Ecosystem-based Adaptation to Climate Change in the Pacific Islands

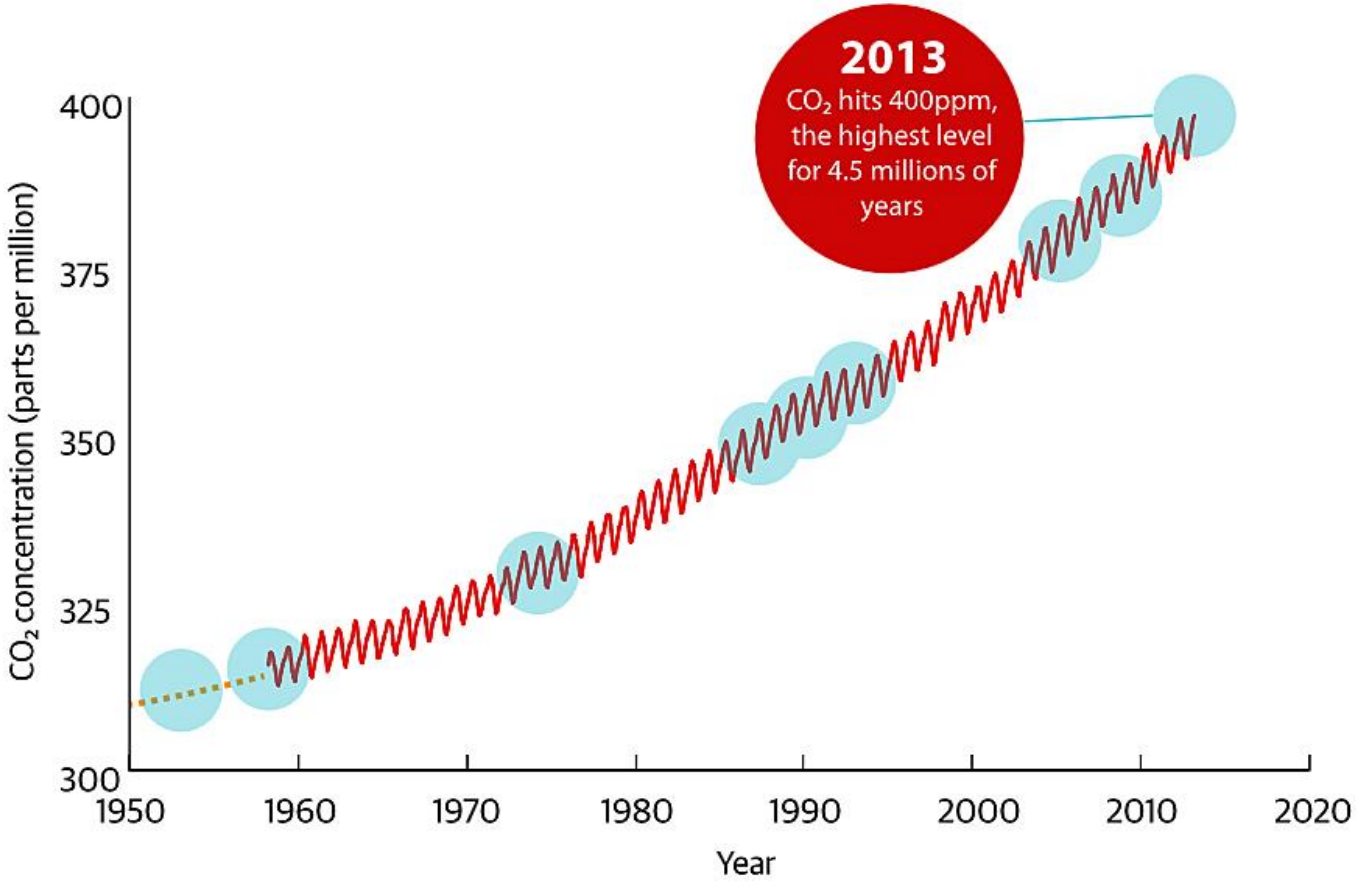
Stuart Chape
Director – Biodiversity and Ecosystem Management Division

