



Technical Assistance Building Coastal Resilience through nature-Based and Integrated Solutions - Finance and Insurance Solutions for Coral Reef Resilience

Final Stakeholder Workshop Indonesia

Denpasar, Bali
26 November 2025



Selamat Pagi!
Rahajeng semeng!
Good morning!

ADB

ASIAN DEVELOPMENT BANK

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Swiss Re



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ACiFF

Moderators



**Budiati (Dias)
Prasetiamartati**
In-country coordinator



**Louise
Heaps**
Project Director

Welcome Remarks

10:00 AM - 10:30 AM



Louise Heaps
Project Director, WWF



Thomas Kessler
Principal Finance Specialist, Asian Development Bank



Firdaus Agung
Director of Ecosystems Conservation, Ministry of Marine Affairs
and Fisheries



WELCOME REMARKS

Thomas Kessler

Principal Finance Specialist
Asian Development Bank



WELCOME REMARKS

Firdaus Agung

Director of Ecosystems Conservation,
Ministry of Marine Affairs and Fisheries



Morning Agenda

10:30 AM - 11:00 AM



Project Overview

Louise Heaps, Project
Director, WWF

Lorena Ramirez, Project
Coordinator, Landell Mills

Morning Agenda

11:15 AM - 12:15



Coral Reef Vulnerability Assessment



Coral Reef Post-Disaster Risk Management and Restoration Plan and Gender Action Plan

Selina Ward & Defy Pada
Coral Reef Ecologists



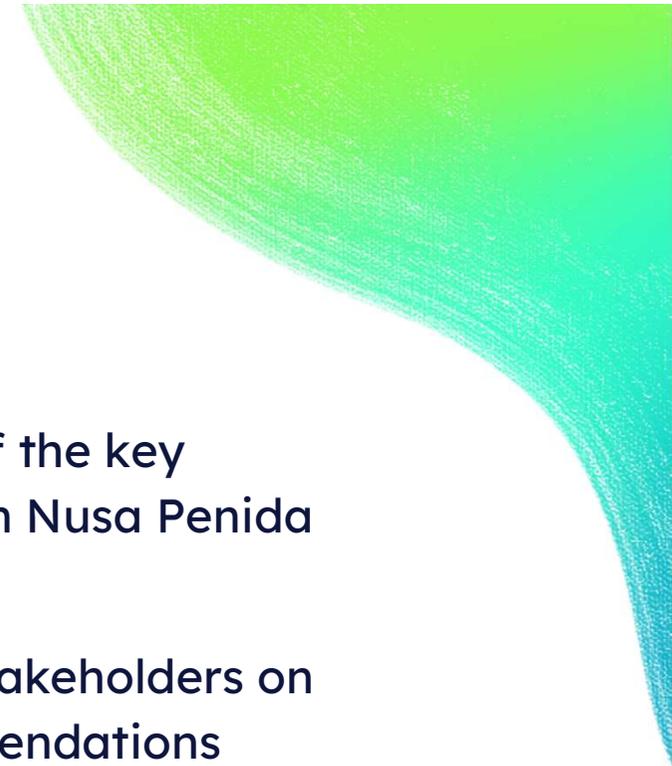
Discussion facilitated by

Hanggar Prasetio
Konservasi Indonesia



Workshop Goals:

- 1 Presenting the findings of the key assessments conducted in Nusa Penida
- 2 Getting feedback from stakeholders on key findings and recommendations
- 3 Identify next steps for implementation



Project Purpose

Identify and make recommendations for the applicability of sustainable financing and risk management models and approaches for coral reef ecosystems in targeted, high-opportunity sites in four countries, namely Fiji, Indonesia, the Philippines and Solomon Islands, towards increasing the climate resilience of coastal businesses, communities and their livelihoods.



Project Objectives

- **Building the case for effective coral reef protection, restoration and sustainable management** by defining the range of goods and services they provide and quantifying the environmental, social and economic risks associated with their damage;
- **Implementing strong policies and governance approaches** to underpin their protection, restoration and sustainable management; and
- **Assessing viable options for sustainable financing and risk management** models and approaches, to optimize and complement the limited public funds allocated for coral reef protection and restoration.



Regional Collaboration



ASIAN DEVELOPMENT BANK

A regional multilateral bank with a mission to foster economic growth and cooperation among countries in the Asia-Pacific Region.



A global consulting firm specializing in sustainable development and environmental protection.



Experts in creating re/insurance solutions that support nature and post-disaster recovery.



KONSERVASI
INDONESIA

Konservasi Indonesia is a national foundation that aims to support sustainable development and environmental conservation in Indonesia.



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agreements (MEAs)

ACLiFF

A multi-donor trust
fund managed by
the ADB, supporting
the development of
financial risk
management
products to enhance
climate resilience

Consultations



**Regional
Inception
Workshop**

Nov 2023

**Prioritization
Workshop**

Feb 2024

**Field surveys
and
consultations**

May 2024

**Presentation
of survey
findings**

June 2024

**Stakeholder
consultations**
Jakarta & Kupang

Dec 2024

**Workshop
Agreement
of Nusa
Penida**

Dec 2024

**Presentation
Restoration
plan**

Apr 2025

**Policy
consultations**
Bandung

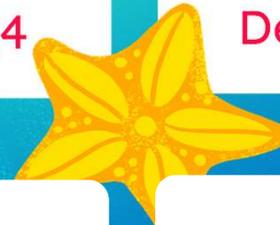
Apr 2025

**Policy
consultations**
Nusa Penida

Jun 2025

**Policy holder
workshop**

Aug 2025



Key assessments



**Inception
report**

Nov 2023

**Climate Risk
Assessment**

Mar 2024

**Prioritization
assessment
(7 sites to 2)**

Mar 2024

Reef Surveys

May 2024

**Reef
Vulnerability
Assesments**

June to
Nov 2024

**Valuation
assessment**

June to
Nov 2024

**Prioritization
(2 sites to 1)**

Selection Nusa
Penida

Dec 2024

**Restoration
Plan and
Gender plan**

Apr 2025

**Policy
Assessment**

Aug 2025

**Insurance
recommen-
dations**

Oct 2025



Coffee break & Photo



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Morning Agenda

11:15 AM - 12:15

 **Coral Reef Vulnerability Assessment**

 **Coral Reef Post-Disaster Risk Management and Restoration Plan and Gender Action Plan**

Selina Ward

Coral Reef Ecologist

 **Discussion facilitated by Hanggar Prasetio**
Konservasi Indonesia

PRESENTATION

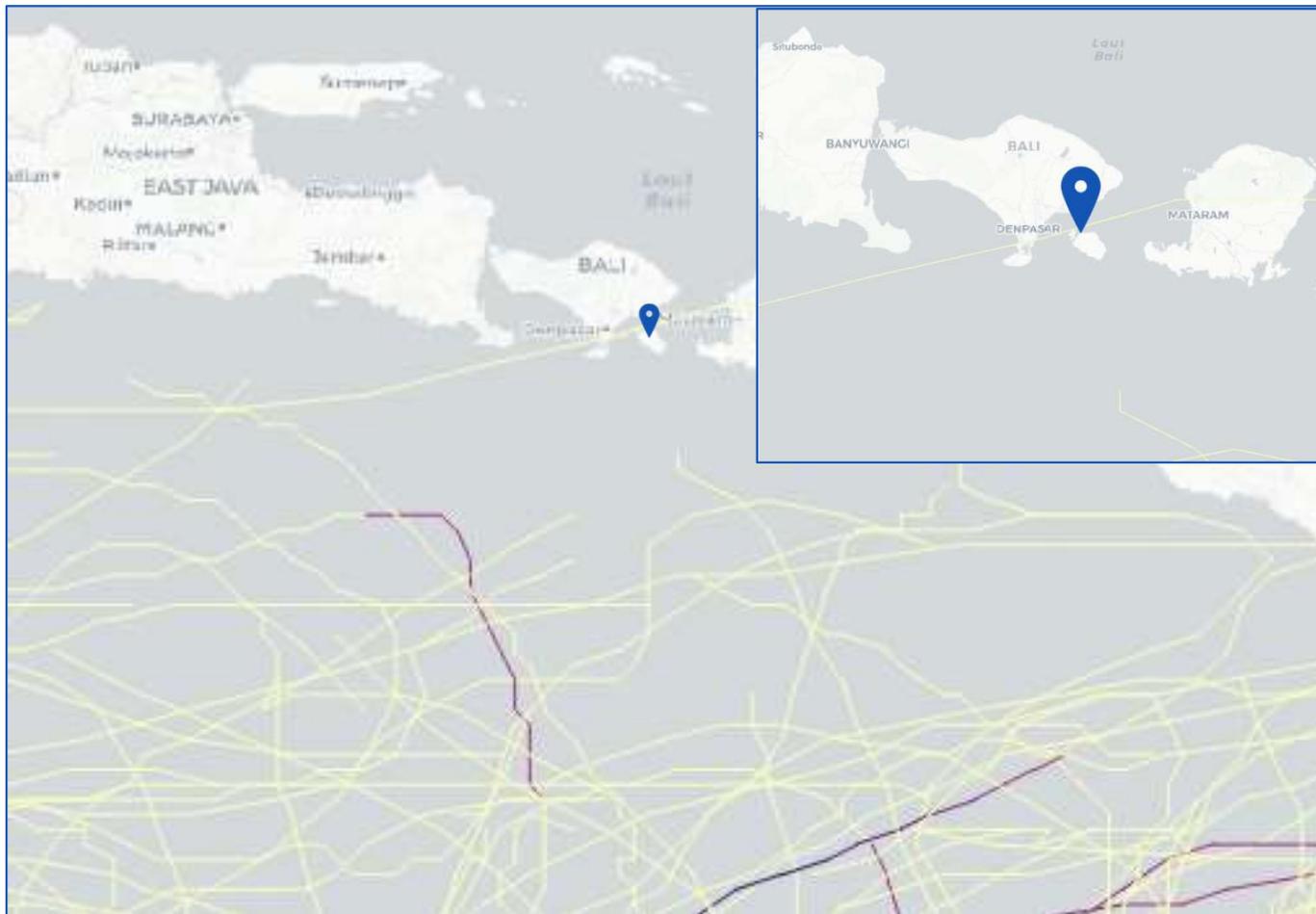
Climate Risk Assessment for Nusa Penida

Alison Drill

Disaster and Insurance Specialist,
Swiss Re



Swiss Re Climate Risk analysis – Minimal cyclone history for Nusa Penida



Data covers **1980–present**.

≤ 0 = Below Category 1

- Marked as **yellow** lines on the map
- includes tropical depression, tropical storm, subtropical, post-tropical, and miscellaneous disturbances;
- Windspeed < 64 kt).

1–5 = Category 1–5 Saffir-Simpson scale

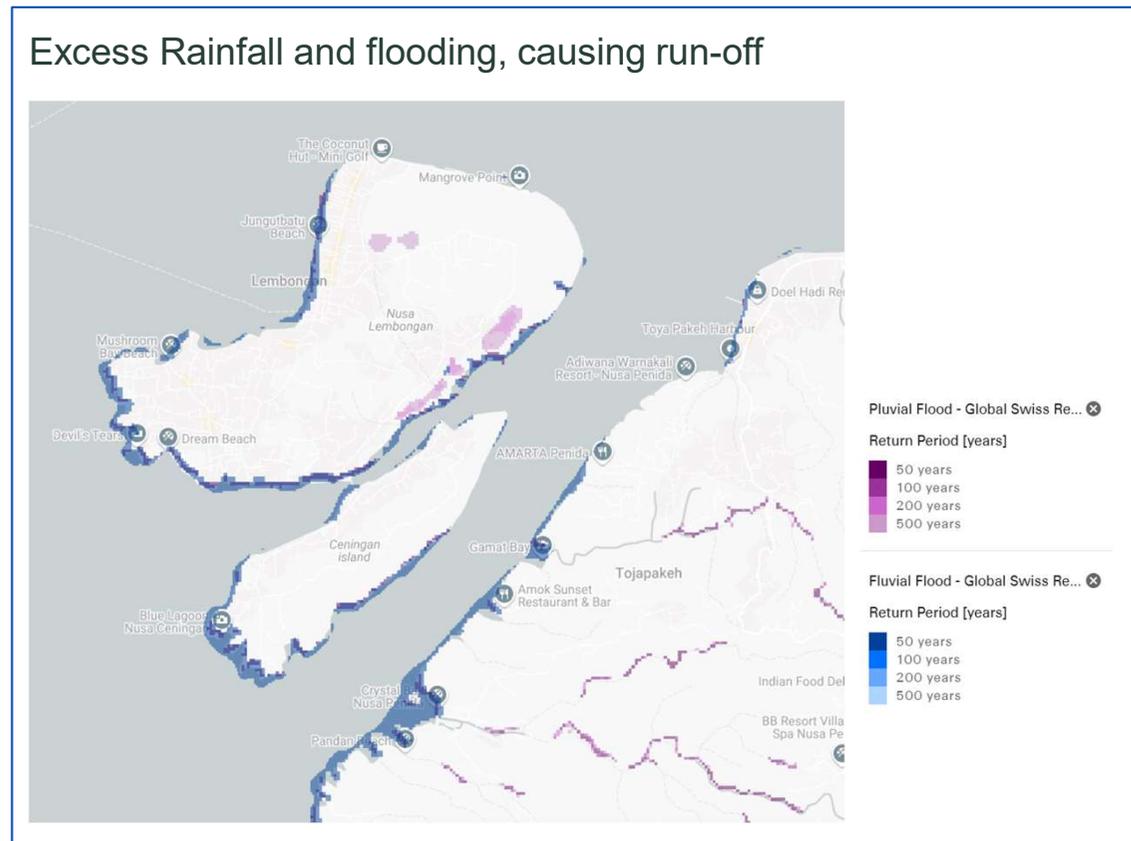
- Marked as **purple** lines on the map
- Cat 1: 64–< 83 kt
- Cat 2: 83–< 96 kt
- Cat 3: 96–< 113 kt
- Cat 4: 113–< 137 kt
- Cat 5: \geq 137 kt

Source: [International Best Track Archive for Climate Stewardship \(IBTrACS\)](#), [National Centers for Environmental Information \(NCEI\)](#), NOAA.

Tropical cyclone categories are assigned from the USA_SSHS field, based on Saffir–Simpson Hurricane Scale thresholds using US-agency 1-minute sustained wind speeds (W, in **knots**)

See the NHC for explanation of how the Saffir–Simpson scale is used and its focus solely on wind speed [Saffir-Simpson Hurricane Wind Scale](#)

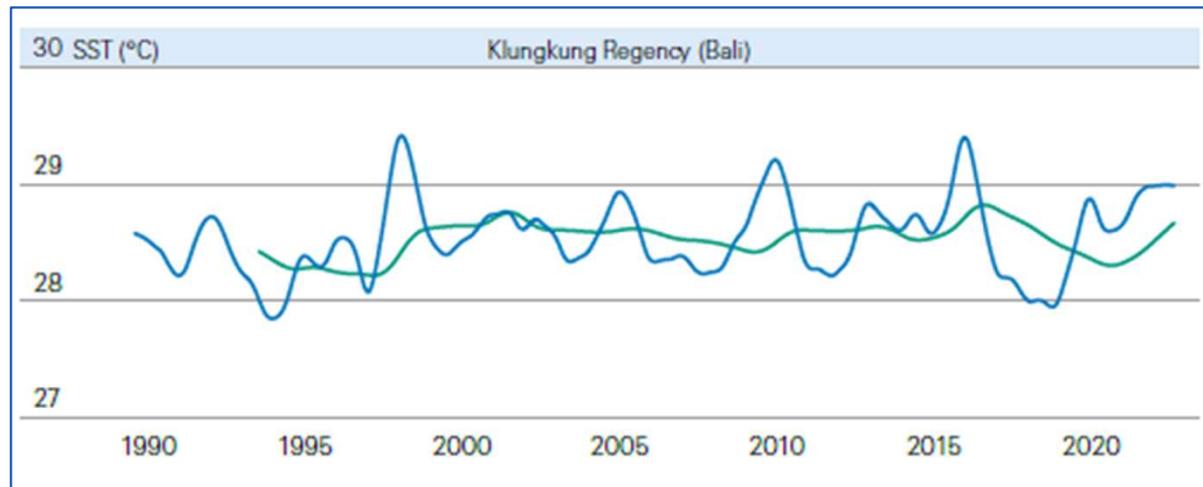
Swiss Re Climate Risk analysis – Key risks identified for Nusa Penida



Indonesia: Nusa Penida: SST

Sea Surface Temperature (SST)

Recognizing the role of SST in influencing heat stress events for coral reefs, the data shows an increasing in SST over time.



