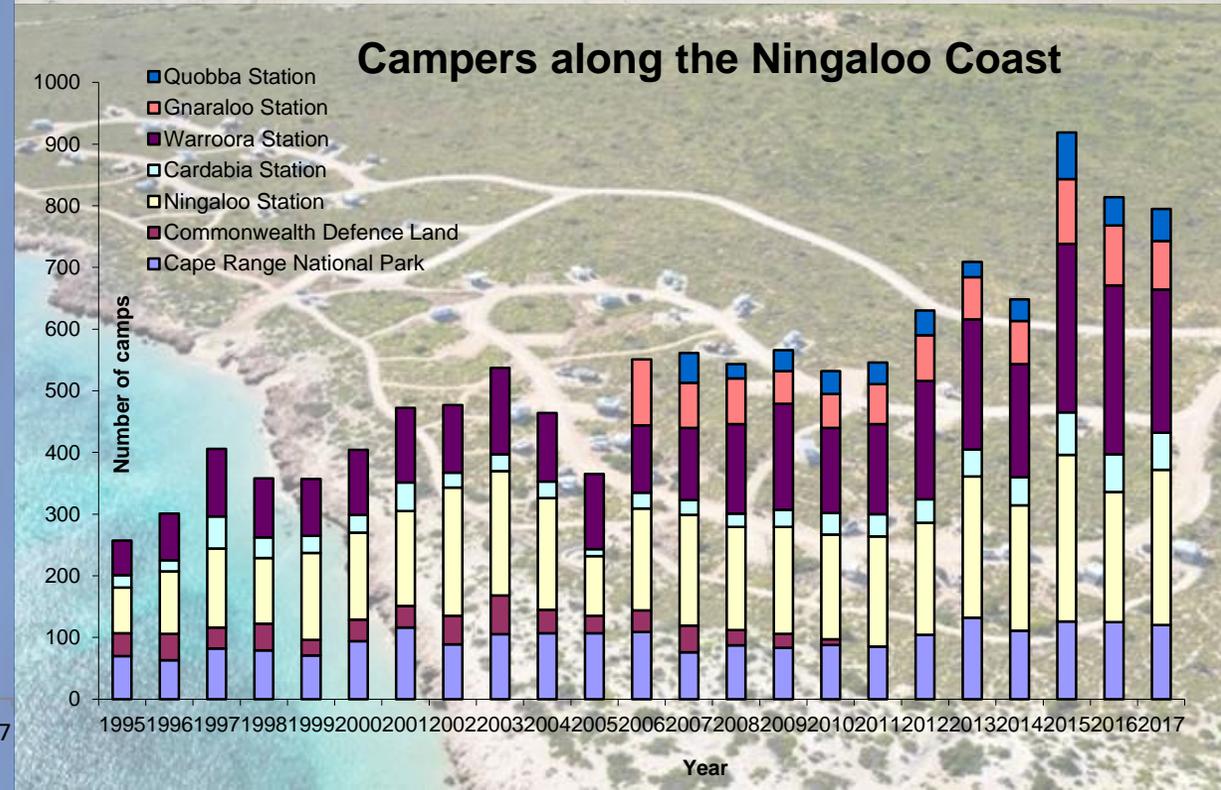
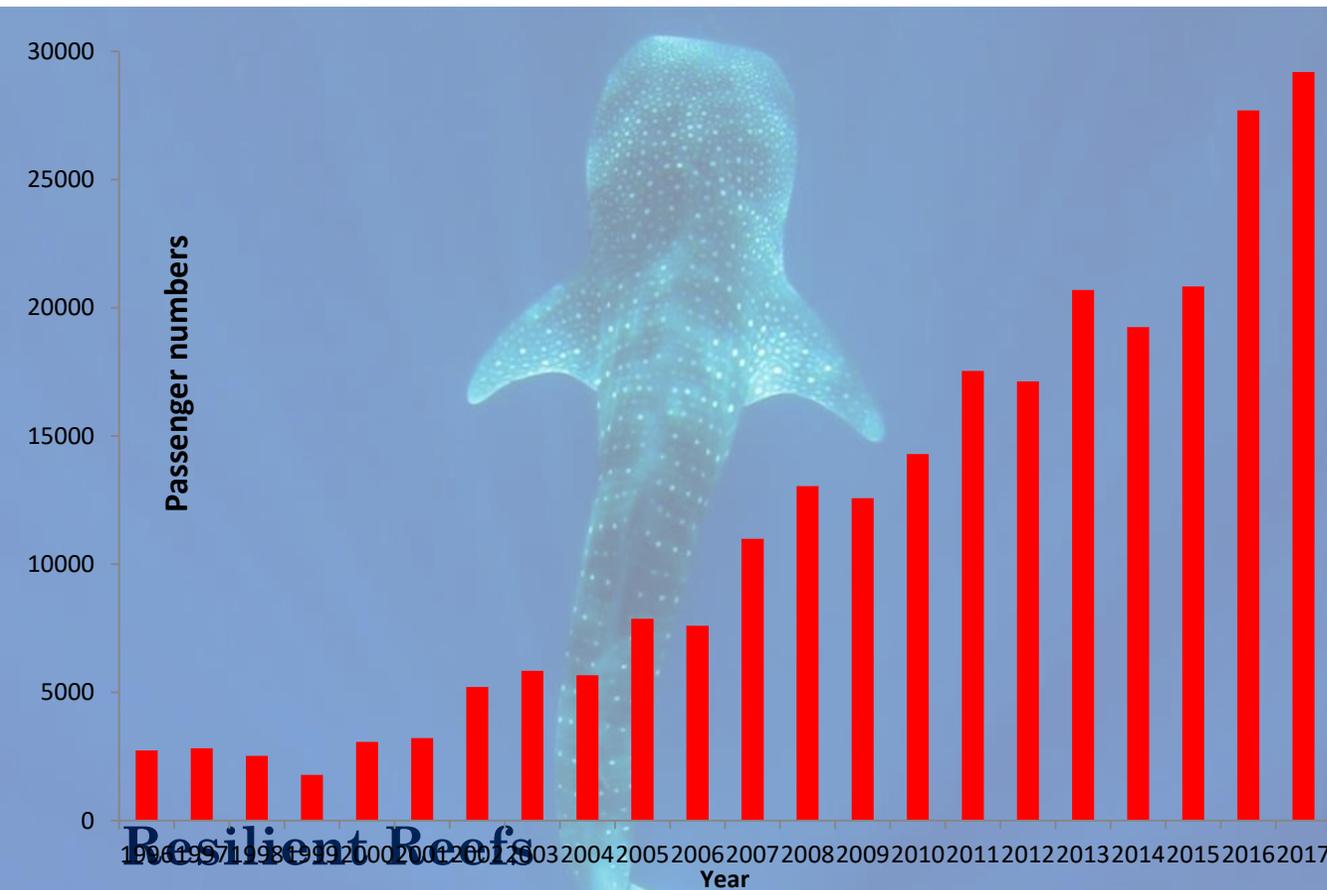