Ecosystem Perspective on Climate Change

Ecosystem Services

The Keeling Curve

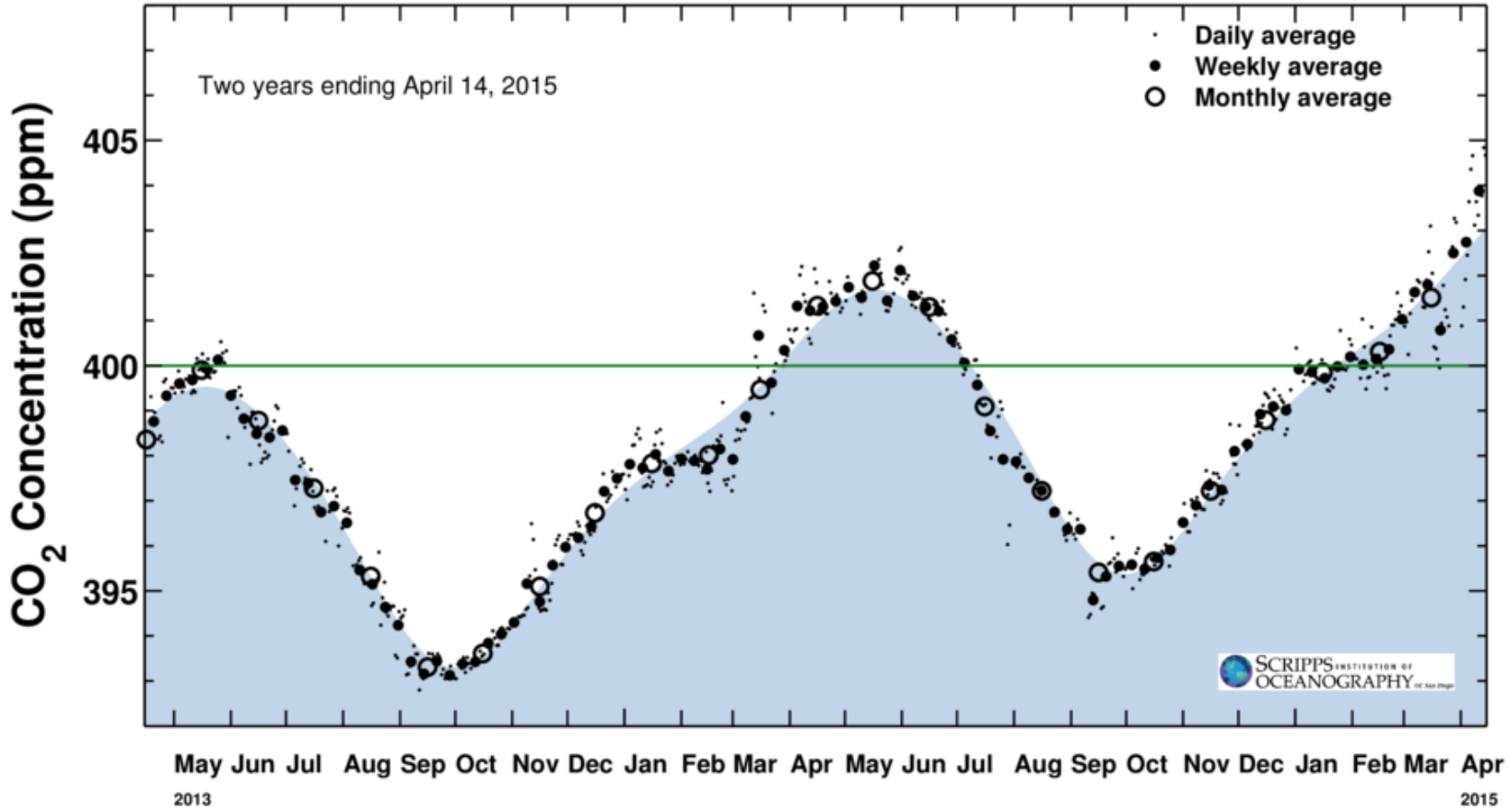
Carbon dioxide levels measured at the Mauna Loa Observatory in Hawaii



'The Keeling Curve' is the name given to the chart of rising atmospheric CO_2 levels, as measured at the Mauna Loa Observatory in Hawaii. So far, none of the action taken to tackle climate change has slowed the curve's inexorable rise. CO_2 has now reached the symbolic threshold of 400 parts per million (ppm).