— SST
— Rolling 4 year average

Indonesia: Nusa Penida: DHW

Degree Heating Weeks (DHW)

Indicates that Klungkung experiences $DHW > 8$ which is highly likely to cause coral bleaching. DHW measures accumulated thermal stress over time. DHW reflects both intensity and duration of elevated SST relative to baseline.

- DHWs over 4 °C weeks have been shown to cause significant coral bleaching
- DHW over 8 °C weeks have caused severe bleaching and significant mortality.

For coral-reef risk and climate studies (e.g. NOAA Coral Reef Watch), DHW is calculated as:

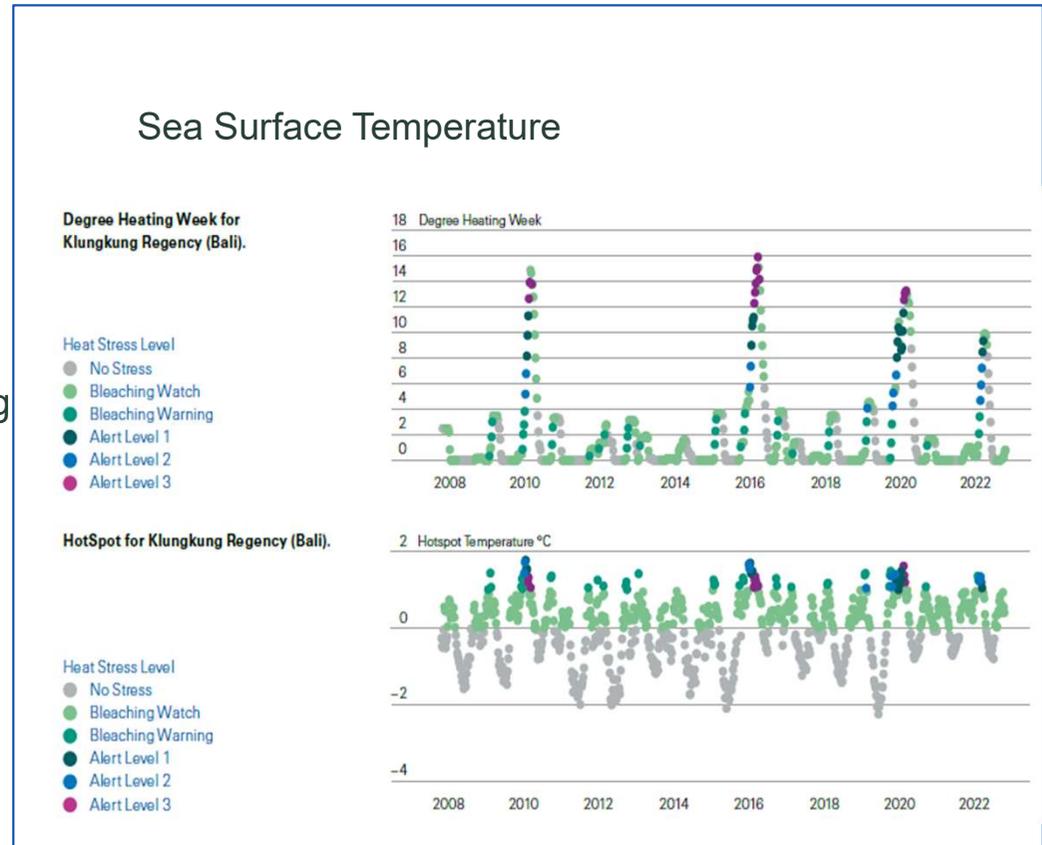
$$DHW = \sum_{t=1}^{12 \text{ weeks}} \max(0, SST(t) - MMM - 1^{\circ}C)$$

where:

- $SST(t)$ = observed weekly sea-surface temperature,
- MMM = long-term mean maximum monthly SST (climatological baseline, typically 1985–2012),
- $1^{\circ}C$ = standard threshold above MMM for heat stress onset,
- The summation covers the preceding 12 weeks (hence “weeks”).

One *Degree Heating Week* corresponds to one week of SST being $1^{\circ}C$ above the MMM .

For example, 4 DHW = 4 weeks at $1^{\circ}C$ above the threshold, or 2 weeks at $2^{\circ}C$ above.



[NOAA Coral Reef Watch Daily 5km Satellite Coral Bleaching Heat Stress Degree Heating Week Product \(Version 3.1\)](#)

1. Risk Assessment Validation

Climate Risk Assessment Report delivered July 2024 – addressed 4 potential sites

Key climate risks for selected site of Nusa Penida:

Higher Risk		Precipitation / excess rainfall causes sediment, waste and pollution run-off into the reef
		Sea temperature extremes as anomalous temperatures can degrade coral health and cause mortality
Lower Risk		Windstorm / tropical cyclone / Storm surge due to wave action ability to dislodge and break corals
		Earthquake and tsunami due to ability to dislodge coral and cover in sediment

Recommended risks for pre-event financing, based on stakeholder inputs are:

(1) Excess rainfall and (2) Extreme sea surface temperature



PRESENTATION

Coral Reef Vulnerability Assessment

Selina Ward & Defy Pada
Coral Reef Ecologists



What did we do?

**Surveyed 13 reefs
around Nusa Penida,
Nusa Lembongan and
Nusa Ceningan**



There are two reports for this work
- **Vulnerability assessment**
- **Restoration report (including Gender Action plan and environmental safeguards assessment)**

These aim to:

- Describe the results of the surveys in terms of resilience and restoration potential of sites
- Address threats to these reefs
- Suggest management actions ahead of disasters
- Create of a restoration plan – how to deal with disasters like cyclones and marine heatwaves



Protection

NUSA PENIDA MARINE PROTECTED AREA ZONING SYSTEM

NUSA PENIDA SUB-DISTRICT, KLUNGKUNG DISTRICT, BALI PROVINCE



POPULAR DIVE & SNORKELING SITES:

- A Manta Point
- B Manta Bay
- C Crystal Bay (Mola)
- D Toya Pakeh
- E SD
- F Mangrove Point

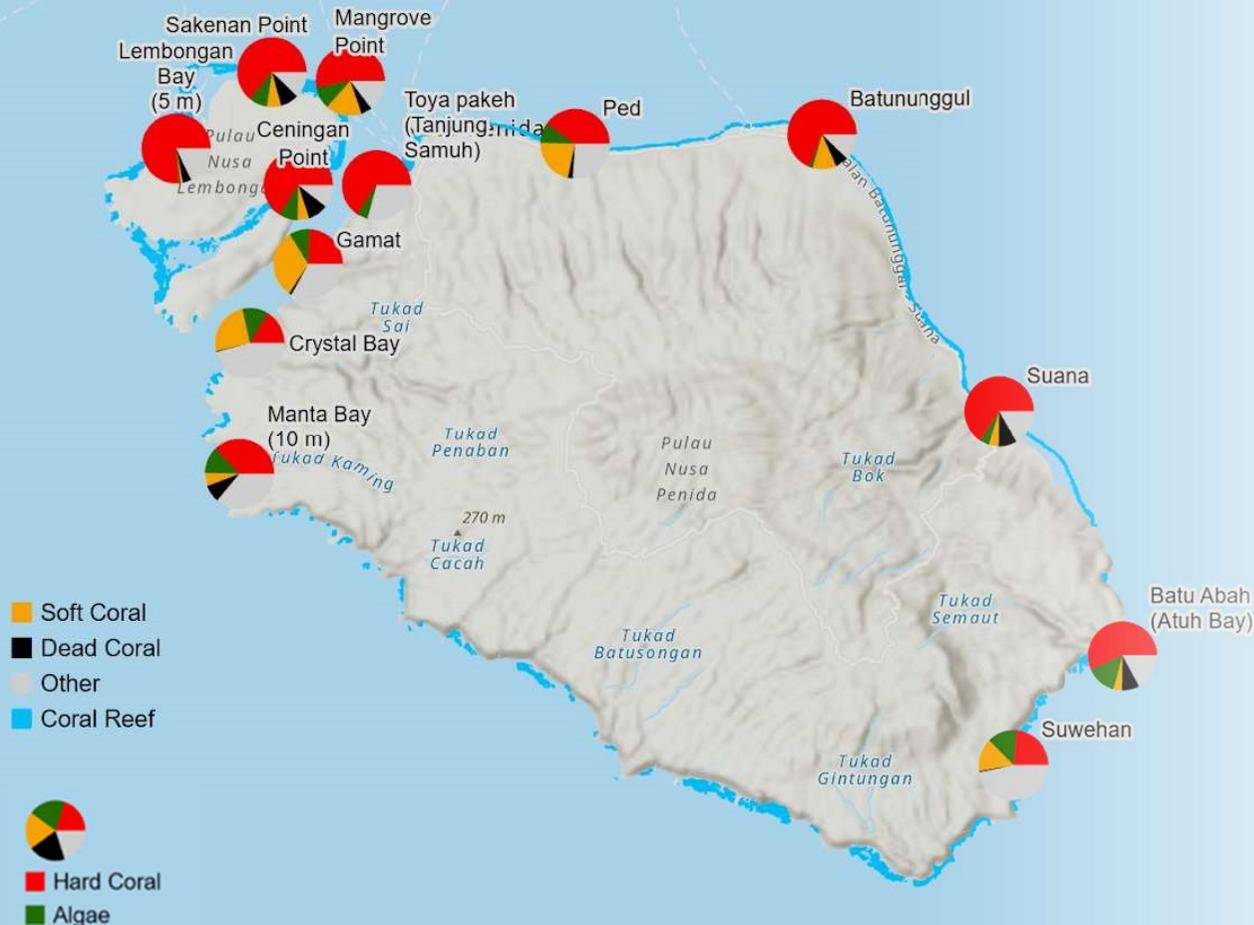
Supported by:



ACTIVITIES	CORE ZONE	SUSTAINABLE FISHERIES ZONE			UTILIZATION ZONE		OTHER ZONE
	CORE ZONE	TRADITIONAL FISHERIES SUB-ZONE	SPECIAL ARRANGEMENT TOURISM SUB-ZONE	SEAWEED FARMING SUB-ZONE	MARINE TOURISM SUB-ZONE	HARBOUR SUB-ZONE	SACRED SUB-ZONE
Tourism							
Diving/Snorkeling/Fauna Watching	●	●	✓	●	✓	●	●
Sport Fishing	●	▲	●	●	●	●	●
Making Picture, Video, Movie	●	✓	✓	✓	✓	✓	✓
Shipping (Cruising)	✓	✓	✓	●	✓	✓	✓
Permanent/semi Permanent Infrastructure (Tourism)	●	●	●	●	●	●	●
Fishing							
Bottom Line Fishing	●	▲	▲	●	●	●	●
Trawling Line Fishing	●	▲	▲	●	●	●	●
Set Net Fishing	●	▲	▲	●	●	●	●
Free Diving with Spear Fishing	●	▲	▲	●	●	●	●
Self-Drifted Long Line Fishing	●	●	●	●	●	●	●
Purse Seine Fishing	●	●	●	●	●	●	●
Drifted Net Fishing	●	●	●	●	●	●	●
Self-Drifted Long Line Fishing	●	●	●	●	●	●	●
Muroami Fishing	●	●	●	●	●	●	●
Fence Bamboo Trap Fishing	●	●	●	●	●	●	●
Fish Aggregating Device	●	●	●	●	●	●	●
Hookah Compressor/Bomb	●	●	●	●	●	●	●
Potassium/Poison Fishing	●	●	●	●	●	●	●
Diving to collect Octopus, Lobsters or Sea Cucumbers	●	✓	●	●	●	●	●
Shark Fishing	●	●	●	●	●	●	●
Hunting for Sea Turtle, Dolphin, Whale or Sea Cow	●	●	●	●	●	●	●
Farming and Collection							
Seaweed Farming	●	●	●	✓	●	●	●
Pearl Farming/Fish Pens	●	✓	●	●	●	●	●
Reef Gleaning/Coral Mining	●	●	●	●	●	●	●
Collecting Crab	●	✓	✓	●	●	●	●
Cutting Mangrove	●	●	●	●	●	●	●
Shipping							
Shipping (Anchoring)	●	✓	✓	●	✓	✓	●
Anchoring	●	✓	●	●	●	●	●
Research, Rehabilitation and Education							
Research and Resource Monitoring	●	●	●	●	●	●	●
Environmental Education	●	●	●	●	●	●	●
Resource Rehabilitation	✓	✓	✓	✓	✓	✓	✓
MPA Management							
Patrol	✓	✓	✓	✓	✓	✓	✓
MPA Management Infrastructure (mooring buoy)	■	✓	✓	■	✓	✓	■
Throwing Trash	●	●	●	●	●	●	●

- : Not Allowed
- ✓ : Allowed activities
- : Allowed activities with permit
- : Allowed only for Boundary Marker
- ▲ : Allowed under the provision that any fauna, such as: Sharks, Ocean Sunfish, Manta Ray and endangered species must be released
- * : In sacred sub-zone, diving is allowed while snorkeling and fauna watching are prohibited