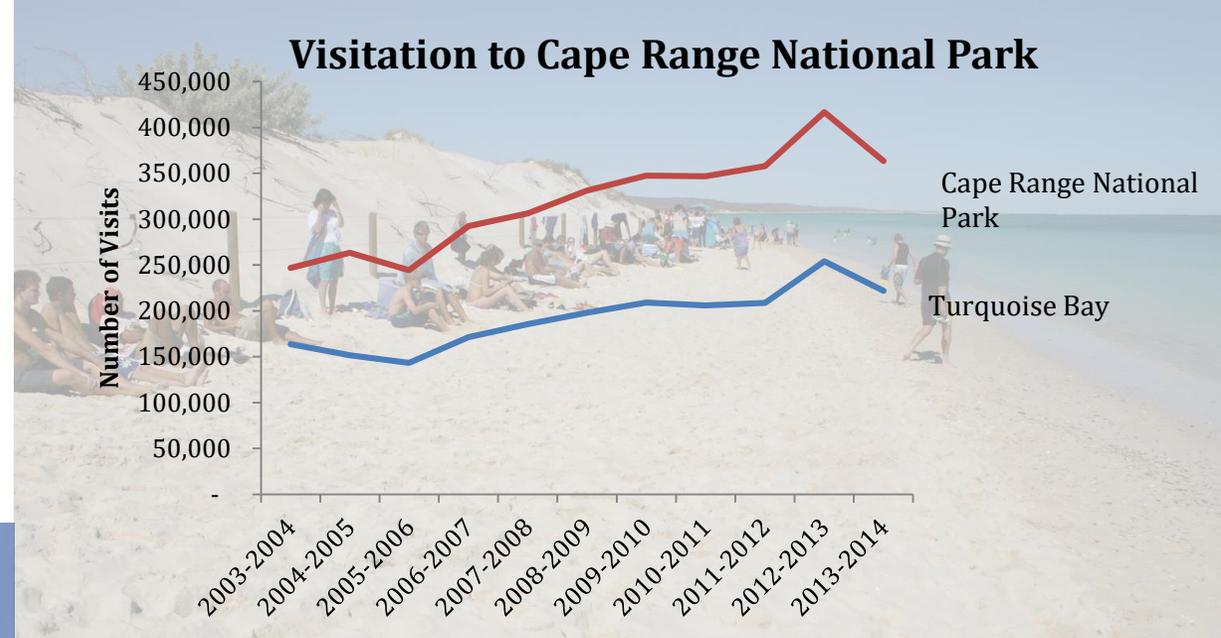