Latest CO_2 reading
April 14, 2015

404.67 ppm



More than 1,000 new coal plants planned worldwide, figures show

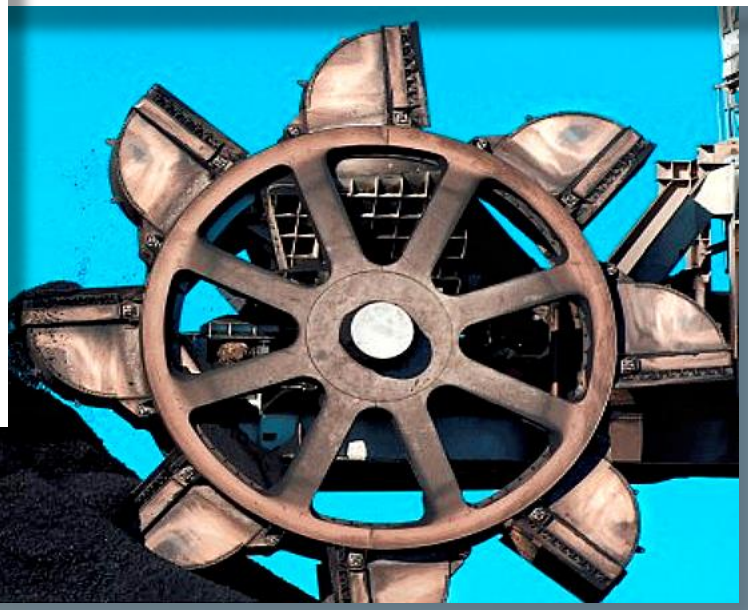
World Resources Institute identifies 1,200 coal plants in planning across 59 countries, with about three-quarters in China and India

Damian Carrington
The Guardian, Tuesday 20 November 2012

Germany To Open Six More Coal Power Stations In 2013

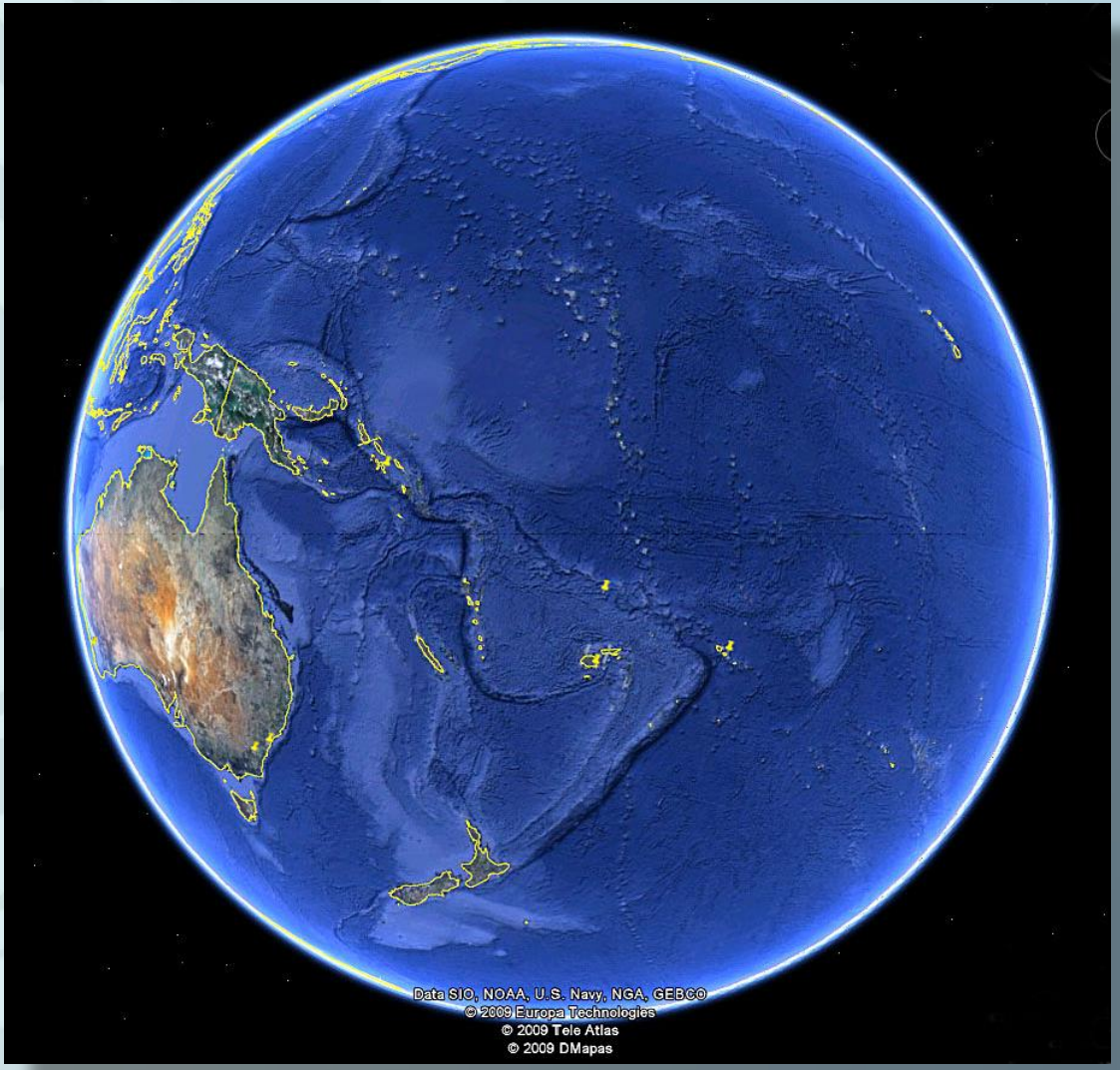
RWE's new lignite power station opened in Neurath in 2012