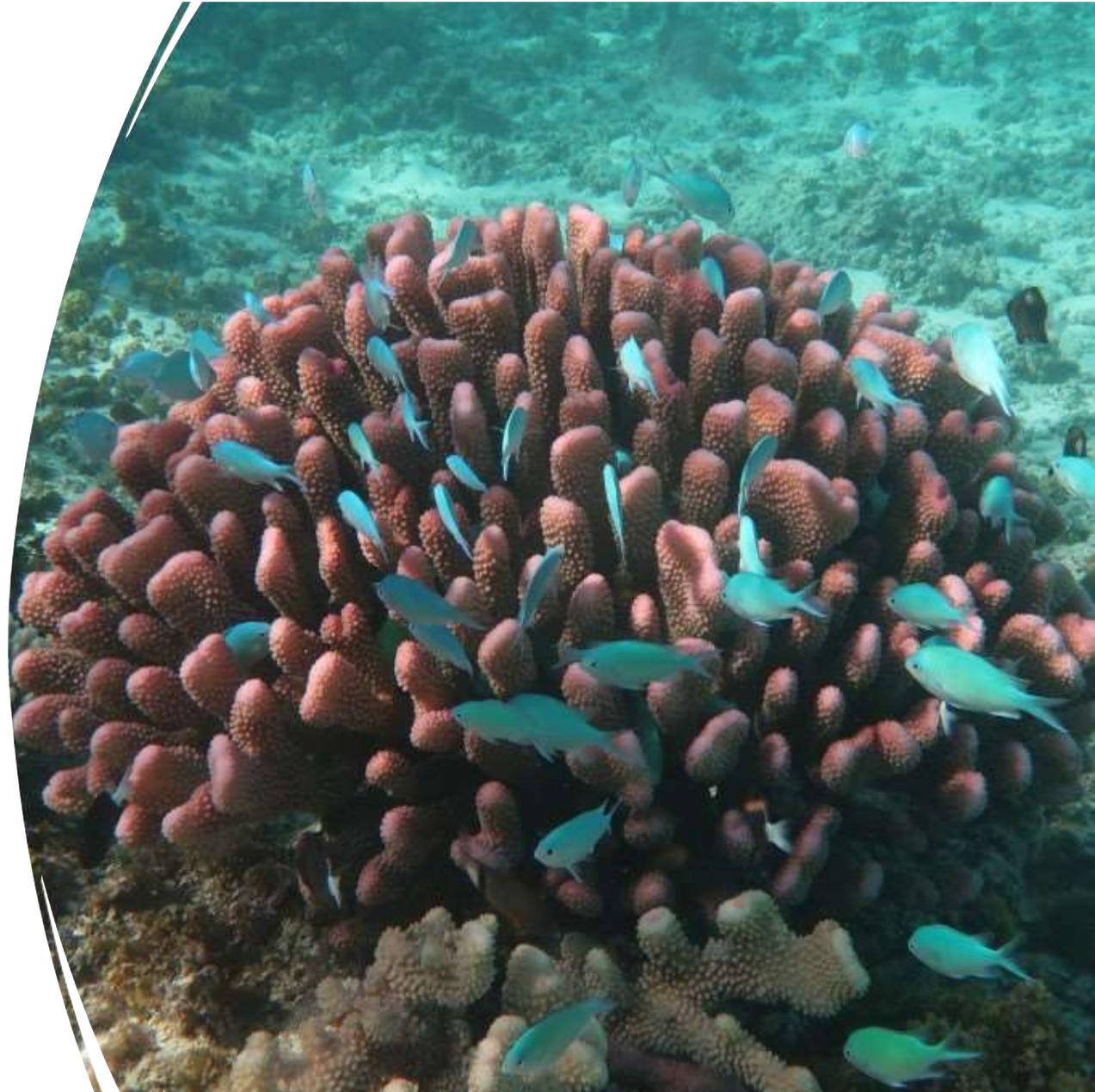
What is there?



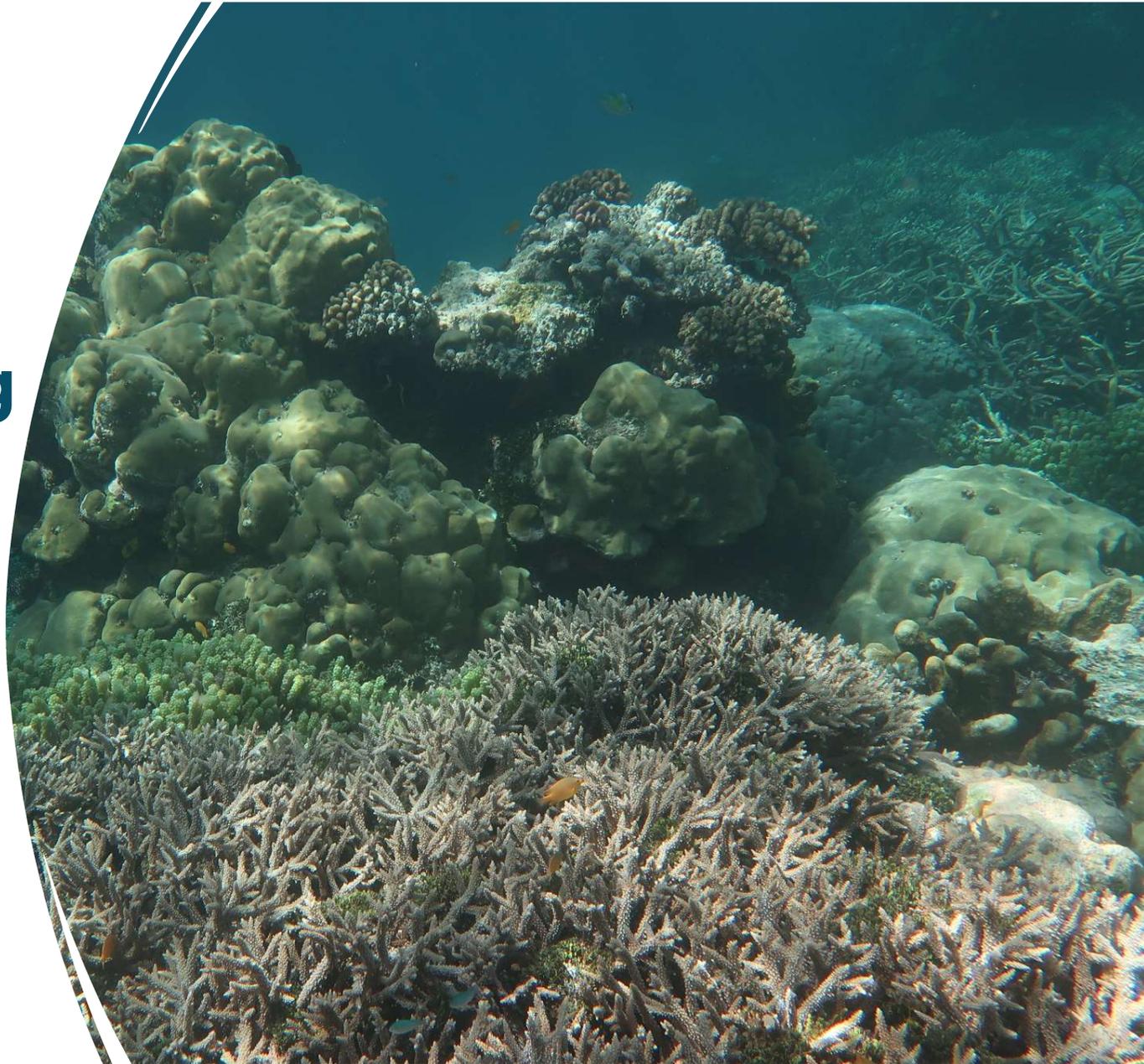
- Well developed, diverse reefs with high coral cover on the NE side of the islands.
- Reefs on the SW areas deeper and not as well developed or diverse.
- Fish density low – especially larger fish-eating fish and herbivores.
- Some bleaching on some of NE

What effects these reefs?

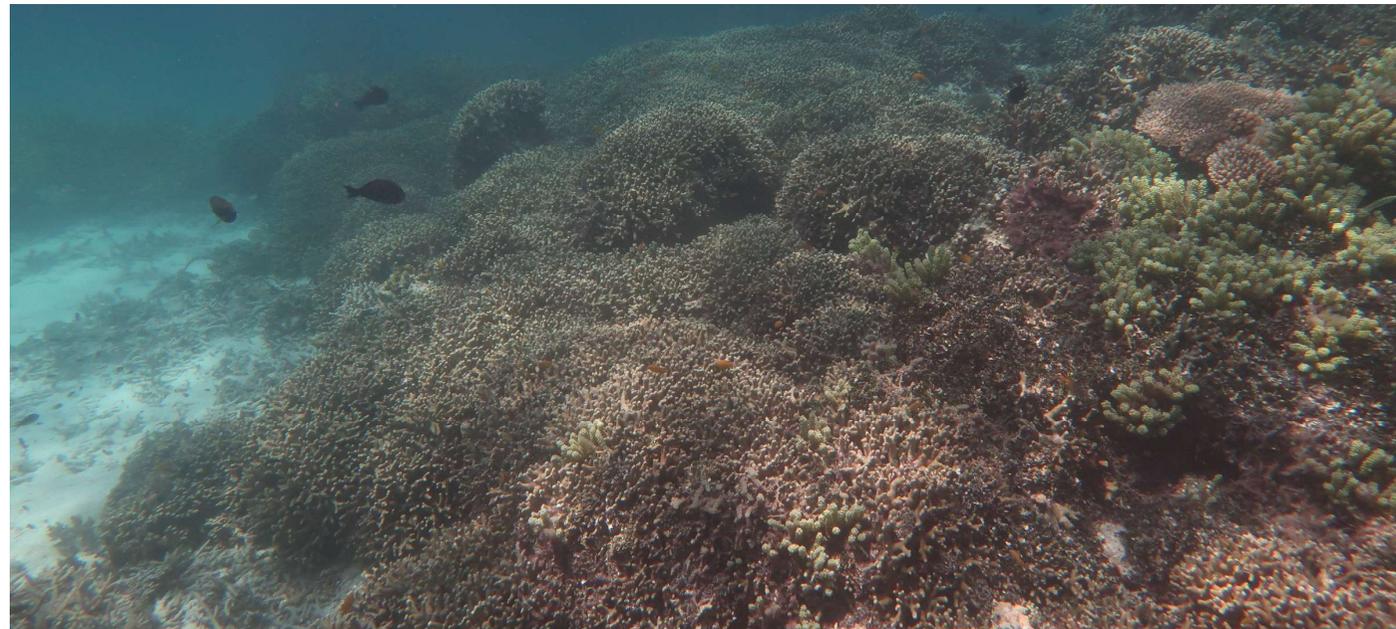
- Strong currents in some areas
- Good water quality in some areas
- Fishing and seaweed farming
- Good recruitment of new corals
- Reef use by local communities



**A good mix of
big heavy corals
and fast growing
more easily
damaged corals
at most sites**



**In contrast,
sites like
these, could
be left with
very little**

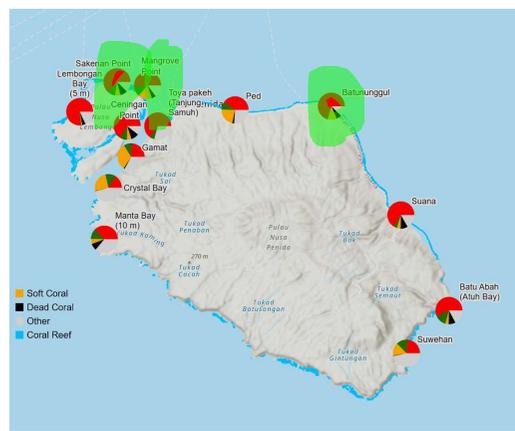
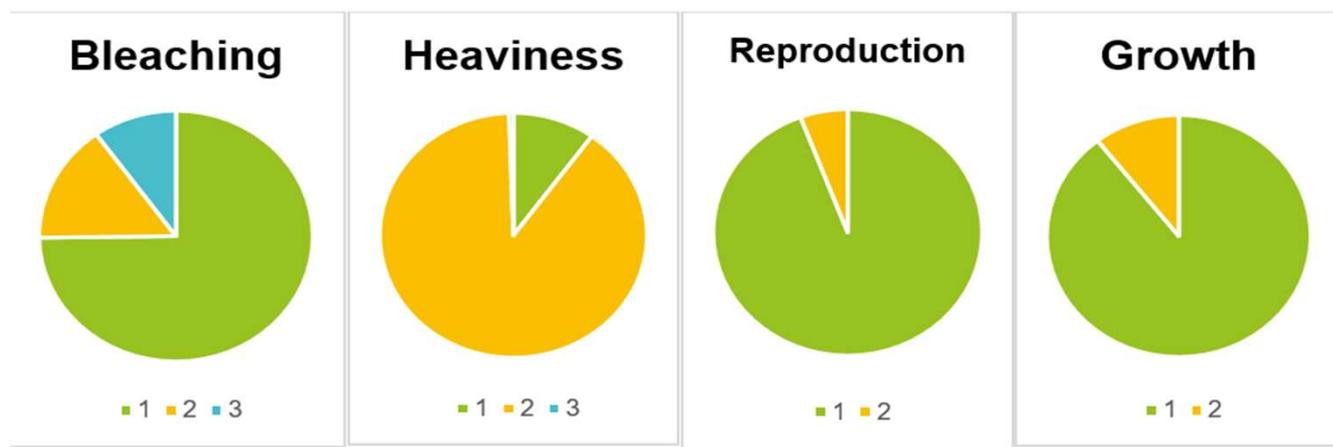


LR1

For each site, there is a high level of detail:

The northern reefs

- Hard coral dominant
- Low algal cover
- Large reef flats – good coastal protection
- Seaweed farming areas
- Mostly bleaching sensitive, fragile, fast growing species
- Fast flowing current, cool clear water
- Popular snorkelling sites



Slide 31

LR1

Can we please one site only, and explain by way of example - we have done this kind of analysis for one site - we don't need to go into every site because we have a workshop covering this. Every info is available in the report. Detailed slides can be shared with them but for presentation we don't need to go in such a detail we have limited time

Lorena Ramirez, 2025-11-25T05:07:31.704

LR1 0

Focus on northern reefs as example of what info collected, level of detailed etc - and remove rest of site specific slides.

Lorena Ramirez, 2025-11-25T05:12:26.030

Restoration Potential is based on:

- **What sorts of corals present – how many are likely to survive a cyclone / marine heatwave?**
- **How accessible is the site for restoration? Is it safe? Are there strong currents, big swells?**
- **How valuable is the site? (coastal protection, what is on the reef, potential as a snorkeling site)**
- **What is the likelihood of good recovery with no restoration?**



Site	Restoration potential
Mangrove Point	High priority
Batununggul	High priority
Sakenan	High priority
Ped	Medium priority
Ceningan Bay	Low – medium priority
Toya Pakeh	Low – medium priority
Batu Abah	High priority
Suwenan	Low priority
Suana	Medium priority
Crystal Bay	Medium priority
Gamat	Medium priority
Manta Bay	Low priority
Lembongan Bay	High priority

What are the threats?

Future marine heatwaves

Storms, wave surges

Shipping accidents, anchor damage

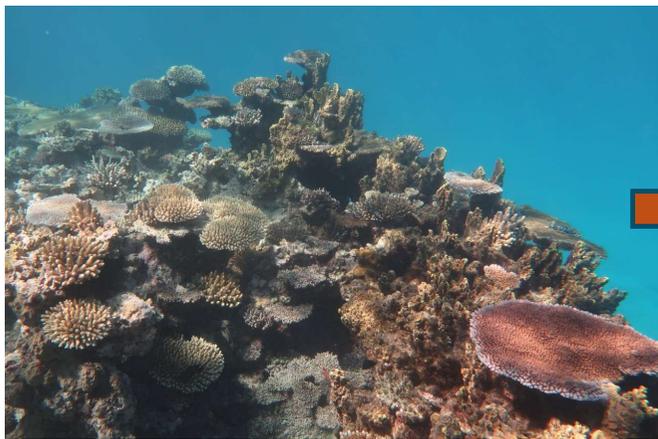
Crown of thorns outbreaks - future

Overfishing

Risks to water quality:

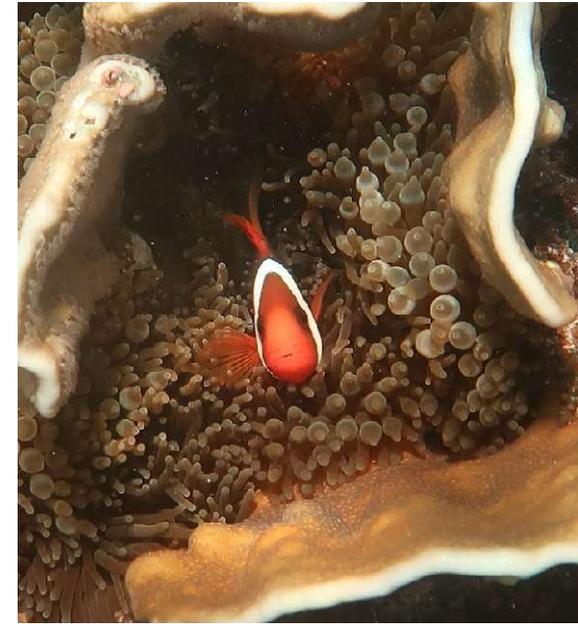
Fast development – risks from sediment from construction

Sewage from resorts and other developments



What can we do to protect the reefs?