2. Unique Biodiversity





Managing visitation is a key management challenge...







9:08 4G 9:10 4G 8:57 4G

Instagram Posts

View 1 comment

Australia



Liked by [redacted] and others

nothing better then floating around in the big blue and a big shadow sneaks up on you well, that's if it's a mummy whale and her baby

View all 335 comments

26 July

Liked by [redacted] and others

There's nothing more humbling than a 40 tonne + humpback whale swimming past you and with in a second they... more

View all 31 comments

7 August

Exmouth, Western Australia

Instagram navigation icons: Home, Search, Post, Heart, Profile





Impacts of Climate Change on World Heritage Coral Reefs:

Update to the First Global Scientific Assessment



Table 1. Onset of recurrent severe bleaching heat stress events under Representative Concentration Pathways (RCP) 8.5, 4.5 and 2.6. Event frequencies are twice-per-decade and annual.

Color categories: ≤ 2025 (dark red), > 2025 to ≤ 2040 (red), > 2040 to ≤ 2055 (orange), > 2055 to ≤ 2099 (yellow), not projected to occur by 2100 (green).

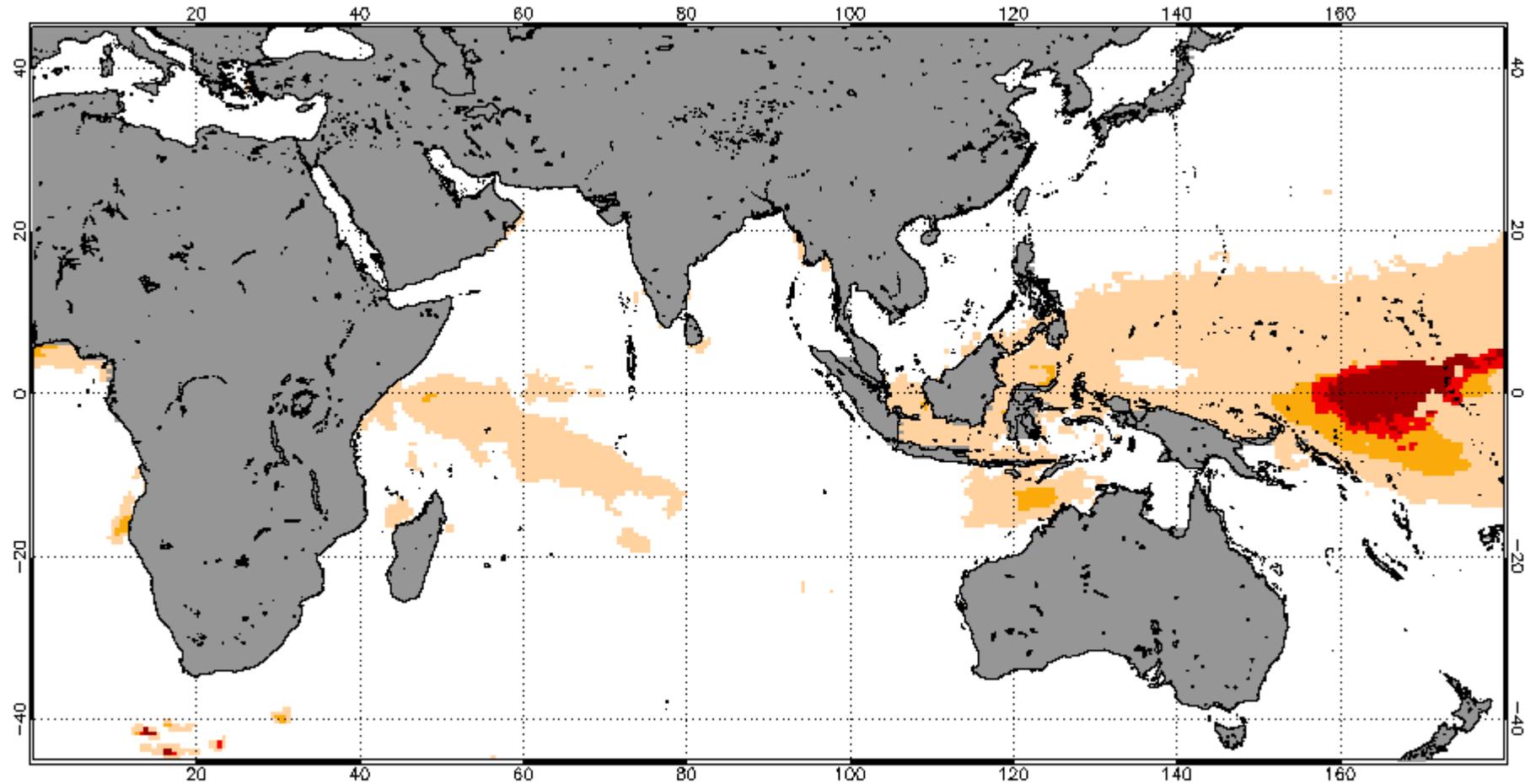
Reef-containing World Heritage site	Future Severe Stress - RCP8.5		Future Severe Stress - RCP4.5		Future Severe Stress - RCP2.6	
	(a) Projected Year of 2x/decade	(b) Projected Year of Annual	(c) Projected Year of 2x/decade	(d) Projected Year of Annual	(e) Projected Year of 2x/decade	(f) Projected Year of Annual
Great Barrier Reef	2035	2044	2041	2051	---	---
Lord Howe Island Group	2024	2043	2026	2055	---	---
Ningaloo Coast	2041	2049	2052	2074	---	---
Shark Bay, Western Australia	2038	2047	2045	2074	---	---
Belize Barrier Reef Reserve System	2028	2036	2036	2044	---	---
Brazilian Atlantic Islands	2028	2039	2035	2049	---	---
Malpelo Fauna and Flora Sanctuary	2038	2050	2056	2077	---	---
Cocos Island National Park	2019	2032	2028	2036	2062	---
Area de Conservación Guanacaste	2030	2043	2040	2055	---	---
Galápagos Islands	2017	2036	2027	2042	2070	---
Lagoons of New Caledonia	2031	2040	2039	2050	---	---
Komodo National Park	2017	2025	2021	2032	---	---
Ujung Kulon National Park	2032	2043	2042	2053	---	---
Ogasawara Islands	2030	2038	2041	2049	---	---
Phoenix Islands Protected Area	2020	2035	2028	2040	2038	---
Gulf of California	2044	2052	---	---	---	---
Archipiélago de Revillagigedo	2031	2042	2043	2052	---	---
Sian Ka'an	2025	2033	2033	2041	---	---
Rock Islands Southern Lagoon	2028	2036	2032	2044	---	---
Coiba National Park	2030	2043	2040	2053	2053	---
Tubbataha Reefs Natural Park	2030	2039	2037	2048	---	---
Aldabra Atoll	2028	2036	2034	2042	---	---
East Rennell	2025	2033	2030	2044	---	---
iSimangaliso Wetland Park	2031	2040	2036	2048	---	---
Sanganeb and Dugonab Bay-Mukkawar Island MNPs	2037	2046	2055	2069	---	---
Everglades National Park	2036	2044	2056	2071	---	---
Papahānaumokuākea	2029	2041	2044	2052	---	---
Ha Long Bay	2077	2086	---	---	---	---
Socotra Archipelago	2040	2048	2061	2077	---	---

Severe bleaching stress threshold defined as DHW of 8 °C-weeks.



2019 Nov 19 NOAA Coral Reef Watch 60% Probability Coral Bleaching Heat Stress for Week 1 (Nov 24 2019)

Experimental, v5.0, CFSv2-based, 112 Ensemble Members



No Stress

Watch

Warning

Alert Level 1

Alert Level 2

Resilient Reefs

Potential threats for Ningaloo

- **Climate change (ecosystems)** – sea level rise, sea temperature, coastal erosion, acidification, extreme weather, sedimentation, geographical shifts and seasonal timing of biological signals
- **Climate change (communities)** – heatwaves, water scarcity, bushfire and drought frequency/severity, damage to infrastructure, increasing costs of insurance, healthcare, utilities, emergency response
- **Physical impacts** – trampling, anchors, boat strikes
- **Visitor pressure** – disturbance to wildlife or environment, inappropriate waste disposal, track/dune erosion
- **Fishing activity** – relative changes in fish stocks due to commercial, recreational, illegal fishing pressure
- **Pollution** – oil/fuel spills, noise, marine debris, plastic, sunscreen
- **Coral predators/disease** – COTS, coral diseases, drupella
- **Increasing/decreasing numbers of tourists**
- **Demographic changes** - Lack of employment/economic opportunities for young people
- **Proposed development**