Germany's dash for coal continues apace. Following on the opening of two new coal stations in 2012, six more are due to open this year, with a combined capacity of 58 enough to provide 7% of Germany's electricity needs.



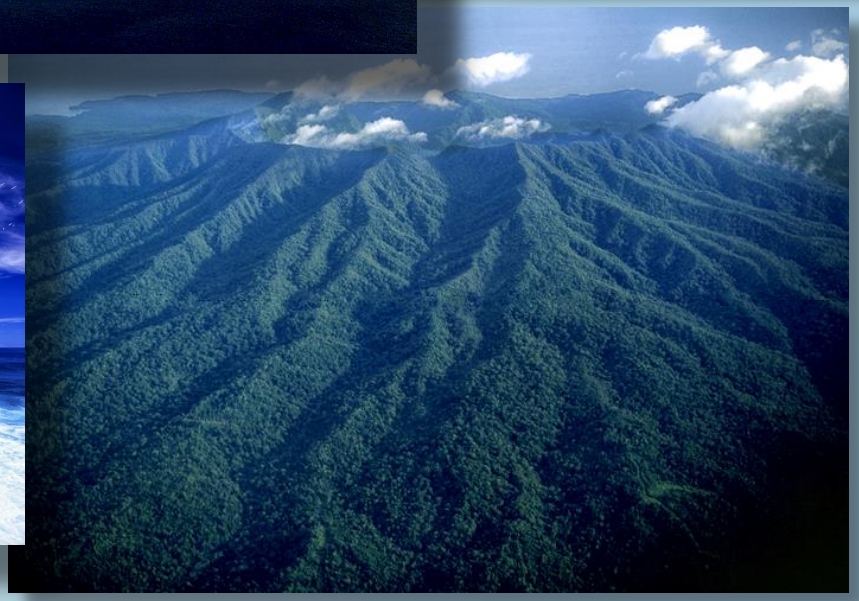

Horsey
IT'S SETTLED...
WE AGREE TO SIGN A PLEDGE TO HOLD ANOTHER MEETING TO CONSIDER CHANGING COURSE AT A DATE YET TO BE DETERMINED.
CLIMATE CHANGE
WORLD LEADERS

Pacific Islands Region: Ecosystem Approach Critical for Climate Change Adaptation