- Manage them well to increase resilience of the reefs.
- Educate the public and visitors on the value of reef protection.
- Monitor so we are aware of changes to the reef
- Be prepared for disasters.





Questions?



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PRESENTATION

Coral Reef Post-disaster Risk Management & Restoration Plan

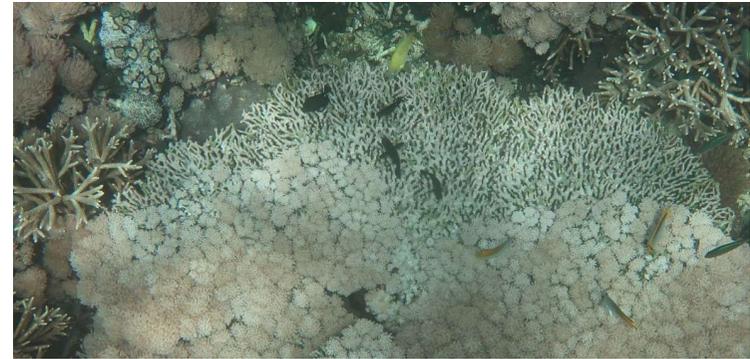
Selina Ward & Defy Pada

Coral Reef Ecologists



Managing for resilience

- Controlling fishing to increase herbivores and big fish
- Managing tourism to avoid damage and pollutants
 - ✓ good briefings for snorkellers
 - ✓ no collection by snorkellers
 - ✓ no effluent from boats
 - ✓ use of moorings to reduce anchor damage
 - ✓ management of boat numbers
- Strengthening enforcement
- Regulating shipping and port development
- Keeping water quality high
 - ✓ managing rapid development
 - ✓ sewage management
- Monitoring to detect change early



Stages of Restoration



Photo Mars Restoration



Photo - Reef Resilience Network

Ahead of the Disaster

- Make a restoration plan
- Train reef brigades
- Purchase equipment
- Make some equipment
- Organise permits, space for storage, agreements

When disaster happens

- Assess the damage
- Clear debris
- Make prioritisation plan
- Begin rescue work

Monitoring

Monitor the survival/ health of restoration work

Later

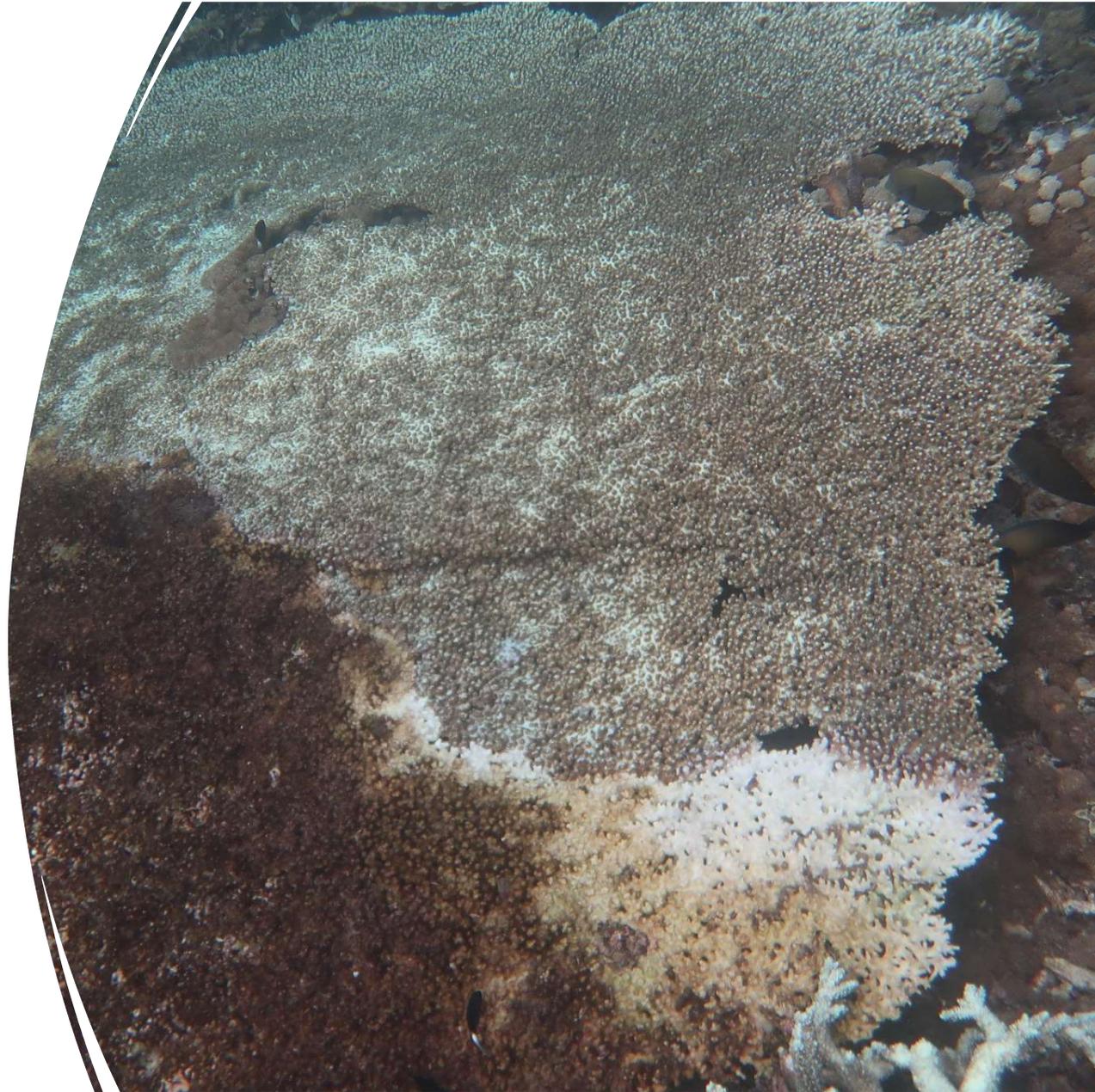
Begin program of later restoration – fill in gaps in space and diversity if deemed necessary. For a bleaching event, this would be where the actual restoration starts

Ahead of the disaster

Reef brigades - as timing is crucial, need many hands. Train the brigades to understand what will happen, how decisions will be made, learn the skills they need on land and in the water, learn how to do the work safely.

Repeat the training each year.

Advantages for Nusa Penida - existing expertise and experience



Ahead of the disaster



Getting the equipment that will be needed



Making some of the equipment



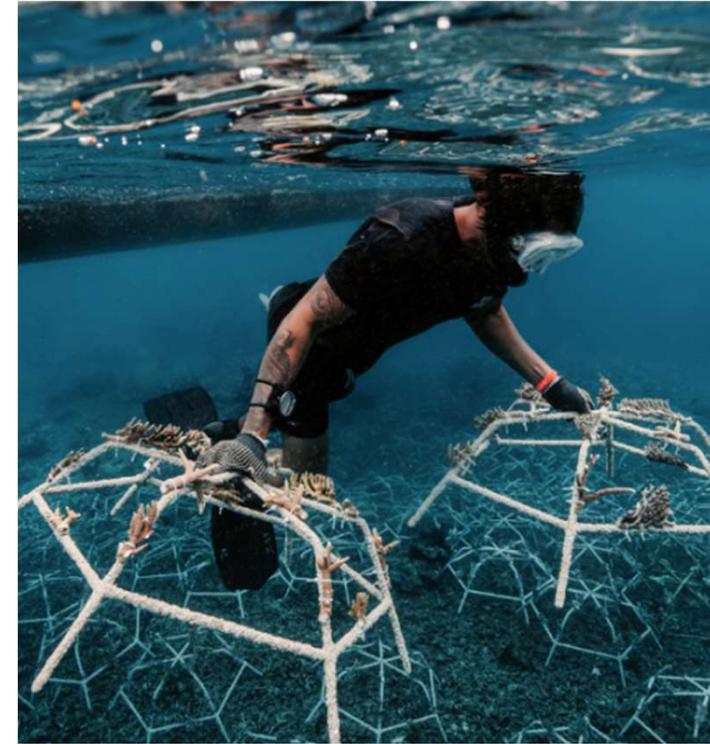
Organising space for storage



Organising permission for work once event happens



Deciding on priority areas within sites for restoration



Work as soon as possible after the event

Assess the damage – visiting sites for rapid assessment, recording debris situation, levels of damage, fish presence

Prioritisation plan – How to deal with debris. How many sites damaged? How many safe to work? Which get priority? Which sites need fish domes?

Start the debris clearing

Start the rescue work if cyclone.

Flip back table corals that have been overturned

Replace dislodged corals on to reef

Collect fragments of opportunity (FOO)

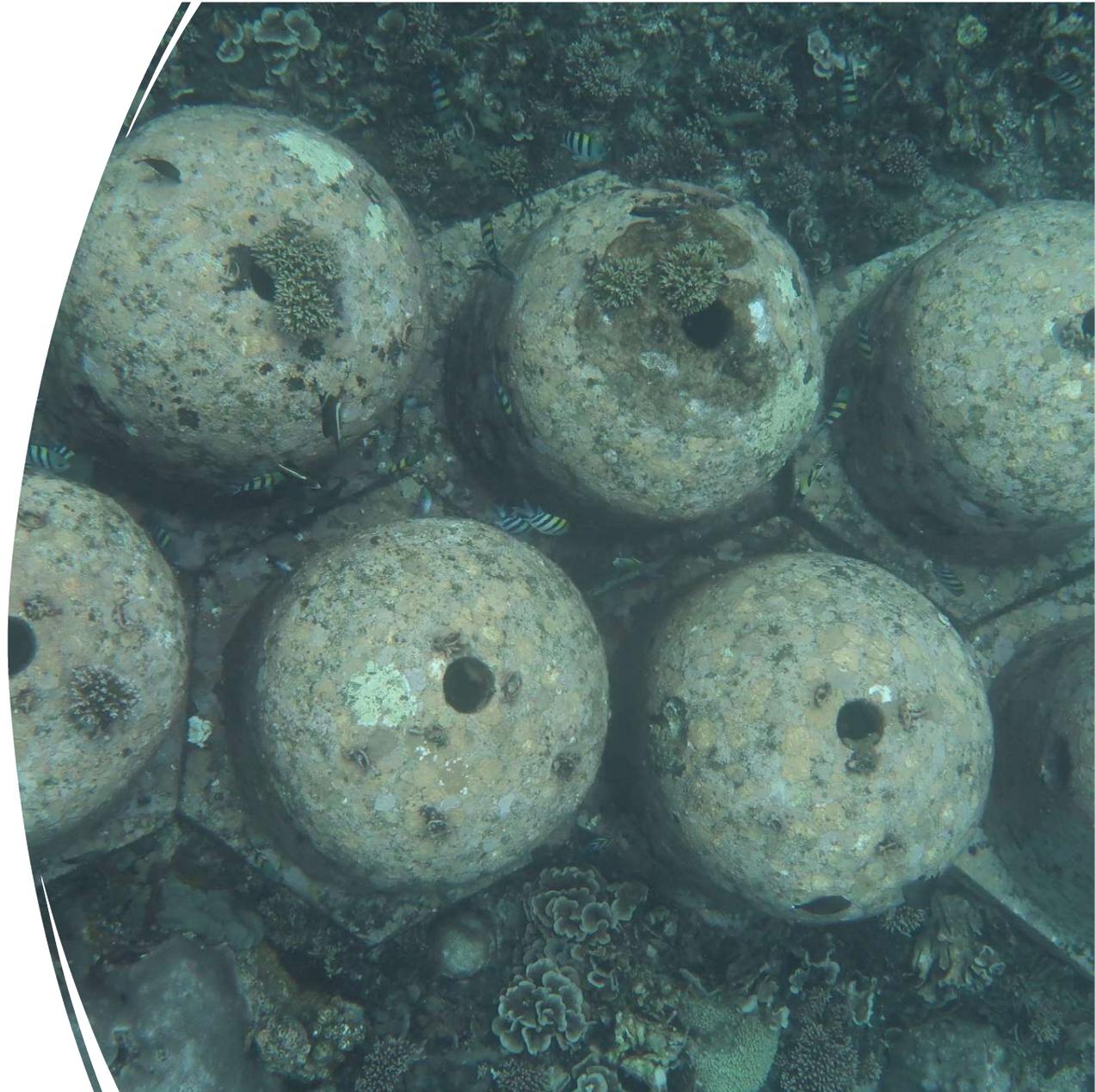


Prioritization of sites and key actions

Key questions for decisions:

- Which sites can be reached safely by boat and can safely take snorkelers.
- Consult restoration plan for restoration potential of each site
- How much damage has been sustained compared to intact healthy corals?
- How valuable the reef is in terms of tourism, diversity, uniqueness?
- How difficult it will be to do the work at each site?

Decisions will be made at this stage about the deployment of fish domes.



Monitoring

- It is vital to maintain and monitor this initial restoration work to help survival and be ready to decide whether more work needs to be done months ahead.
- Visit sites every 2 weeks for 3 months then 6 at months and every 6 months until 3 years post event.
- The later restoration may begin a few months after the event, so the monitoring would adjust to cover the new work as well.