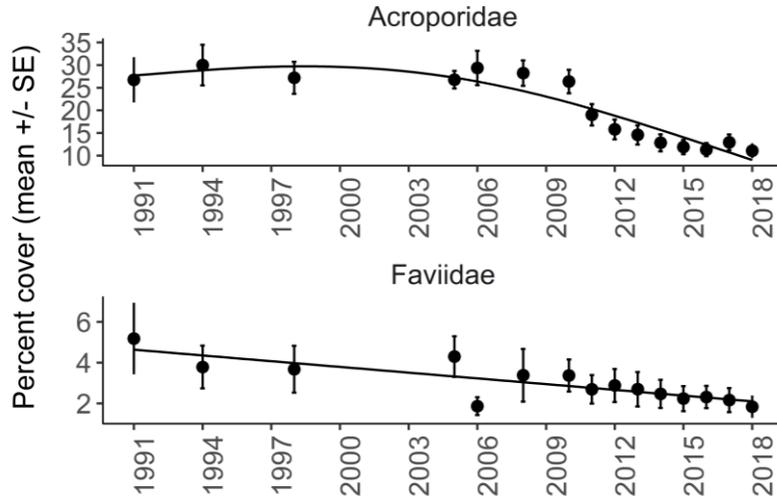
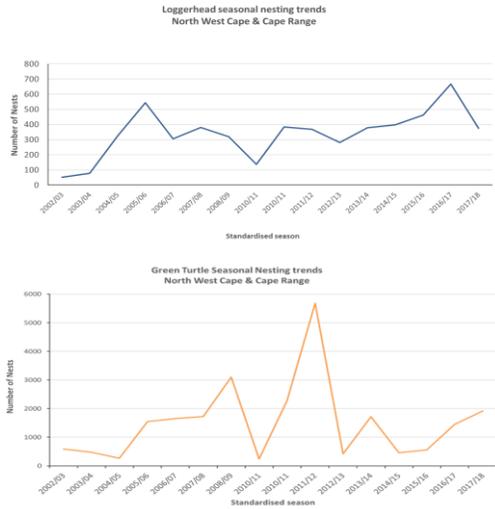
Resilience Strategy Development



- Workplan approved
- Steering Committee TOR approved
- Stakeholder engagement plan in draft
- Early consultations
- Part way through Resilience Assessment
- Commencing economic valuation study

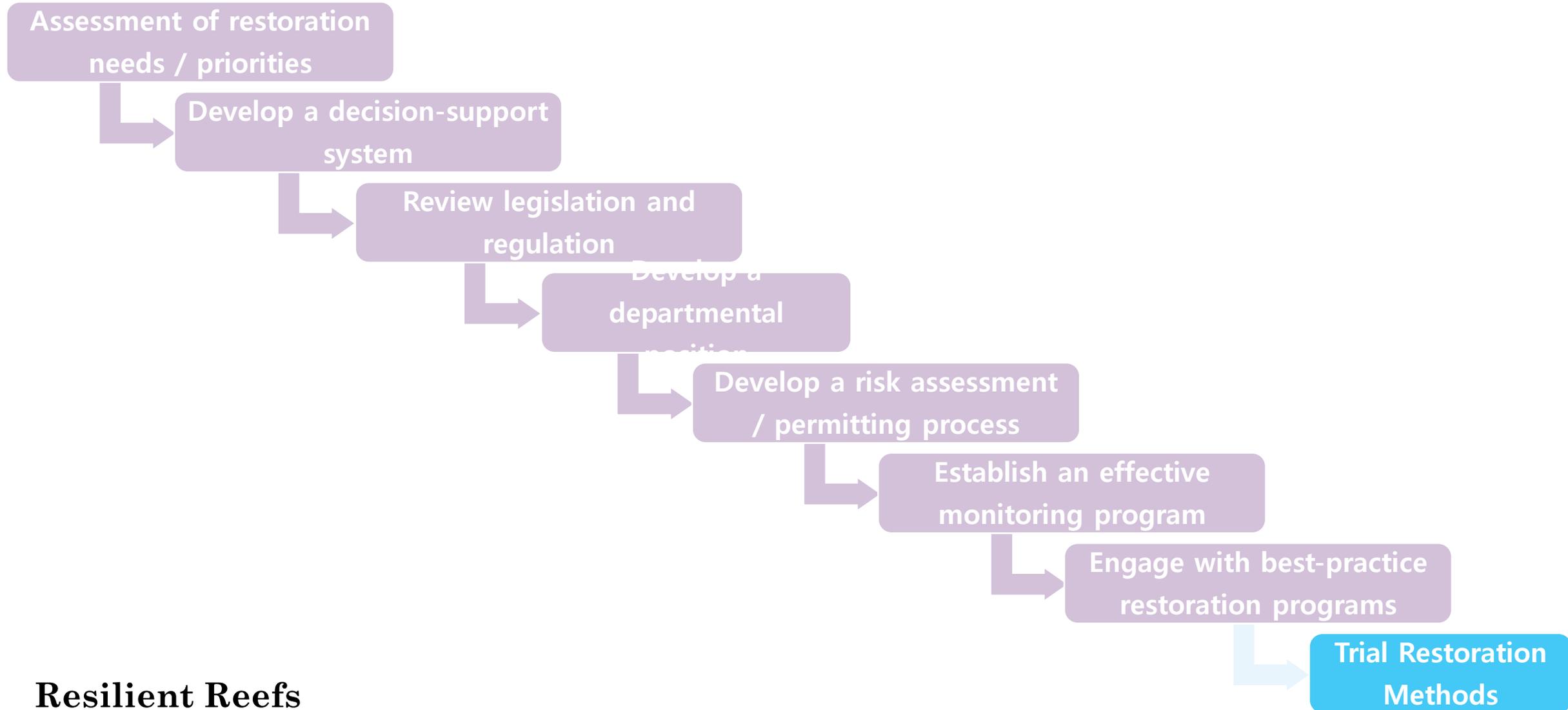


Challenges: Lots of Data (But Not Necessarily the Right Type)



Asset/ KPI	Status of KPI		Assessment Confidence	
	Value	Condition	Pressure	Condition
Water quality	Satisfactory	Moderate	High	High
Coral reefs	Unsatisfactory	High	Medium	High
Mangroves	Satisfactory	Moderate	Medium	Medium
Macroalgae	Satisfactory	Moderate	Low	Low
Fish	Satisfactory	Moderate	Medium	Medium
Resilient	Satisfactory	Moderate	Medium	Medium

Challenges: Institutional Legacies and Outcome (rather than Process) Focus





Reefs are facing unprecedented challenges

Globally, tropical coral reefs have declined by at least 50% over the past 30–50 years, and 75% of reefs are currently threatened by local and global stresses (*Burke et al. 2011*).

By 2041, Ningaloo is expected to experience bleaching at least twice per decade, a rate which is likely to cause widespread mortality (*Heron et al. 2017*).

However:

1. We don't know how reefs will react/adapt to rapidly changing stresses and shocks
2. There may be shocks and stressors coming we don't know about
3. Many of these factors are beyond the ability of reef managers to control

We need flexible, adaptive ways to strengthen reefs and communities to whatever Resilient Reefs may happen.