Pacific Islands Region

Island Ecosystem Diversity



High Biodiversity Values



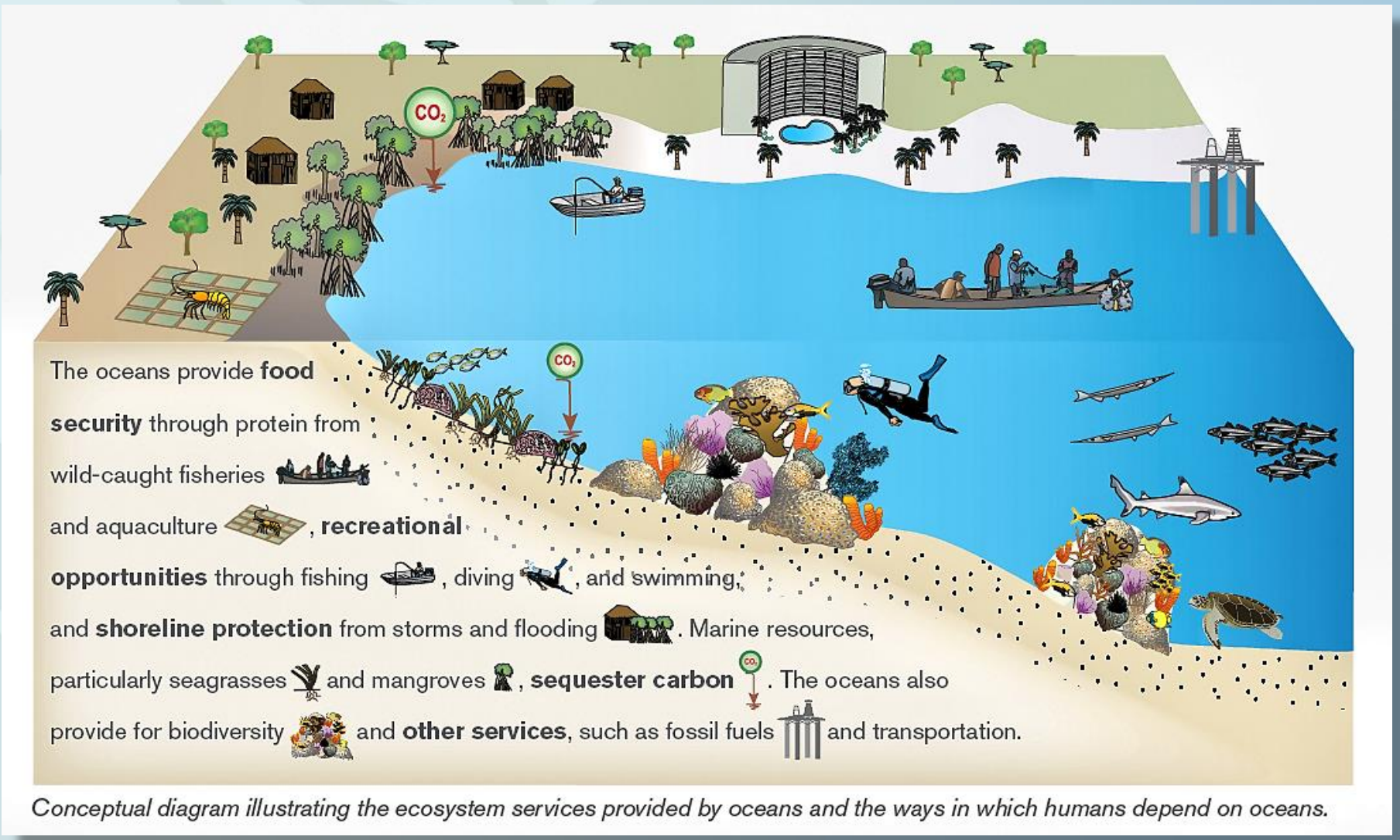







Pacific island people reliant on natural resources