Later Post Disaster Work

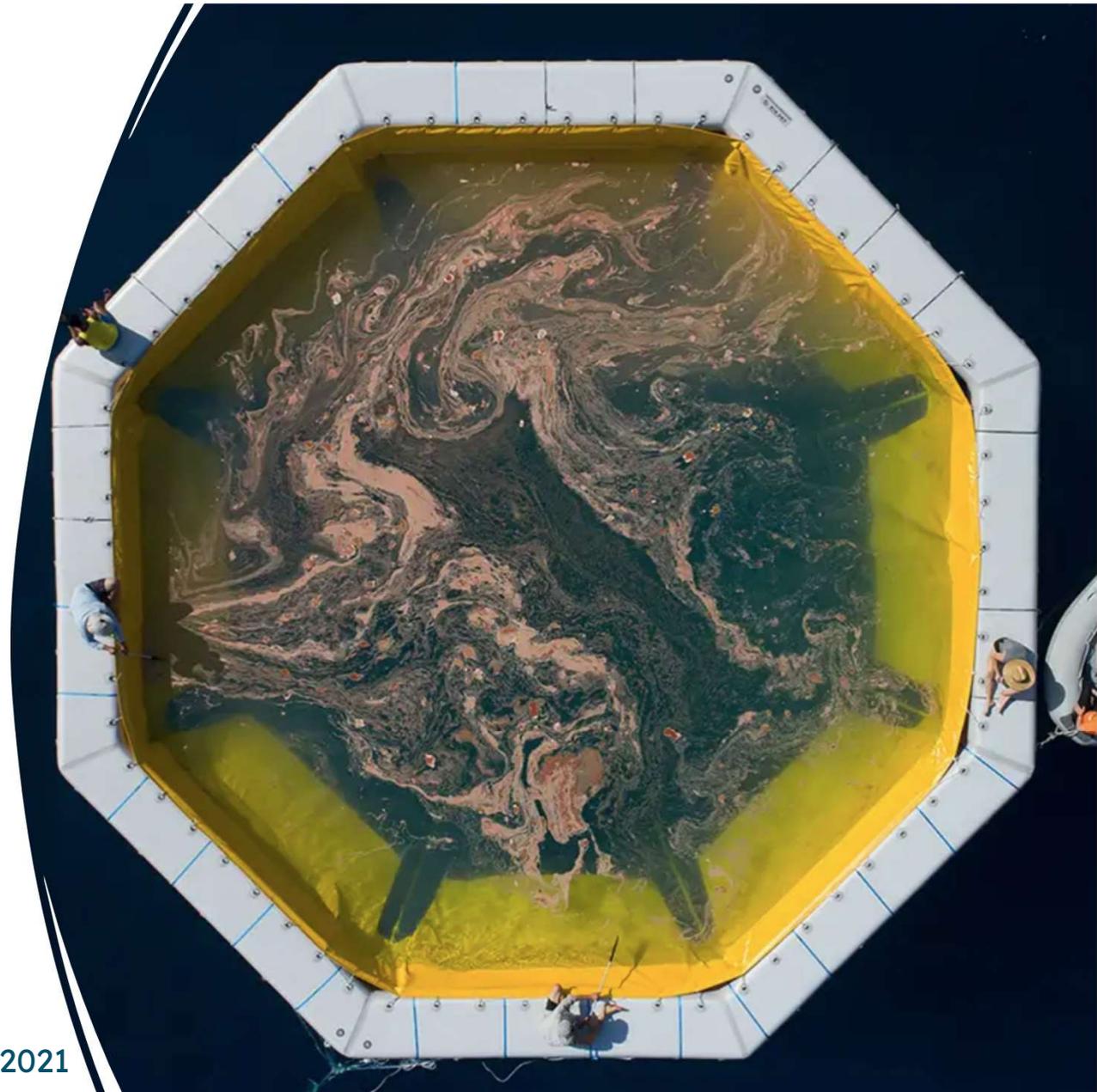
- Use of small pieces of fragments on frames, racks or clips to restore gaps.
- For a bleaching event, this would occur to assist replacement of dead corals once mortality has settled.



Reproductive restoration

- Using capture of wild spawn to plant large numbers of competent larvae on suitable reef areas.

Photo New Scientist 2021



Restoration budgets

- It is difficult to create restoration budgets as there are so many unknowns – how severe will the event be, how many reefs will be damaged etc
- The restoration plan has separate budgets for each of the stages of the restoration activity – prior, immediately after, monitoring, well after the event.
- There are costs for the brigade training and purchase and creation of materials prior and for the monitoring.
- For the other restoration work, the budgets are per hectare of reef restored. This can then be multiplied according to how much reef will be tackled. This will be dependent on the funding and human resources as well as availability of boats etc.

Restoration budget

Activity	Cost (Rp)
• Equipment purchased ahead of event	193 519 840
• Training of disaster workers	139 243 550
Total for pre-event	332 763 390
• Immediate post disturbance activity - assessment	126 243 550
• Immediate post disturbance activity – 1 hectare restoration	1 905 800 000
• Monitoring and management of restoration (3 years)	67 200 000
• Restoration work well after the disturbance	236 743 550
• Reproductive work at spawning time following the disturbance	271 620 818
Total for post event	2 607 607 918
Total for pre + post event	2 940 371 308

Slide 48

LR1

Selina providing slide with summary of restoration budget

Lorena Ramirez, 2025-11-25T13:01:11.153



Questions?



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Lunch Break



Selamat Siang!
Rahajeng Tengah!
Good afternoon!

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Afternoon Agenda

13:15 - 14:15

 **Coral Reef Ecosystem Valuation and Cost Benefit Analysis**

James Spurgeon

Ecosystem Valuation Specialist,
Sustain Value

 **Discussion facilitated by Viga Ananda**

Konservasi Indonesia

14:15 - 15:00

 **Policy, Legal and Regulatory Conditions to Support Financing Mechanism and Risk Transfer Instruments**

Justitia Avila Veda,

Legal and Governance Specialist,
Konservasi Indonesia

 **Discussion facilitated by Yani Namiruddin**

Konservasi Indonesia

Afternoon Agenda

15:15 – 16:00



**Insurance for
Coral Reef Risk Management**

Alison Drill

Disaster Risk Insurance
Specialist, Swiss Re



**Discussion facilitated by
Budiati Prasetiamartati**

In-country Coordinator,
Konservasi Indonesia

16:00 – 17:00



Discussion and next steps

Louise Heaps, Project
Director & **Budiati**

Prasetiamartati, In-country
coordinator



Closing Remarks

Thomas Kessler

Principal Finance Specialist,
Asian Development Bank

PRESENTATION

Coral Reef Ecosystem Valuation and Cost Benefit Analysis

James Spurgeon

Ecosystem Valuation Specialist, Sustain Value



Study Objectives

Considerable value generated by corals = Rp 737 billion per year!

1) Value the coral reefs around Nusa Penida

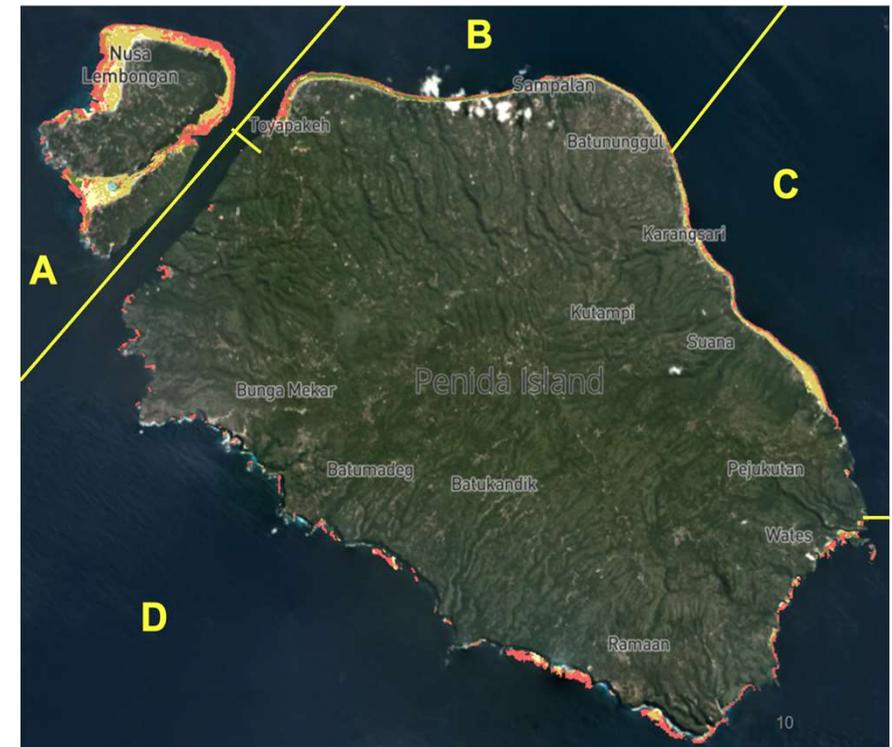
- Split into 4 coastal sections (A - D)
- Determine total annual & per m²/yr values

2) Conduct Cost Benefit Analysis

- Post impact restoration options
- Area to be restored
- Sensitivity analysis



Make recommendations



Total values and approaches applied



Considerable value generated by corals = Rp 737 billion per year!

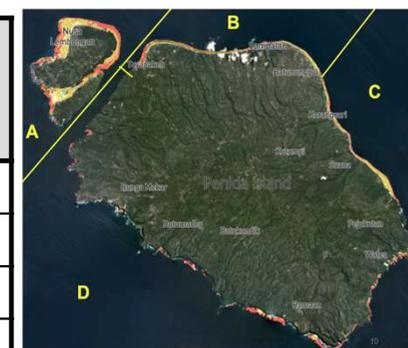
Ecosystem Service	Estimated value (Rp billion/year)	Valuation approach	Core source
Fishing (direct & indirect)	1.9	Market value: Catch volume x price x % dependence on nearby corals	Gov Statistics & academic papers
Seaweed harvest protected	39.3	Market value: Volume produced x market price	Gov Statistics
Coast protection (erosion)	26.7	Replacement cost: Length of coast with buildings and sea walls protected by corals x cost of sea wall	GoogleEarth
Diving and snorkelling	657.3	Expenditure: Diver & snorkeler #s x local expenditure	Stakeholders/ GoogleEarth
Surfing	12.3	Expenditure: Surfer #s x local expenditure x % dependence on live corals (75%)	Stakeholders/ Google Earth
Total	737.4		

Breakdown of coral ecosystem service values



- **West & South (D):** predominantly dive & snorkel - highest value = Rp 383 billion/yr
- **Lembongan (A):** 4 services over Rp 10 billion/yr - 2nd highest total = Rp 184 billion/yr
- **North coast (B):** 3rd highest total = Rp134 billion/yr

Item	Coastal Section A – Nusa Lembongan	Coastal Section B – North Penida	Coastal Section C – East Penida	Coastal Section D – West & South Penida	Total Value
Area of reef (coral/algae) (ha)	3,543	3,022	768	1,231	8,564
Area of hard coral (ha)	214	49	37	112	412
Direct fishing (IDR mil/yr)	207	138	-	-	344
Additional indirect fisheries support (IDR mil/yr)	754	83	165	504	1,506
Coast protection (IDR mil/yr)	10,284	14,461	1,917	-	26,661
Seaweed protection (IDR mil/yr)	34,408	4,283	638	-	39,329
Diving and snorkelling (IDR mil/yr)	135,275	114,866	24,565	382,130	657,286
Surf support (IDR mil/yr)	12,319	-	-	-	12,319
Resident conservation value (IDR mil/yr)	Potentially moderate value				?
Visitor conservation value (IDR mil/yr)	Potentially high value				?
Total value (IDR mil/yr)	193,696	133,830	27,285	382,634	737,445
Value per hectare of coral (IDR mil/ha/yr)	905	2,731	737	3,416	1,790



Note: Non-use/conservation value (i.e. willingness to pay to protect corals for its own sake, for others and for future generations) is not estimated – no need!

Main stakeholder groups benefiting from coral reef values



Stakeholder Group	How they benefit
Tourists (Foreign and domestic), and local residents	Enjoy diving, snorkelling and surfing which all depend on coral reefs. Plus non-use/conservation value.
Tour operators (diving & snorkelling boat tours and surf related)	>40 dive centers & snorkelling operators depend on coral health for business viability.
Coastal property owners (Hotels, restaurants, other businesses, municipalities and domestic)	Coral reefs' natural coastal protection function reduces potential flooding and erosion damage.
Fishers and seaweed farmers	Coral reefs support fishers directly and indirectly, Seaweed farmers depend on corals' coast protection function.
Other tourism related businesses (e.g. hotels, restaurants, tour operators and transport providers)	Benefit indirectly through tourism related expenditures linked to coral reefs - driving economic activity and supporting many livelihoods.
International populations	Non-use/conservation value - just knowing corals continue to exist for i) corals own sake ii) people using them and iii) future generations.

Proposed restoration costs – over 5 years

- **Total costs for restoration pre-event 1Ha = Rp 0.89 billion**
- **Total costs (pre and post event) for 1 Ha = Rp 3.5 billion**
- **Total cost (pre and post event) for 2 Ha = Rp 5.5 billion = Economies of scale**

Activity	Cost (Rp)		
	Fixed	Variable per Ha	Total for 1 Ha
· Equipment purchased ahead of event	178,519,840	15,000,000	193,519,840
· Training disaster workers (total for 5 years)	696,217,750	-	696,217,750
Total for pre-event	874,737,590	15,000,000	889,737,590
· Immediate post impact assessment	66,743,550	59,500,000	126,243,550
- Immediate post impact restoration	-	1,905,800,000	1,905,800,000
· Monitoring and management of restoration (total for 3 years)	67,200,000	-	67,200,000
· Restoration work well after the impact	236,743,550	-	236,743,550
· Reproductive work at spawning time following the impact	271,620,818	-	271,620,818
Total for post event	642,307,918	1,965,300,000	2,607,607,918
Total for pre + post event	1,517,045,508	1,980,300,000	3,497,345,508

Costs provided by Selina Ward (coral ecologist)

Approach to evaluate restoration benefits



$$\text{Restoration benefits} = \text{Ecosystem service value (Rp/m}^2\text{/year)} \times \text{Area of hard corals restored (m}^2\text{)} \times \text{Difference in years of restoration plan vs natural recovery (years)}$$

Proposed locations to be restored	Natural recovery rate (years post impact)	Restoration plan recovery rate (years post impact)
Fast growing corals (e.g. branching)	7	3
Slow growing corals (e.g. massives)	30	10

= 4 years of benefits

= 20 years of benefits

Benefit to Cost Ratios (BCR) per coastal section – Marine heating event

BCR = Benefit / Costs

BCR >1 = economically efficient

Higher BCR = greater economic efficiency

Different discount rates* applied (Best estimate is between 0 – 5%)

Proposed restoration plan is, on average, economically efficient in all coast sections for 1 Hectare of restoration**

Coastal section	BCR Undiscounted (zero)	BCR Discounted 5%	BCR Discounted 10%
A - Nusa Lembongan	1.9	1.5	1.3
B - North Penida	9.8	6.6	5.0
C - East Penida	2.0	1.5	1.2
D - West & South Penida	13.0	8.9	6.6

BCR per coastal section – Storm run-off (or cyclone)



Proposed restoration plan is, on average, only economically efficient in coast section B and D – for 1 Hectare of restoration

Coastal section	BCR Undiscounted (zero)	BCR Discounted 5%	BCR Discounted 10%
A - Nusa Lembongan	0.9	0.7	0.6
B - North Penida	4.2	2.9	2.2
C - East Penida	0.9	0.7	0.5
D - West & South Penida	5.9	4.0	2.9

- However, this i) excludes non-use/conservation value and ii) does not allow for a growth in tourism.
- With both these aspects included, all sites are likely economically viable to restore.