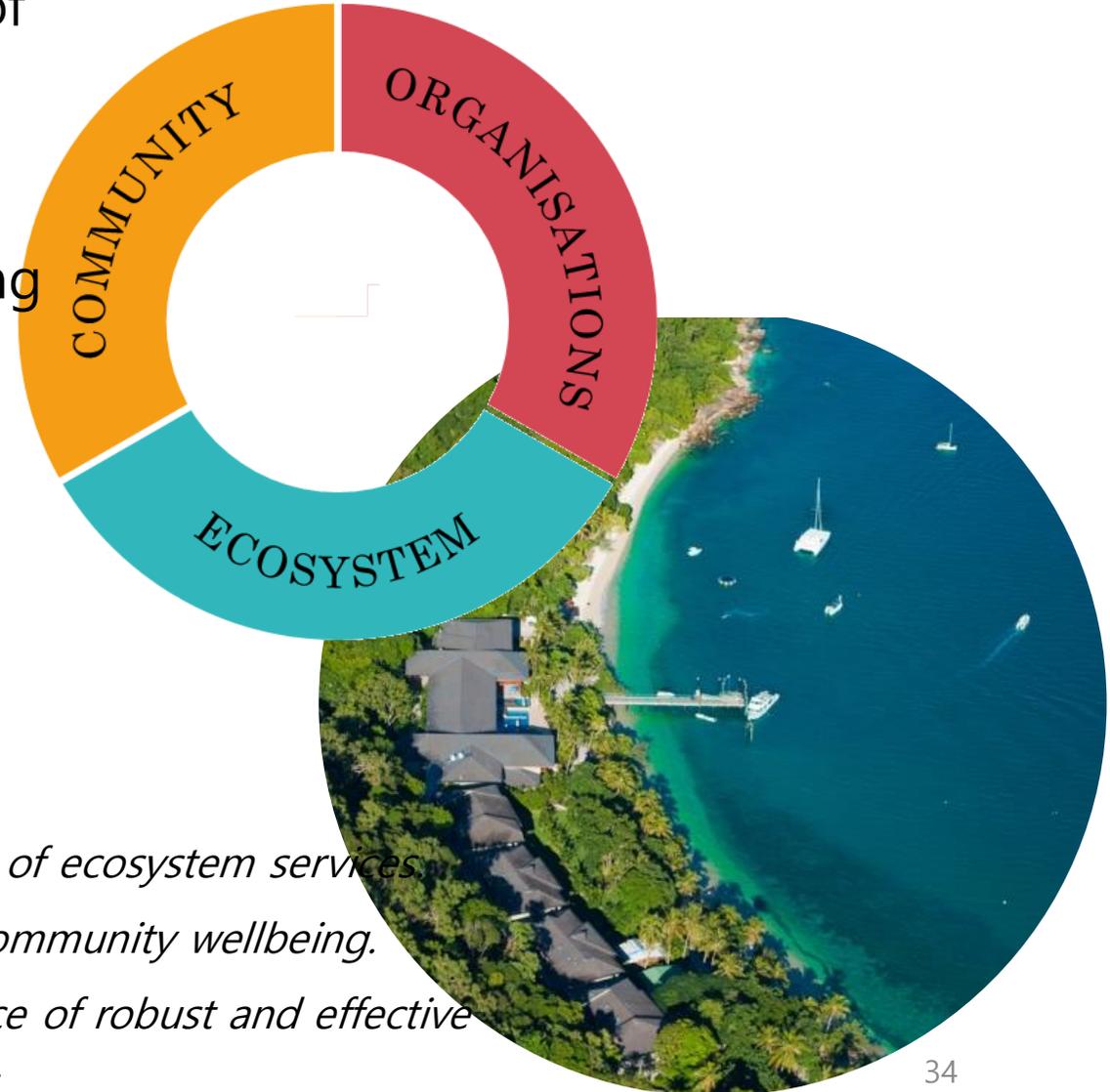
But don't overpromise!

What makes *Resilience* different?

- **Climate change** – the scale and urgency of the challenge needs new flexible/adaptive approaches.
- **Proactive and empowering** – focuses on local action (reducing stressors and building adaptive capacity) in the face of global threats
- **Adaptive** - cycles of innovating, testing, learning and adapting
- **Systemic by design** – integrated planning process with local community and governance partners who also impact and depend on the reef

*Healthy Country,
Healthy People*
Resilient Reefs

- **Ecosystem** – preservation of ecosystem services.
- **Community** – fostering community wellbeing.
- **Governance** – maintenance of robust and effective governance arrangements.





Diversity / Flexibility / Redundancy

- Maintain a diversity of habitat types, species, genes, functional groups
- Maintain response diversity and redundancy within functional groups
- Livelihood diversification



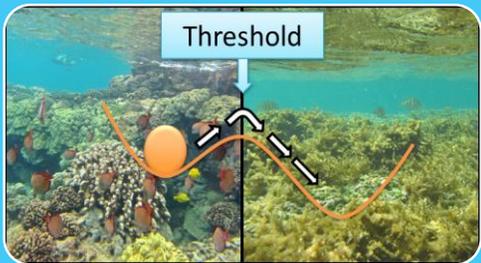
Adaptive Capacity

- Fostering learning and innovation
- Participatory management and social cohesion
- Responsive governance



Recovery

- Maintain pathways of connectivity
- Identify and cultivate refuges
- Coral gardening / seeding / transplanting resistant coral species



Manage slow variables and feedbacks

- Identify potential regime shifts and protect desirable feedback mechanisms
- Effective monitoring for early warning, recovery patterns, regime shifts
- Promote adaptive management and responsive governance

Opportunities & Outcomes:



Breaking new ground in adaptive management and collaborative governance



Provides a framework to coordinate existing resilience actions, management and funding