Ecosystem services even more important today

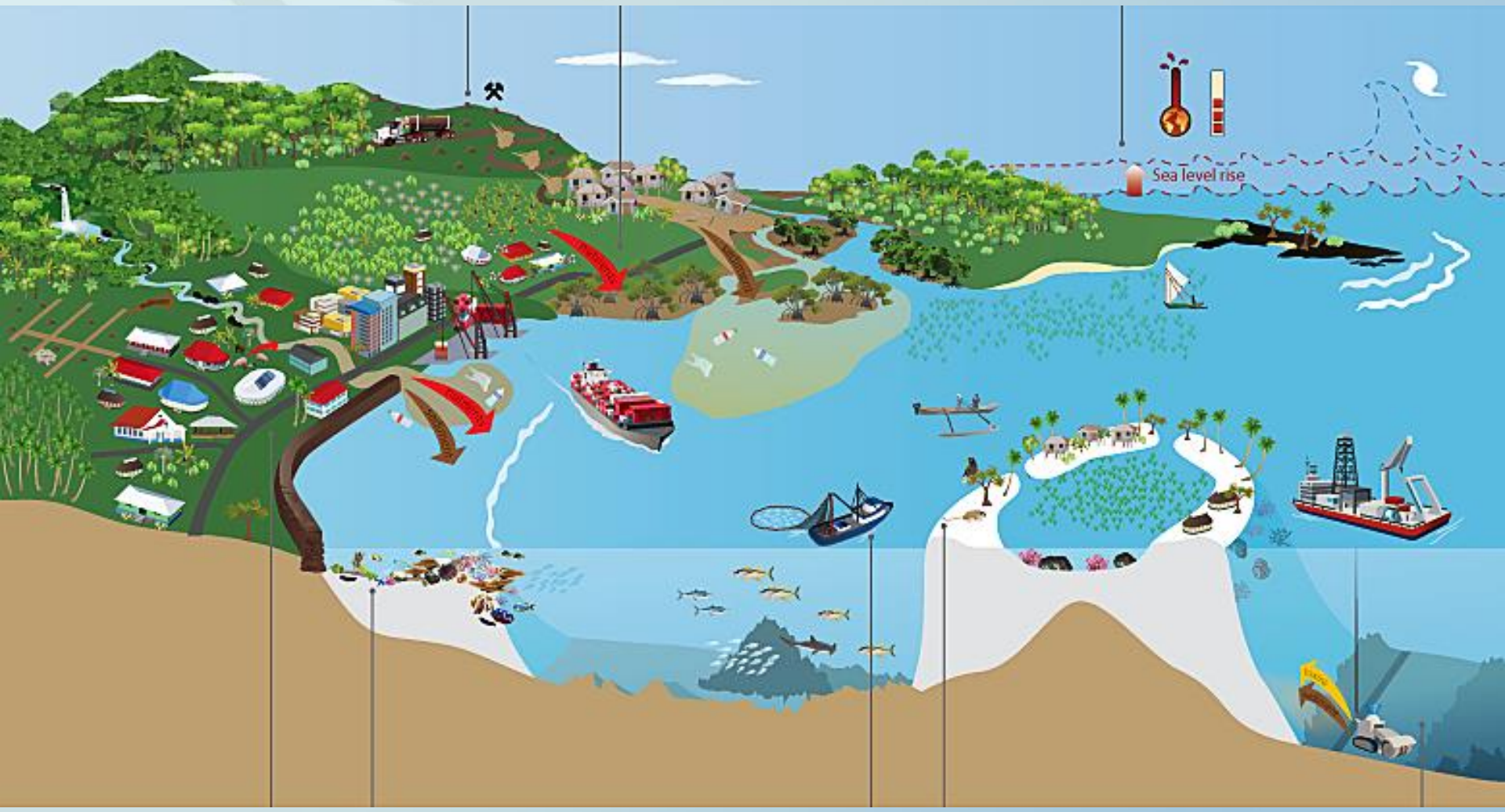


Conceptual diagram illustrating the ecosystem services provided by oceans and the ways in which humans depend on oceans.