Benefit to Cost Ratios (BCR) for specific sites



- Assume 90% of value apportioned to the main dive & snorkel sites
- Main sites' activity split by evidence of activity levels (MPA surveys & GoogleEarth)
- 1 site's value based on surfing not diving and snorkelling (= Lembongan Bay)
- All of these main sites economically viable for restoration

Coastal section	Location	Proportion of fast growing corals (%)	Proportion of divers/ snorkellers at each site (%)	Spend (IDR/year)	Specific to dive/snorkel spots		
					Area of coral (approx)	IDR/m2/yr	BCR Discounted at 5%
A - Nusa Lembongan	N Nusa shore	82	15.1	111,160,194,880	20	555,801	4.3
	*Surf areas		n/a - surfers	12,318,750,000	10	123,188	1.1
	Other coral areas A		3.3	24,565,030,720	179	12,695	0.3
B - North Penida	N Nusa shore	56	8.0	59,285,437,269	30	197,618	2.5
	Toya Pakeh		7.5	55,580,097,440	19	292,066	3.5
C - East Penida	Coral areas C	69	3.3	24,565,030,720	37	67,008	0.6
D - West & South Penida	Gamut Bay	57	4.5	33,348,058,464	1	3,334,806	34.6
	Crystal Bay		25.1	185,266,991,466	4	4,631,675	48.1
	Dolphin Beach		8.0	59,285,437,269	2	2,964,272	30.8
	Manta Point		21.6	79,664,806,330	1	7,966,481	82.7
	Other coral areas D		3.3	24565030720	104	23,629	0.25
Total		63	100.0	657,286,115,280	411	159,865	1.66

BCRs for different size area of restoration



- Larger areas restored have a higher BCR and efficiency
- This is due to economies of scale (fixed & variable costs)
- The BCRs below are for restoration at Coast Section A (Nusa Lembongan) for 1 - 4 Ha of restoration:

Area restored (Ha)	BCR Undiscounted zero	BCR Discounted 5%	BCR Discounted 10%
1	0.9	0.7	0.6
2	1.1	0.7	0.7
3	1.2	1.0	0.8
4	1.3	1.0	0.8

- Restoration of 3 Ha or more generally appears economically viable
- But with additional 'non-use/conservation' value, likely to be even more viable

Potential revenues from visitor fees



- Considerable potential to use tourist revenues to pay for restoration/coral insurance
- Table shows potential revenues based on current fees x 2024 visitor numbers

Location	Type of fee	Potential Rp billion/year	US\$ million/year
Nusa Penida	MPA User fee (from 2022)	45	2.6
	Tourist entry fee (from 2024)	65	3.8
Bali	Tourist levy	900	54

- However, current MPA user fee collection rate is low for Nusa Penida (Rp 1.75 billion in 2023)
- Plus, potential use of US Government Debt for nature swap of US\$ 35 million which covers Nusa Penida, as part of the Lesser Sunda - Bunda Seascape.

Potential Nusa Penida fees alone = Rp 110 billion/year

Restoration costs are Rp 3.3 and 5.5 billion for 1 and 2 Ha respectively.

Extra issues raised during site visit by a main diver operator



'It is more urgent and important to manage tourist activity at Manta Point than to arrange coral insurance'

>40 dive & snorkel boats at Manta Point in July 2024



Key issues:

- 1) Excessive divers and snorkelers
- 2) Beginner snorkelers (& divers?)
- 3) Limited control & oversight
- 4) Site is very small
- 5) Site exposed to swells

Potential Risks:

- 1) Human injury & death
- 2) Scare away the Manta rays

Conclusions

1. Extremely high value of coral reefs (Rp 737 billion/yr) – especially dive and snorkel related
2. Values are highly site specific – main dive/snorkel sites + surf area are highly valuable
3. Proposed restoration plans are cost effective
 - Marine heating: All coastal areas (BCRs of 1.2 to 13)
 - Storm run-off (cyclones) for main dive, snorkel and surf sites (BCRs of 1.1 to 83)
4. More economically efficient to restore larger area (e.g. 2+ Hectares)
5. Considerable potential visitor fee revenues (Rp 110 billion/year on Nusa Penida)
6. Manta Point activities currently risk human life and scaring off Manta rays

Recommendations

1) Three coral management actions proposed:

- i. Enhanced coastal zone management
 - Investigate coral related impacts, dependencies, risks and opportunities
 - Optimise associated management
- ii. Targeted ongoing monitoring surveys and restoration
 - Part financed & voluntary
 - Include small scale restoration
 - Cover for several hectares
 - Target most valuable sites
- iii. Implement risk financing for major impacts
 - Marine heating and storm run-off

2) Investigate and implement improved MPA fee collection system

3) Investigate and enhance management of Manta Point

Alignment of survey & valuation sites & overall restoration priority

Coast section	Coral survey location	Good restoration potential	Economic valuation location	Economic viability of restoration	Overall priority
A	Mangrove Point	Yes	North Lembongan shore	4.3	High
	Ceningan	No	Other coral area A	0.3	Low
	Sakenan	Yes	North Lembongan shore	4.3	High
	Lembongan Bay	Yes	Surf area	1.1	High
B	Toya Pakeh	Yes	Toya Pakeh	3.5	High
	Batununggul	Yes	North N Penida shore	2.5	High
	Ped	Yes	North N Penida shore	2.5	High
C	Suana	Yes	Other coral area C	0.6	Medium
D	Batu Abah	Yes	Other coral area D (Core Zone)	High Non-use value	High
	Suwenan	No	Other coral area D	0.25	Low
	Crystal Bay	Yes	Crystal Bay	48.1	High
	Gamat	Yes	Gamat	34.6	High
	Manta Bay	No	Other coral area D	0.25	low
	Not included in ecological surveys			Dolphin Beach	30.8
			Manta Point	82.7	Medium?

- Prioritization based on study's ecological surveys and coral valuation.
- 9 priority locations

PRESENTATION

Policy, Legal and Regulatory Assessment

Justitia Avila Veda

Senior Policy Manager,
Konservasi Indonesia



Alignment with National Policies and Framework



National Long Term Development Policy



National Medium Term Development Policy



Indonesia Blue Carbon Strategic Framework



Indonesia Blue Carbon Roadmap/Action Plan



FOLU Net Sink 2030



Indonesia 30 by 45



Indonesia Biodiversity Strategic Action Plan (IBSAP)

UNITED STATES AND INDONESIA SIGN LANDMARK DEBT-FOR-NATURE SWAP TO PROTECT CORAL REEF ECOSYSTEMS

Nature for Debt Swap TFCCA

Overview of Policy Gaps



Gap in Thematic Law

- Existing regulations focus on conservation and restoration, not on financial risk transfer mechanism such as coral reef insurance
- No legal definitions of parametric triggers or ecological indicators to active post-disaster payouts
- Policies align with conservation targets but lack provisions for sustainable financing frameworks



Gap in Insurance Design

- Indonesia has experience with parametric insurance, but marine ecosystems are not yet included
- No ecological-based triggers or models designed for coral reef health or damage assessment
- Limited institutional capacity and no regulatory framework to support ecosystem-based insurance design



Gap in Financing the Insurance

- No dedicated budget mechanism for risk transfer at national or subnational levels
- Disaster funding remains reactive and focused on post-event response, not proactive protection
- Coral reef insurance requires multi-source financing (government, private sector, tourism levies, climate finance, and innovative instruments)

Identification of Risk Transfer Entities

Identification Criteria

- **Legal mandates:** Owns a valid business license from the Fiscal Services Agency (OJK)
- **Relevance:** Potentials in developing nature-based insurance product e.g., coastal ecosystem and reef protection
- **Technical Capacity:** Able to support risk-transfer mechanism, including parametric insurance and climate risk modeling.

Entities identified:

- Private insurance company
- Private reinsurance company
- Foreign insurance company
- State-owned insurance provider
- State-owned reinsurance provider
- Foreign reinsurance company



Risk Transfer Entities

Entities Category	Types	Licensing Requirement	Key Roles
Local	Private Insurers & Private Reinsurers	Licensed by the Financial Services Authority (OJK)	Provide underwriting, product development, and actuarial capacity; can technically deliver parametric climate and ecosystem insurance
	State-Owned Insurance Companies	Licensed by OJK and require an operating permit from the Ministry of State-Owned Enterprises	Can deliver government-backed or subsidized coverage and align insurance products with national development and financial inclusion policies.
	State-Owned Reinsurance Company	Licensed by OJK and require an operating permit from the Ministry of State-Owned Enterprises	Strengthens domestic insurance capacity by absorbing risk and supports pricing and technical modelling for climate-related products.

Entities Category	Types	Licensing Requirement	Key Roles
Offshore	Foreign Insurers (Locally Established)	Licensed by OJK	Issue policies directly without the need for a fronting entity and can cede risk to both domestic and international reinsurers.
	Foreign Insurers (Not Locally Established)	Not licensed domestically; must partner with a locally licensed insurer	Cannot issue policies locally and require a fronting insurer. May act as a technical partner or structure risk transfer solutions through the local insurer.
	International Reinsurers	Operate through reinsurance agreements with local insurers	Provide risk capacity through reinsurance agreements with locally established insurers and supports coral reef insurance product structuring and pricing.

Stakeholder Mapping Analysis

- Institutional roles
- Relevance to coral reef insurance
- Level of influence towards the insurance
- Stages and engagement period

Shortlisting Potential Policyholders

- Legal mandates
- Insurable interest
- Governance and financial capacity



Potential Policyholders

Main criteria	Nusa Penida Public Services Agency (BLUD) <i>(upcoming)</i>	Bali Marine and Fisheries Agency	Nusa Penida Ecotourism Business Association
Legal mandates	MoHA Reg 79/2018 allows the establishment of BLUD for efficient financial management	Operates based on Balinese Gov Reg 25/2023, has authority over 12 nautical miles	Recognized by the local government, has CSR programs
Insurable interest	Can be determined as the technical unit responsible for marine conservation in Nusa Penida	Has the strongest jurisdictional claim over coral reef and authority to represent public interest in the insurance	Dependent on coral reef health for their business
Governance and financial capacity	High flexibility in managing external funding and ability to receive various source of funds.	Can propose funding to the local development agency, but requires regulatory basis for managing insurance claim	Flexible in mobilizing fund, with varied capacity of among business actors and highly dependent on internal coordination

Source of Financing based on Policyholder

Policyholders	Potential Source of Funds	Challenges and Concerns
Nusa Penida Public Services Agency (BLUD)	<ul style="list-style-type: none"> ● Allocation from the provincial budget (APBD) (by request) ● MPA user fee ● Tourism user fee Nusa Penida ● Bali Tourism levy ● Private-sector funds ● Funding from NGOs 	<ul style="list-style-type: none"> ● Lengthy establishment process ● APBD funding depends on annual approval and local political dynamics. ● Cross-sector support is needed post-establishment.
Bali Marine and Fisheries Agency	Allocation from the provincial budget (APBD) (by request)	<ul style="list-style-type: none"> ● APBD funding unpredictable ● Cannot manage claim directly; must be administered through the provincial treasury. ● Requires an agreement with the institution responsible for claim management.
Nusa Penida Ecotourism Business Association	Contributions from tourism operators (such as dive and snorkeling operators)	<ul style="list-style-type: none"> ● Resistance due to concerns over profit motives and financial transparency. ● Voluntary contributions are unstable ● Lacks the legal mandate and capacity to manage large funds.



Rationale for Nusa Penida BLUD as the policyholder

Financial and operational flexibility

- Ability to receive, allocate, reinvest revenues from service users, APBD, external grant and non-grant funds
- Authorized to manages claim payouts

Clear legal mandate and direct insurable interest

- Directly responsible for the stewardship of the reef based on Law 23/2014
- Will operate under the Bali Marine and Fisheries Agency

Transparent and multistakeholder governance structure

- Multi-stakeholder oversight mechanism
- Enable collaboration across local communities, government agencies, tourism operators, and conservation organizations

Conclusions and Recommendations

- **Regulatory framework:**
 - While coral reef insurance is aligned with Indonesian main policies, MMAF needs to advocate legal recognition of coral reef as insurable assets.
- **Governance and policyholder:**
 - **BLUD model is preferred** as the policyholder and its establishment need to be prioritized.
- **Risk transfer and reinsurance:**
 - Partnering with local insurers (licensed by OJK) and global reinsurers (forming consortia) while parametric triggers validated by BMKG.

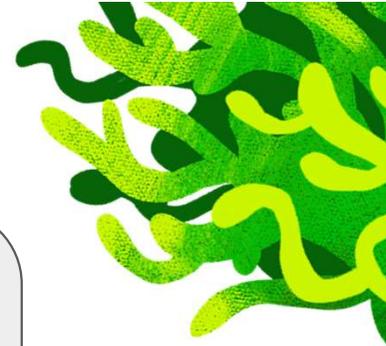


Conclusions and Recommendations

- **Financing mechanism:**
 - No existing funding in the thematic law and budgetary framework.
 - Blended finance model (public budget, tourism revenues, private funds, etc) to be explored.
- **Risk management strategy:**
 - Risks include financial instability, regulatory uncertainty, low awareness, and environmental pressure
 - Mitigation requires diversified funding sources, legal reform, strengthening governance, market incentives, and community engagement strategies.



Risk and Mitigation Strategy



Financial Risk

Description: Funding uncertainty, reliance on APBD, and volatile private-sector revenue.

Impact: Inconsistent premium payments → insurance coverage is disrupted.

Mitigation Strategies:

- Diversify funding sources.
- Apply co-financing and phased-premium models.
- Leverage external donor support.

Regulatory Risk

Description: The scheme is new and lacks a clear legal foundation.

Impact: Legal ambiguity reduces participation and weakens legal protection.

Mitigation Strategies:

- Support formalization of ecosystem-based insurance regulation.
- Advocate integrating ecosystem insurance into risk-financing policies.

Governance Risk

Description: Fragmented inter-agency coordination leads to slow decision-making.

Impact: Delays in claim distribution → inefficient implementation.

Mitigation Strategies:

- Develop joint protocols to streamline decision-making and strengthen accountability.

Market Risk

Description: Low interest due to the novelty, limited data, and high premiums.

Impact: Low insurer participation and a very narrow target market.

Mitigation Strategies:

- Partner with global insurers/reinsurers to lower premiums.
- Provide incentives to encourage insurer participation.

Community and Stakeholder Risk

Description: Low awareness and resistance from tourism operators and local communities.

Impact: Challenges in securing sustainable financing.

Mitigation Strategies:

- Conduct targeted outreach and capacity-building.
- Implement fair benefit-sharing mechanisms.



Questions?



ASIAN DEVELOPMENT BANK



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Coffee Break



PRESENTATION

Recommendations on Insurance for Coral Reef Risk Management

Alison Drill

Disaster and Insurance Specialist,
Swiss Re



Swiss Re process and contribution to the consulting program



1. Climate & Disaster Risk Assessment

Analysis: Desktop research to understand climate risks, informed by historical data and current trends.



2. Impact and Insurability Assessment

Relevance: Understanding actual experiences and needs – local stakeholders reef ecologists, natural capital assessments, local regulatory environment



3. Risk Financing Recommendations

Solutions: Concepts that can be translated into self-funded or insurance solutions
Recommended insurance solutions are dependent on the data availability and stakeholder needs

We are here
Final
Workshop

Recommendations for Nusa Penida

Based on desktop climate risk assessments and onsite stakeholder consultation, recommendations are for a **holistic Risk Management Program** that includes:

- **protection** - conservation and enforcement actions to protect existing reef
- **disaster preparation** - planning, resources and capability for post event action
- **emergency fund** – self-financed reserve for moderate or frequent events
- **risk transfer** - parametric insurance to provide prompt claims payout post event

This is funded by a **blended financing approach**, combining

- designated amount of tourist levies and user fees,
- government and/or commercial budgets, and
- temporary philanthropic support

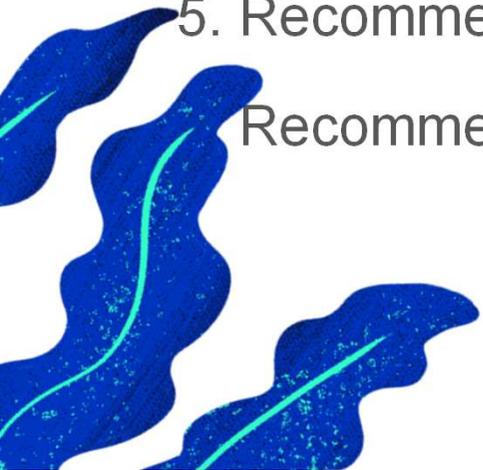
Implementation is staged to ensure

1. Ownership and financing established
2. Enforcement, protection and resilience building programs in place
3. Integration of emergency fund and insurance program once disaster preparedness capability is in place

Parametric (index-based) insurance cover for extreme sea surface temperature is recommended to compliment the coral reef risk management program. Excess rainfall parametric insurance could be explored subject to data availability.