Shared learning with other WA Parks and global reefs



Options and hope for the future



Harnessing high levels of community concern and engagement



A licence for innovation through inclusion



Resources for sites

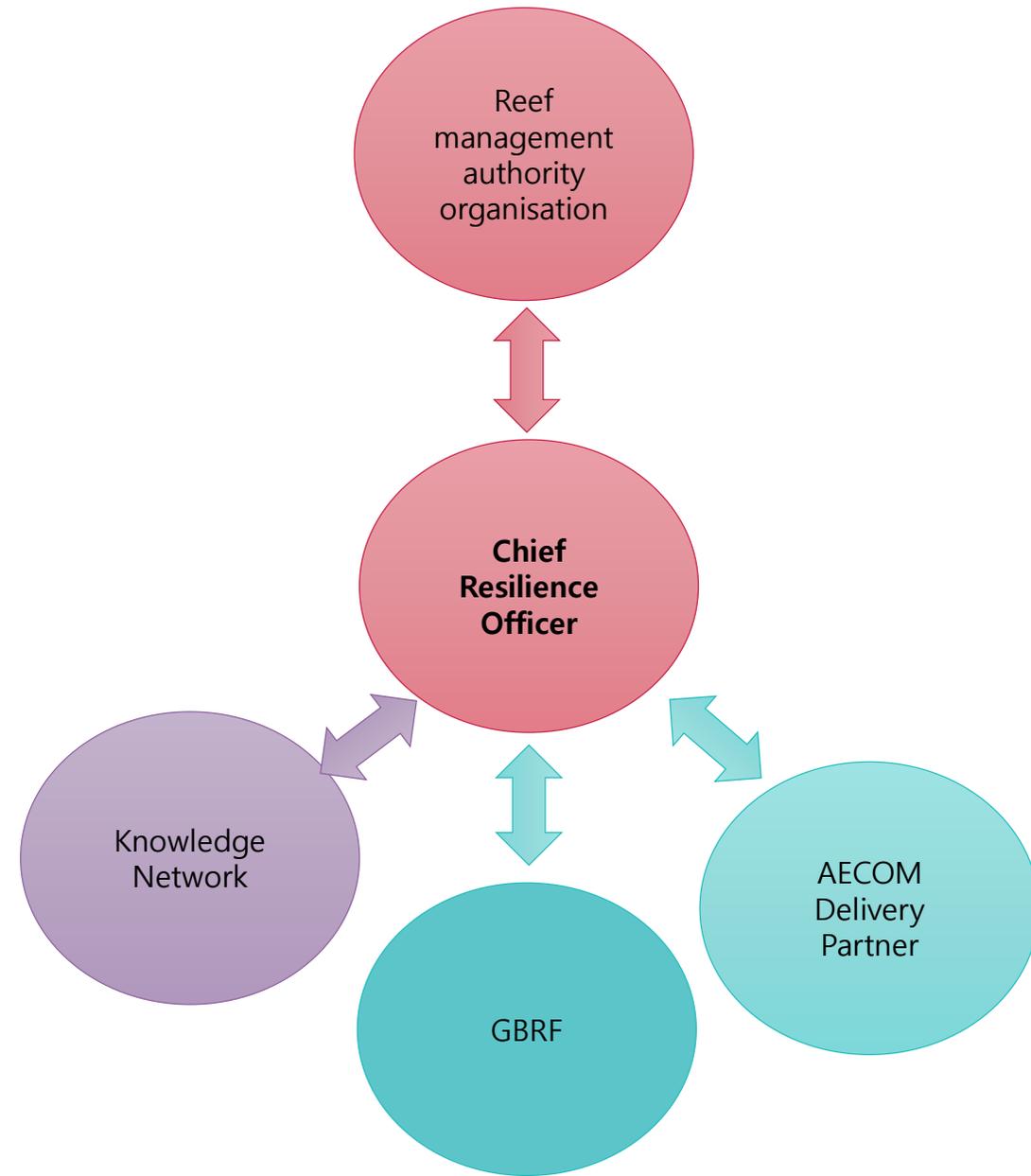
Resilient Reefs

Delivery team



- CRO leads the process with support from reef management authority
- Delivery Team supports the CRO and local team. Support may include:
 - › Project management
 - › Research and analysis
 - › Stakeholder engagement
 - › Action design
 - › Implementation and monitoring plans

Resilient Reefs



Support from the Knowledge Network

Plan the process and establish local governance

Engage broadly

Training for CROs

Assess resilience.

Global case studies and connections | Network exchanges for CROs | Peer review by KN partners and other CROs

Prioritise resilience challenges

Network exchanges for CROs | Peer review by KN partners and other CROs | Resilience Accelerators

Develop actions

Training for CROs | Support to develop and design actions | Peer review by KN partners and other CROs | Global case studies and connections | Resilience Accelerators

Develop the strategy

Support to action implementation planning | Global case studies and connections

Strategy guide

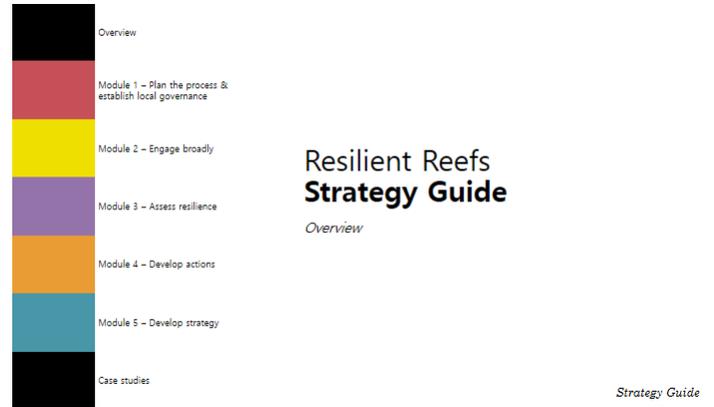
- Practical, coherent, and user friendly guide
- Clearly identifies required deliverables, timelines, roles and responsibilities
- Reflects global best practice resilience planning
- Enables customization to local context whilst establishing a consistent global approach
- Is integrated with Resilient Reefs Knowledge Network offerings



Resilient Reefs Image Credit: GBRF

Resilient Reefs

Strategy guide content



Overview

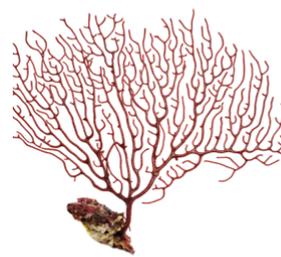
- Module 1 – Plan the process & establish local governance
- Module 2 – Engage broadly
- Module 3 – Assess resilience
- Module 4 – Develop actions
- Module 5 – Develop strategy