Agenda

1. Risk Assessment Validation
2. Design Principles
3. Market Testing & Implementation Considerations
4. Recommendations - Risk management program
5. Recommendations - Financing
Recommendations - Insurance



2. Design Principles for Insurance

Following onsite research, stakeholder consultation, market testing and expert review, the insurance design focused on the most important needs of the impacted stakeholder groups:

	<p>✓ Affordability Premiums should be affordable over the long term for the policyholder</p>
	<p>✓ Simplicity and Transparency Clear and easy for stakeholders to understand the coverage provided, when it pays out and who receives the funds</p>
 	<p>✓ Minimised Basis risk Aim to reduce situations where the claim payout is much less than or greater than actual damages and repair costs</p>
	<p>✓ Commercial Sustainability Cover is availability in the open insurance market and pricing sufficiently attractive to insurers at market</p>

Parametric (index-based) insurance is recommended as the most appropriate cover against identified risks, as part of the holistic risk management program

3. Market Testing & Implementation Considerations

- Parametric insurance is already used in Indonesia for agriculture and sovereign disaster risk, and there is growing interest to expand this to community-level disaster risk resilience and natural assets such as coral reefs.
- Regulatory approval (OJK) required for parametric insurance policy in Indonesia. Local insurer may issue parametric policies with such regulatory approval; expected process to take up to several months.
- Success depends on a credible local policyholder (e.g., potential future establishment of Nusa Penida BLUD), strong data systems, sustainable funding and ongoing stakeholder engagement and education
- Parametric insurance for extreme sea surface temperature is innovative and new to the insurance market, (although Gili Islands is currently progressing a pilot case). Product design requires ongoing input and collaboration to refine appropriate triggers and data, and to ensure match to local reef conditions and stakeholder needs.
- Intense rainfall events leading to pollution and sediment runoff is a key climate risk, but current satellite rainfall data is insufficient for insurance triggers. Until more appropriate rainfall data is available, an emergency fund is recommended to provide funding for restoration after rainfall-pollution events and/or damage caused by storm-driven waves and other causes.

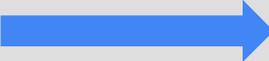
Consultation with insurers and brokers confirmed there is market interest for weather-based parametric insurance to support coral reef restoration. Indonesia parametric insurance is currently used for agriculture and sovereign disaster risk protection. Local insurer capability can be supported by international reinsurer expertise and capacity if needed.

*Market Testing contributors
(sample, not exhaustive)*



4. Recommendations – Risk Management Program

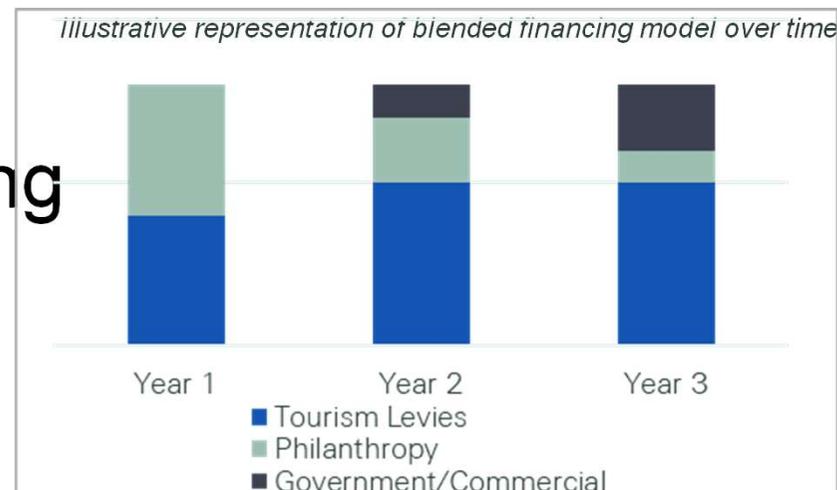
Accept	<p>1. Risk owner established. Identification and prioritisation of risks <i>BLUD proposed as risk owner (and policy holder) to be set up. Financed by visitor/tourism levies and other contributions.</i></p> 
Avoid	<p>2. Enforcement and protection management programs in place <i>Implementation and enhancement of programs to manage tourist impacts and fee collections Coral restoration and onshore activities to improve reef resilience</i></p> 
Reduce	<p>3. Resilience building and disaster preparation initiatives <i>Build capability and purchase equipment for disaster preparedness and post event action Accumulate Emergency Fund for frequent or moderate causes of reef damage</i></p> 
Transfer	<p>4. Integration of insurance program <i>Parametric insurance to fund post-event recovery and restoration</i></p> 

FINANCING NEEDS TO BE IN PLACE FIRST  **THEN INSURANCE CAN BE CONSIDERED**

5 Recommendations Financing

A blended financing approach is recommended:

- pool of tourist fees, government budget, commercial revenues and philanthropic/donor revenues, and
- supplement with alternative/innovative sources such as blue carbon credits, green bonds and impact investments.



Year	Funding Source	Recommendations and Potential Approaches
1	Tourism levies + philanthropic grant	<ul style="list-style-type: none"> • Enhance collection of Nusa Penida tourist fees and MPA user fees, to provide core funding . • Potential for grant support to build the supporting financing model, facilitated by expert local NGOs, such as KI.
2	Tourism levies + philanthropic grant + commercial revenues or government budget	<ul style="list-style-type: none"> • Robust collection of tourism fees directed to BLUD, improved capability and experience • Execution on grant-funded development work to help implement commercial revenue and alternative/innovative models, e.g., Tourism Agency collaboration, debt for nature swaps • Potential for allocation of local or national government budget
3	Tourism levies + commercial revenues or government budgets	<ul style="list-style-type: none"> • Tourism levies potentially increased by fees, e.g., marine permits, insurance premium levies • As the government & commercial funding stabilises, philanthropy is minor contribution • BLUD explores use of insurance to help to cover the costs of recovery post disaster.

5. Recommendations – Financing

Recommended (illustrative) Financing budget in IDR – for one Hectare of Reef restoration

- Costs are rounded from Ecosystem Valuation and Cost Benefit Analysis and reef ecologist reports. Operational Management & Conservation budget includes funds for enforcement, on-going conservation, restoration & monitoring activities. Ideally, it would also include budget for restoration & recovery costs for smaller or uninsured events, and accumulation of Emergency Fund reserves.
- It is expected that the larger insured post-event restoration costs would be covered by parametric insurance claim payouts up to IDR1Billion per Event if targeting 1+ hectare of reef restoration. The illustration below shows severe marine heating event(s) occurring in year 3, leading to restoration costs that would be funded from the claim payout.
- Insurance illustration designed for affordability and simplicity with claim payouts only for high marine heating (DHW > 8

YEARS	1. Ongoing Management & Conservation	2. Disaster Preparation Activities	3. Annual Insurance Premium	4. Post Event Restoration Activities	Total Estimated Budget (items 1, 2 and 3)
1	1,500m	330m	0	0	1,830m
2	1,500m	140m	150m	0	1,790m
3	1,500m	140m	150m	1,000m assumes large event in year 3	1,790m
4	1,500m	140m	150m	0	1,790m
5	1,500m	140m	150m	0	1,790m

Illustration for Nusa Penida, Indonesia - 2025 SST

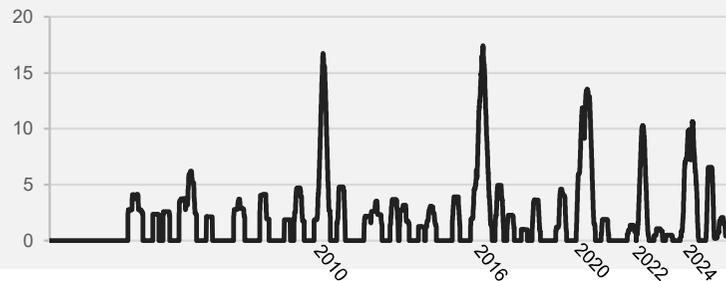
**Recommended Insurance (illustrative):
Extreme Sea Surface Temperature Parametric Insurance
Policy** Payouts aligned to anomalous SST events of
extended and/or extremely high SST surrounding Nusa
Penida



Degree Heating Weeks averaged across area (in DHW subject to minimum of 3-week duration)	Payout Factor in % of Event Limit
<8.0	0%
≥8.0 and < 11.0	10%
≥11.0 and < 14.0	50%
≥14.0	100%

Back testing to check relevance DHW (2000 – June 2025) – spatial average and detrended

Detrended DHW



Year	Heating Degree Week (HDW) average	Payout Factor	Payout Amount in IDR
2010	> 14	100%	1,000m
2016	> 14	100%	1,000m
2020	> 11	50%	500m
2022	> 8	10%	100m
2024	> 8	10%	100m

6. Recommendations – Parametric Insurance for Extreme SST (Illustration)

Insurance Policy

Indicative Term Sheet	Extreme Sea Surface Temperature (SST) Parametric Insurance Policy
Structure	Parametric "cat in a shape" insurance with stepped trigger covering reef area for sustained high sea temperatures that are highly likely to lead to coral bleaching within reef area defined as gridded shape. Insurance payout depends on the sustained high sea temperature defined as Degree Heating Weeks (DHW) within the shape.
Original Insured	Policyholder such as trust fund, commercial entity, local or national government entity
Insurer	Primary insurance company to issue the policy to the Original Insured. This primary company needs to be appropriately domiciled and regulated, and have the required authorization to issue parametric insurance
Reinsurer/ Reinsurers	Local or international reinsurance company that will provide the risk transfer protection for the insurer. May be one or multiple reinsurers assuming risk on same basis
Policy Term	From 00:00am Local Standard Time on [1 July 2026] (the "Effective Date") to 00:00am Local Standard Time on [30 June 2027] (the "Expiration Date") "Policy Term" shall mean the period from the Effective Date to the earlier of (i) the Expiration Date, or (ii) the effective date of termination of this Policy, trigger for such termination to be set out in the Policy. Alternative Policy Term may also be for multi-year policy period such as 3 years or 5 years from Effective Date, with individual "Cover" Years defined.
Insured Peril	This Policy covers the occurrence of an Eligible Event arising from the peril of extreme sea surface temperature only in the covered Territory. A condition for coverage is that the Insured has a genuine economic interest in the non-occurrence of the Eligible Event. Coverage is for response costs for reef repair and restoration after an Eligible Event, so coral reef itself is the covered asset. The Insured must have the necessary authorizations to undertake the reef repair and restoration at the covered sites.
Territory	This Policy shall only apply to Eligible Events occurring in Nusa Penida, Klungkung Regency, Bali, Indonesia
Currency	Indonesian Rupiah (IDR) Alternative USD. For convenience of stakeholders, the amounts shown are expressed in Indonesian Rupiah (IDR), but the insurance could be placed in US Dollars (USD) currency. Based on international reinsurance markets, it may be easier and more efficient (cheaper) to access international reinsurance capacity if insurance premiums and payouts are in USD.
Premium	The Premium for the Policy Term is estimated IDR 130M to IDR 200M payable within 30 days of the Effective Date. Premium components: Aggregate Limit IDR 1,000,000,000 Event Limit IDR 1,000,000,000 Annual Premium IDR 130,000,000 – 200,000,000

SST Event



Claim Payout



Restoration



Policyholder enters into insurance agreement and pays premium for annual (or multi-year) cover

Extreme SST event of anomalous high SST for extended period and/or extreme high temperature causes coral bleaching

Claim Payout calculated dependent on Degree Heating Weeks (DHW). Claim paid within 30 days to Policyholder

Post-Event restoration damage assessment and preparation, then replant coral and/or use reproduction techniques. Funding for restoration and related activities from claim payout

claim payout

6. Recommendations – Parametric Insurance. Next Steps for insurance placement

Requirement	Description	Recommendations and Status
Risk Owner/ Policy Holder	Legal entity that takes out policy and pays premium. Ability to fund risk management and insurance premium	<i>Recommended entity to be BLUD, legal entity to be set up</i>
Defined Hazard	Clear threat, peril or event with probability of occurrence (random, not ambiguous, nor inevitable)	<i>Recommended to insure high Sea Surface Temperature, use Emergency Fund for Rainfall (until appropriate rainfall data available)</i>
Financial Loss	High likelihood that hazard can cause quantifiable loss to insured asset or service	<i>Pending stakeholder validation of risk management and restoration recommendations</i>
Risk Management	Insurance integrated with risk management and risk reduction program; insurer aligned with policyholder goals	<i>Pending stakeholder validation of risk management and restoration recommendations</i>
Sustainable Funding for Premium and Risk Management	Reliable income stream to support ongoing risk management activities and annual premium payment	<i>Recommendation for a blended finance approach, improve MPA fee and KKK entrance fee collection system</i>



Questions?



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Discussion and Next steps

Budiati (Dias) Prasetiamartati and Louise Heaps

In-country coordinator and Project Director

Key conclusions:

-  Nusa Penida coral reefs have great value and offer an excellent opportunity for risk transfer, risk management and recovery solutions.
-  Parametric insurance for sea surface temperature (SST) is a viable option. Excess rainfall should be dealt with through an emergency fund.
-  The restoration costs after a marine heating event are Rp 0.5 to 1 bn for 1 Ha. Recovery and restoration costs after severe storm or excess rainfall event are Rp 2.6 bn for 1 Ha, mostly due to immediate coral rescue activity costs.
-  The illustrative costs associated with coral reef management and disaster risk financing is Rp 1.8 bn/year. For claim payout of up to Rp 1 bn for an extreme SST event, with smaller payouts for less intense but more frequent SST events, the estimated premium is Rp150 m/year from year 2 onwards.
-  Risk management and risk transfer finance options include tourism-related fees and will require improved collection and governance.
-  BLUD has been identified as the most suitable policyholder and it is recommended that it is established as soon as is practicable.
-  In the meantime, it is recommended that a multi-stakeholder taskforce is established to coordinate interim implementation steps, including how the restoration plan will be established and implemented.

Key questions:



Pertanyaan umum

1. Apa yang menurut Anda perlu dilakukan selanjutnya untuk mencapai tahap implementasi?



Pertanyaan pendanaan/keuangan

1. Apakah tarif masuk KKP Nusa Penida merupakan opsi yang layak untuk membiayai premi asuransi terumbu karang?
2. Bagaimana cara meningkatkan biaya pengguna dari Rp1,75 miliar (2023) menjadi potensi pendapatan tahunan Rp45 miliar?
3. Bagaimana pandangan Anda tentang biaya premi - apakah ini sesuai dengan ekspektasi Anda?
4. Bagaimana pandangan Anda tentang adanya dana darurat (emergency fund) untuk peristiwa hujan deras ekstrim?



Pertanyaan tata kelola

1. Bagaimana kemungkinan mendirikan BLUD - dan berapa lama waktu yang dibutuhkan? Apa langkah selanjutnya?
2. Bagaimana pandangan Anda tentang Tim Tugas Sementara Multi-Pihak (interim multi-stakeholder Taskforce)? Siapa yang harus menjadi anggotanya? Siapa yang harus memimpin? Apa yang diperlukan untuk mendirikan ini?
3. Bagaimana menurut Anda aliran dana dari pembayaran asuransi ke BLUD hingga tim restorasi?
4. Peran dan tanggung jawab untuk kegiatan restorasi terumbu karang?
5. Siapa yang akan menjadi anggota utama brigade terumbu karang?
6. Siapa yang akan menjadi pelatih restorasi?