Case studies

Resilient Reefs Strategy Guide

Overview

Strategy Guide



Module 1 – Plan the process and establish local governance

Resilient Reefs

Strategy Guide



Module 2 – Engage broadly

Resilient Reefs

Strategy Guide



Module 3 – Assess Resilience

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Strategy Guide



Module 4 – Develop actions

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Strategy Guide



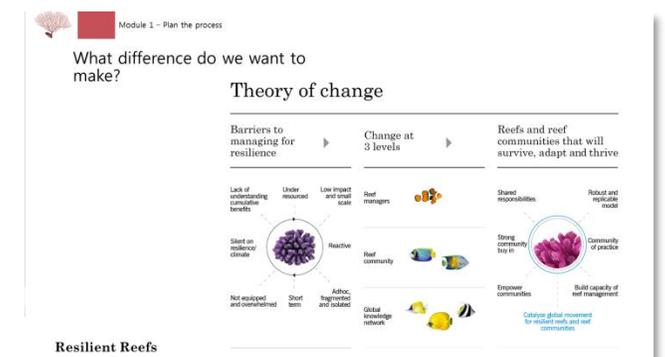
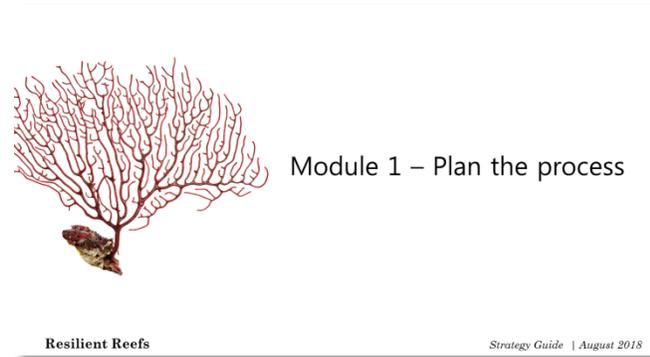
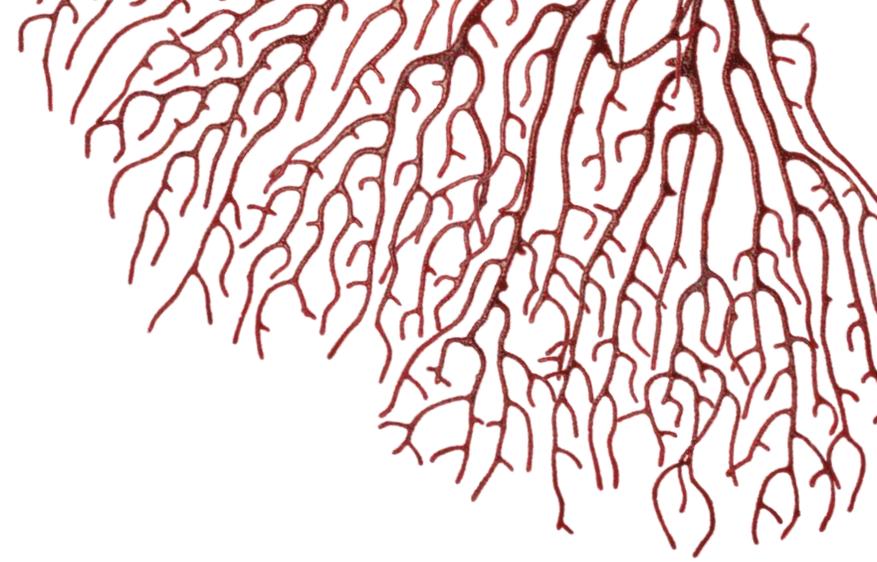
Module 5 – Develop the strategy

Resilient Reefs

Strategy Guide

Guide content

Each module is supported by resources such as templates, tools, presentations, case studies, and further readings, which are all linked to in various formats.



MS Word



MS PowerPoint



MS Excel

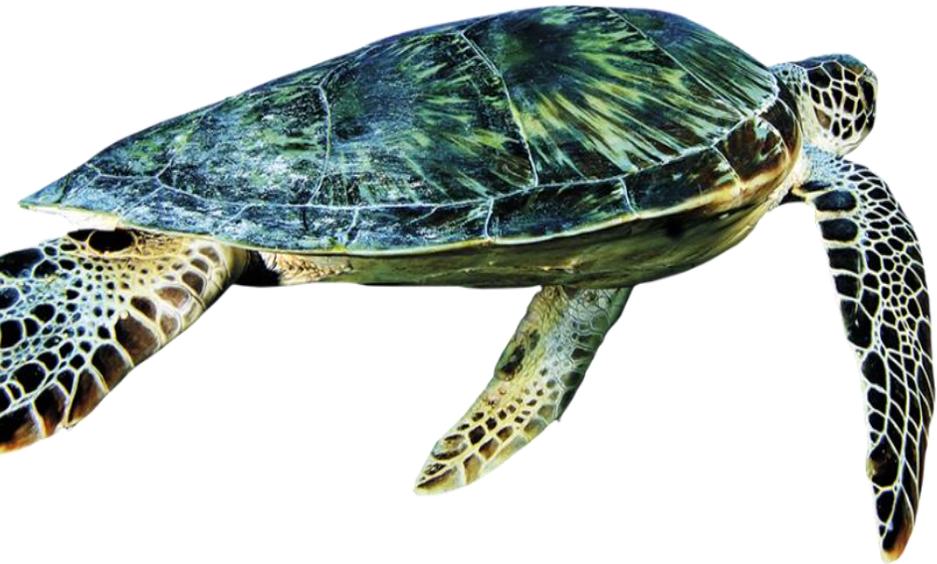


Acrobat

Guide content

Module	Aim	Tools / resources	Deliverables
Overview	Introduce the Resilient Reefs initiative and orient the CRO to the strategy process and relevant resources	Program guide CRO orientation workshop guide	-
Module 1 – Plan the process & establish local governance	Provide a practical guide to developing a robust and ambitious workplan which responds to the site context and the Resilient Reefs objectives. Establish the site steering committee and site-specific processes for oversight and decision-making.	Work plan template Site alignment checklist Steering Committee Terms of reference template	Work plan Steering Committee composition
Module 2 – Engage broadly	Prompt sites to consider with whom and how they need to collaborate to ensure the strategy reflects the input and engagement of diverse, representative community stakeholders.	Stakeholder mapping tools Proposed stakeholder engagement principles Suggested stakeholder engagement plan table of contents	Stakeholder engagement plan
Module 3 – Assess resilience	Conduct a holistic resilience assessment. Take stock of current vulnerabilities, assess performance during times of shock or stress, identify future threats, and prioritise resilience challenges, through research, desktop analysis, and stakeholder engagement. Identify and agree on priority resilience challenges.	Reef Resilience Assessment Tool Challenge statement prioritisation principles	Resilience assessment Resilience challenge statements
Module 4 – Develop actions	Work with stakeholders to shape the resilience agenda for the site and identify and develop solutions to priority resilience challenges.	Suggested workshop format and activities Action design template Case studies	Priority actions
Module 5 – Develop the strategy	Deliver an inspiring and actionable resilience strategy that will set a bold vision for the future, be innovative and integrated in its thinking, and result in short and long-term solutions that will directly address the reef and reef community's vulnerabilities.	Strategy launch checklist	Resilience strategy
Case studies	A library of case studies to be developed throughout the pilot process.	Case study template	-

Resilient Reefs



Reef Resilience

Resilient Reefs

Identifying stresses

Stresses are influences that gradually but persistently weaken reef systems and communities. Stresses which affect both reef ecosystems and communities can reduce the ability of both systems to function normally, and recover after shocks. Stresses may also increase the vulnerability of either system to shocks.

Examples include: Water pollution runoff; Increasing coastal development; Overfishing; Chronic food or water shortages; Unregulated tourism; Corruption; Unemployment; Sea level rise; Drought; Invasive species.



Identifying shocks

Shocks are sudden, short-term events that disrupt or damage reef ecosystems and communities.

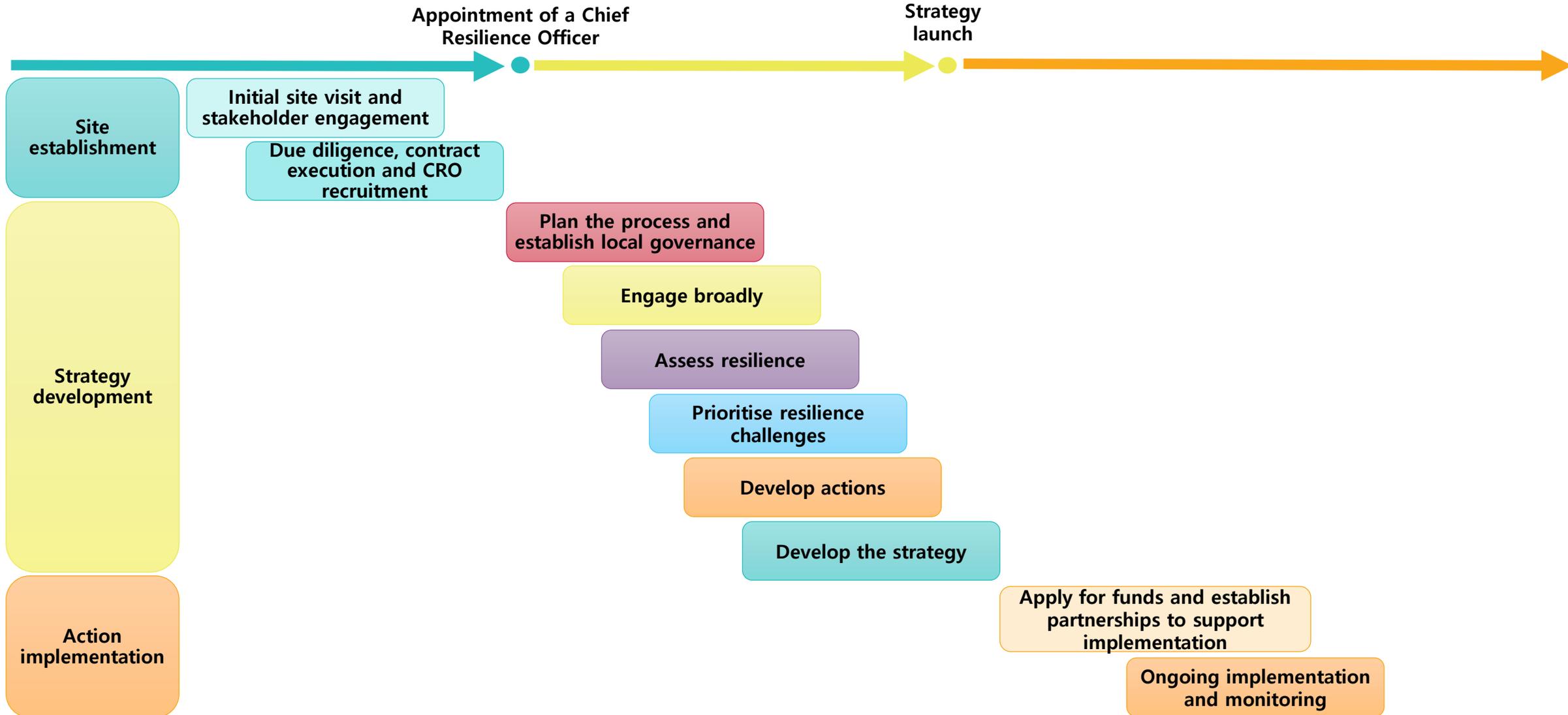
Examples include: Cyclones, hurricanes and typhoons; Coral bleaching; Oil spills; Civil unrest or riot; Earthquake; Volcanic eruption; Inland flooding impacting water quality.



Resilient Reefs

Image credits: Oil spill in Mississippi, [Amanda Mccoy/The Sun Herald](#) Cyclone Erica approaching New Caledonia, [Jacques Desclotres/NASA](#); Coral bleaching in Honduras, [Michael Webster/Huffington Post](#);

Phases of the Initiative



Reef Resilience Framework



The Reef Resilience Framework has been developed as a tool to assist reef communities and managers to better understand the current state of resilience of their reef and communities, identify strengths and weaknesses, and prioritise actions.

The Framework looks holistically at coral reefs, the communities that depend on them, and the governance arrangements that influence them as an integrated system which must be understood together.

The Framework provides a structure for understanding reef resilience through layers of increasing detail including 3 Dimensions and 12 corresponding Attributes.

Framework Dimensions:

- **Ecosystem** - the preservation of ecosystem services.
- **Community** – maintaining or improving community wellbeing.
- **Governance** - the maintenance of robust and effective governance arrangements to support these outcomes.

Resilient Reefs