Discussion and Next steps

Budiati (Dias) Prasetiamartati

In-country coordinator



Next Actions:

-  **Advocate policies at the provincial level by presenting the concept of coral reef insurance to the Governor, to ensure alignment with the region's vision and mission and natural resource protection priorities.**
-  **Strengthen sustainable funding schemes, including integrating KKP entrance fees into travel tickets and developing tourism levies (e.g., diving) to support insurance premium payments.**
-  **Initiating the establishment of the Nusa Penida KKP BLUD as a prerequisite for transparent and flexible financial management, as well as an official channel for insurance claim funds to flow into restoration activities.**
-  **Establishing a temporary multi-stakeholder task force to prepare collaboration mechanisms, transparent distribution of claim funds, and rapid response to emergencies such as mass coral bleaching.**



CLOSING REMARKS

Ministry of Marine Affairs and Fisheries





CLOSING REMARKS

Thomas Kessler

Principal Finance Specialist,
Asian Development Bank

Terima Kasih!
Suksma!
Thank you!



APPENDIX

Extra slides for discussion
and stakeholder meetings



Climate Risk Assessment Summary – Focus on Nusa Penida



Illustrative Budget (all amounts in IDR)

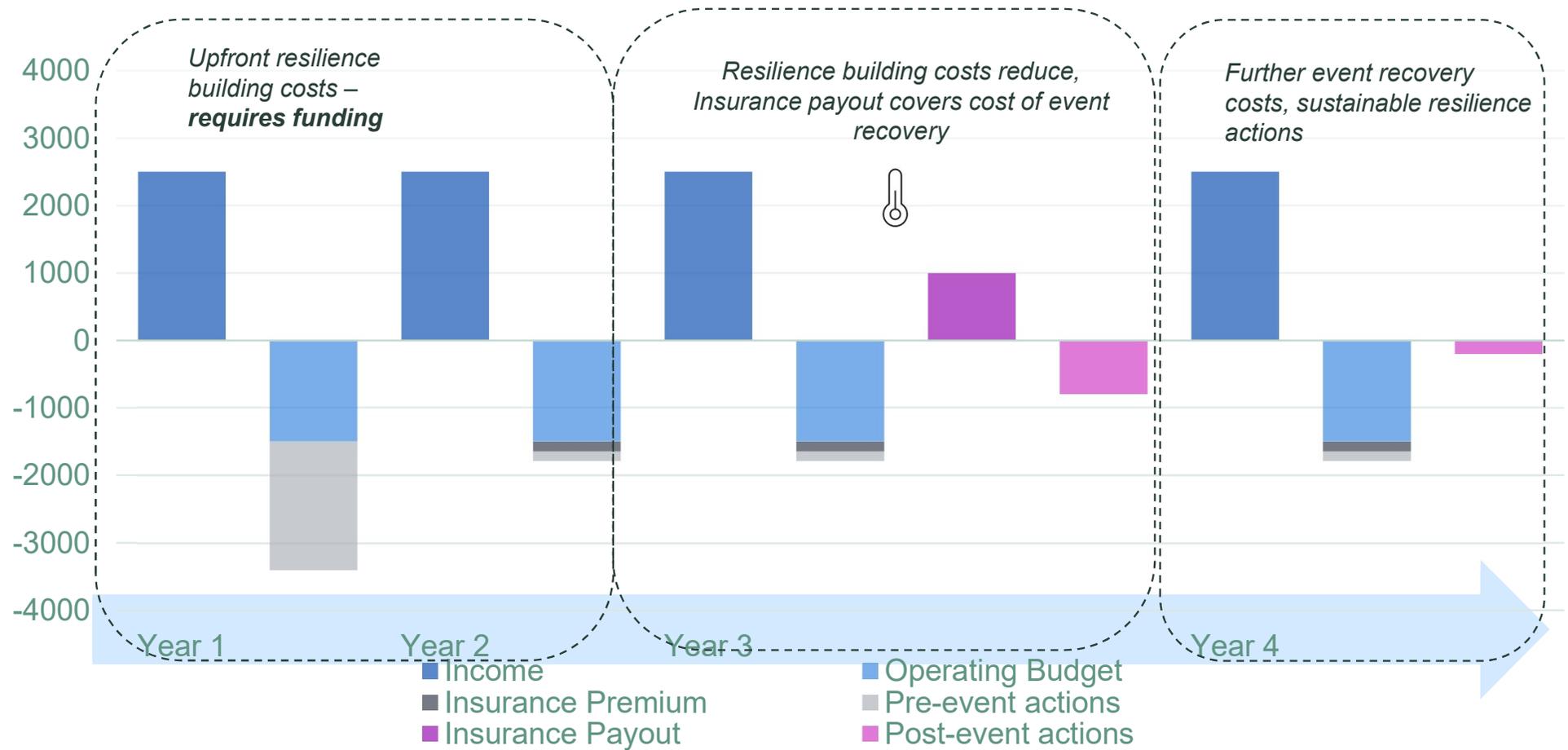
*potential
funding*

additional costs, funded via new BLUD

- Assumes purchase of parametric insurance for extreme SST at annual premium range IDR 130-200m
- Insurance payout of 1,000m estimate to cover majority of post event restoration and recovery costs, in the scenario of a large insured event loss

Year	Income from e.g., tourism fees, donors other.	Operating budget for BLUD	BLUD Emergency fund allocation	Pre-event Disaster Preparation Activities	Annual Insurance Premium	Post event Restoration Activities	Estimated annual budget requirement
1	2,500m	1,300m Admin, ongoing conservation, monitoring	200m Initial fund buildup	1,900m upfront investment and equipment purchase	0	0	3,400m
2	2,500m	1,300m Admin, ongoing conservation, monitoring	200m Contingent use for post-damage repairs or fund buildup	140m Annual training as per project report	150m	0	1,790m
3	2,000m	1,300m Admin, ongoing conservation, monitoring etc.	200m Contingent use for post-damage repairs or fund buildup	140m Annual training as per project report	150m	1,000m Insurance payout Assumes one large event in 3 years	1,790m
4	2,000m	1,300m Admin, ongoing conservation, monitoring etc.	200m Contingent use for post-damage repairs or fund buildup	140m Annual training as per project report	150m	0	1,790m

Illustrative Cash Flow showing event in Year 3 (all amounts in IDR millions)

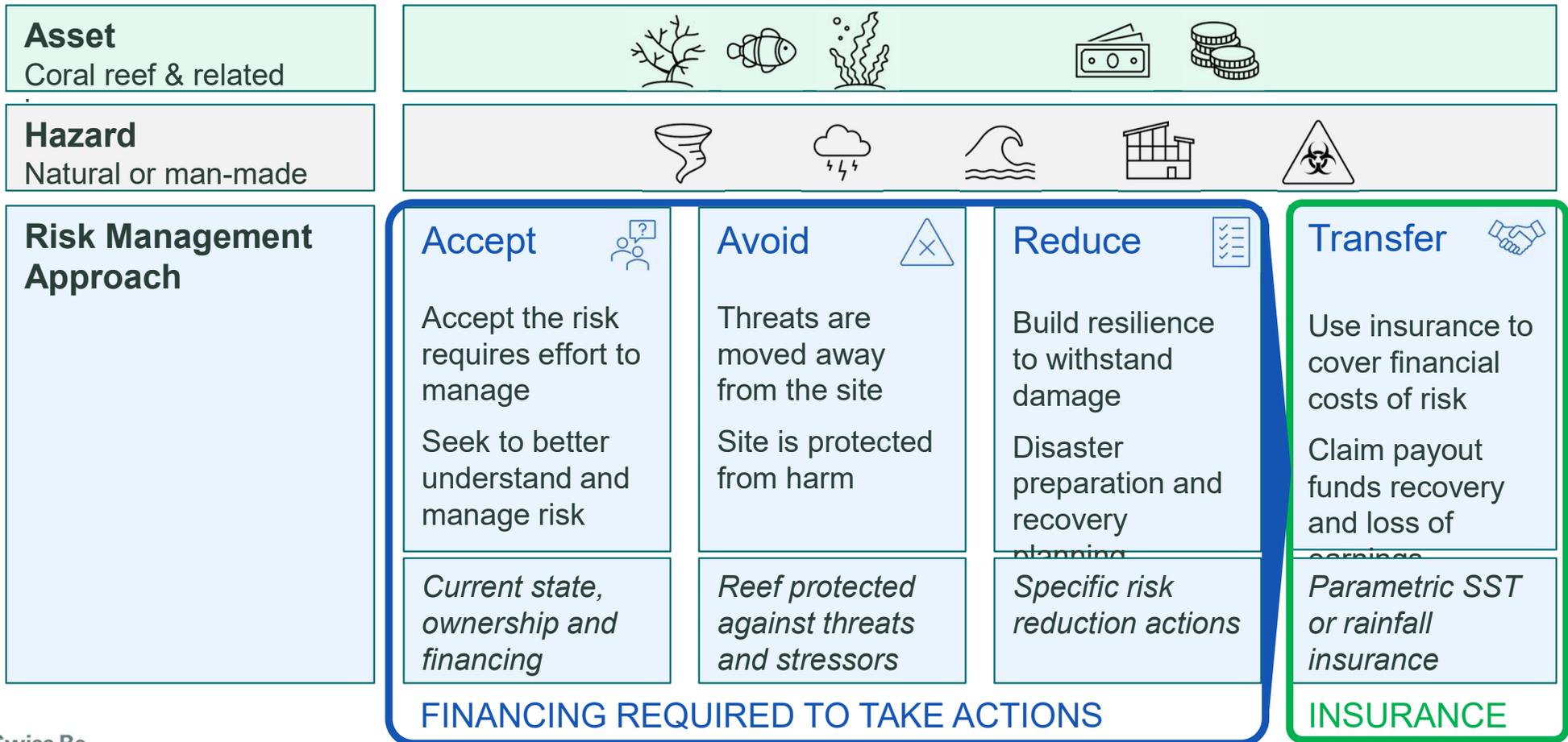


The Role of Insurance to Support Coral Reef Risk Management



Risk Management Approaches

Effective and holistic risk management uses a combination of all approaches



Insurance can help stabilise public budgets and ensure funds for disaster recovery

WITHOUT INSURANCE



Higher costs

- Emergency response costs
- Reconstruction costs
- Community support



Lower revenues

- Lower income from taxes / tourism
- Loss of investor confidence



Funding options

- Donor assistance
- Increase taxes / levies
- Raise debt
- Reallocation of budgets



Illustrative

WITH INSURANCE



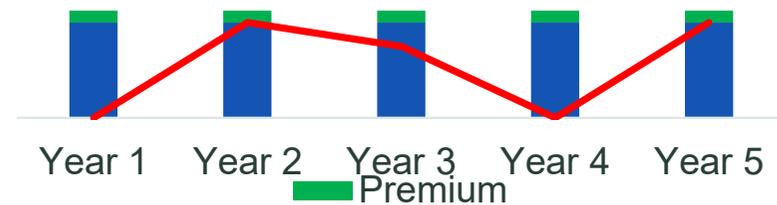
Risk management

- Insurance premium part of annual budget
- Ongoing risk management program – enhanced with insurance



Post event assurance of funds

- Insurance payout helps to fund repair and recovery costs
- Operational budgets are less impacted
- Insurance payout covers the excess of costs when needed, creating budget stability
- It also frees up funds allocated for disaster relief to be invested into resilience initiatives



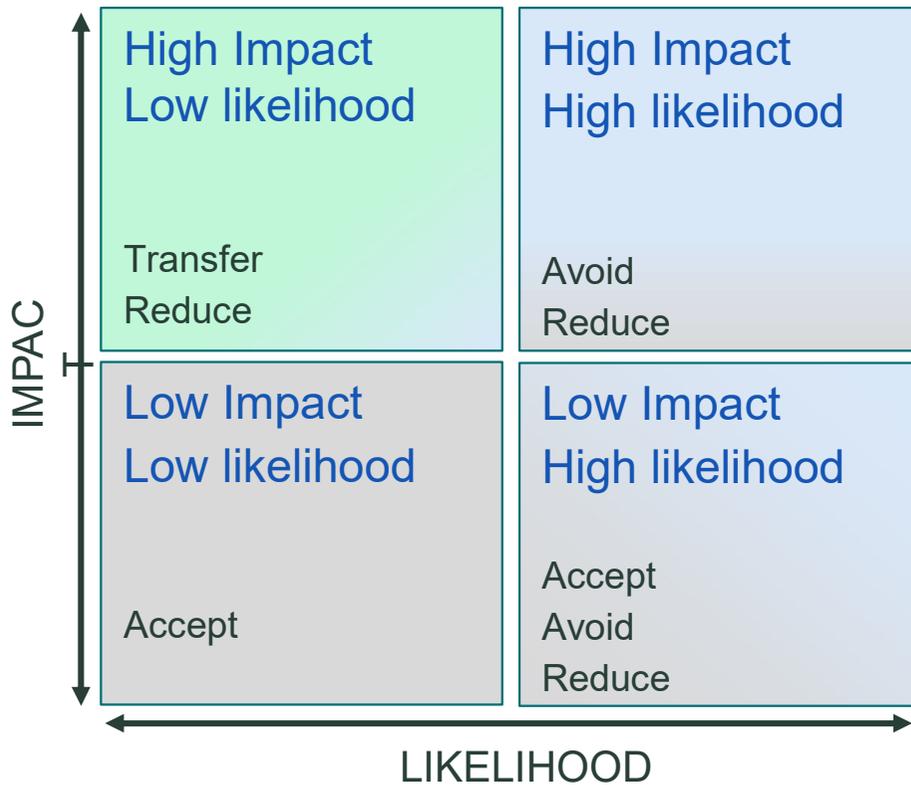
Illustrative

Main types of general insurance cover – and potential application to coral reef

Insurance Cover	Description	Potential application to coral reef	
Property damage 	<ul style="list-style-type: none"> Covers the value of the asset, and costs associated with damages and replacement, such as clean-up of debris 	<ul style="list-style-type: none"> Funds to support cleanup, recovery and rehabilitation post a weather or pollution event. 	
Business Interruption 	<ul style="list-style-type: none"> Covers the lost revenue from the named business/s, due to property damage 	<ul style="list-style-type: none"> Funds to supplement lost revenue for local businesses and community due to the damaging event. 	
Environmental Liability 	<ul style="list-style-type: none"> Protects against damage to third parties or public environments by private operator 	<ul style="list-style-type: none"> Compensation and funds to clean up post an environmentally damaging event. 	
Marine Liability 	<ul style="list-style-type: none"> Protects against damage to third parties or public environments by shipping operator 	<ul style="list-style-type: none"> Compensation and funds to action damage caused by shipping or cargo accident 	

Feasibility and requirements for insurance

1 Is the risk appropriate for insurance?



2 Are the necessary requirements in place?

Requirement	Description
Risk Owner/ Policy Holder	Legal entity that takes out policy and pays premium.
Defined Hazard	A clear threat, peril or event (not ambiguous, latent or difficult to identify)
Probability of Occurrence	The frequency and severity of hazard risk, with data to facilitate underwriting.
Financial Loss	Certainty that hazard can cause quantifiable loss to insured asset or service
Risk Management	Insurer and insured should share the goal of loss prevention Actions in place to manage vulnerability and reduce the likelihood or impact of losses.

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