Non-Climate Change Development/Environment Issues

Mining and Logging

Pollution and Waste



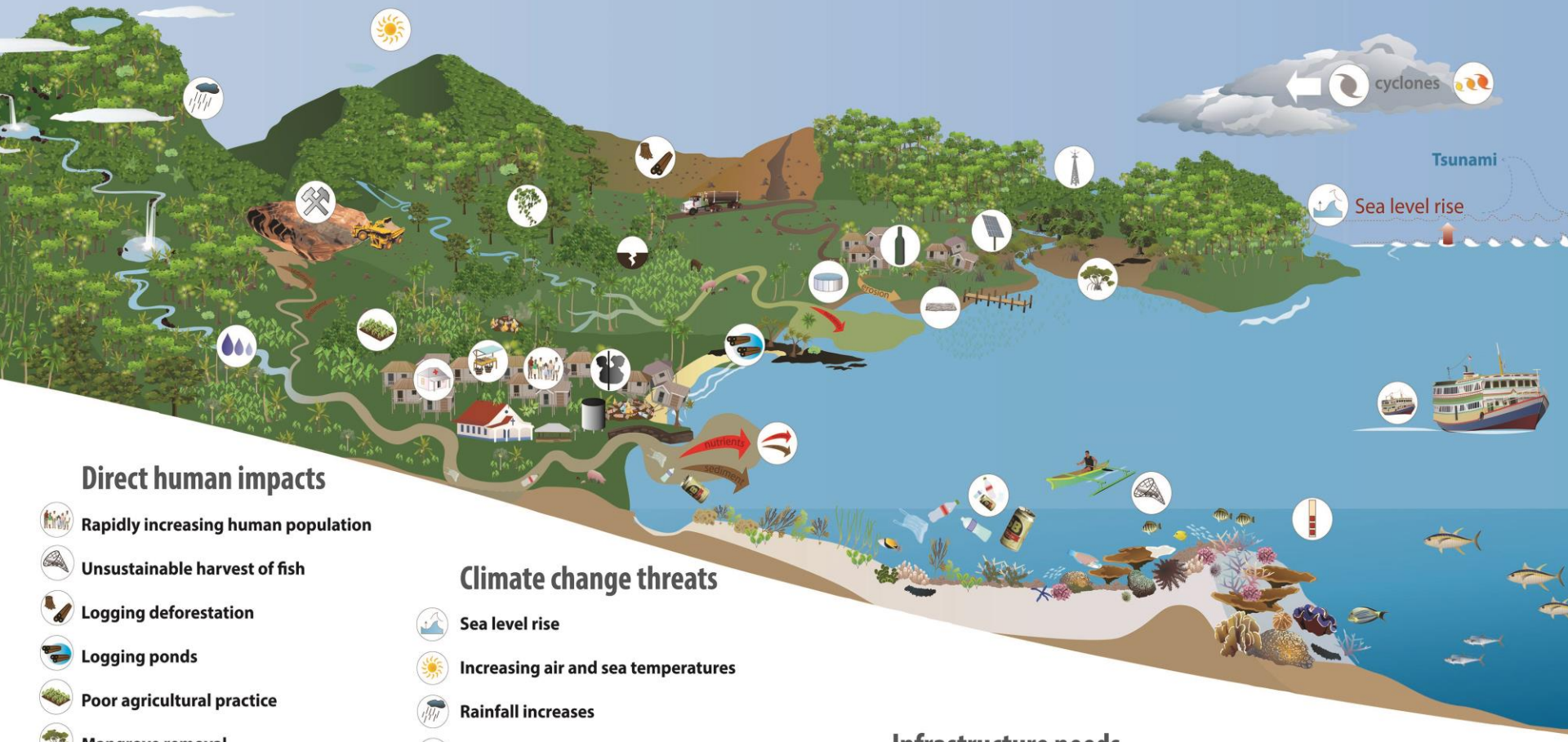
Coastal Development

Unsustainable Fishing

Invasive Species

Emerging Uses

Threats identified by Choiseul communities + other known issues



Direct human impacts

- Rapidly increasing human population
- Unsustainable harvest of fish
- Logging deforestation
- Logging ponds
- Poor agricultural practice
- Mangrove removal
- Inappropriate coastal defences
- Proposed mining operations
- Invasive species
- Nutrient and sediment flow
- Inappropriate rubbish disposal

Climate change threats

- Sea level rise
- Increasing air and sea temperatures
- Rainfall increases
- More intense tropical cyclones
- Ocean acidification

Natural disasters

- Cyclones and tsunamis
- Drought
- Earthquake

Infrastructure needs

- Limited access to fresh water
- Lack of communication infrastructure
- Distance to markets
- Limited basic services
- Limited energy generation

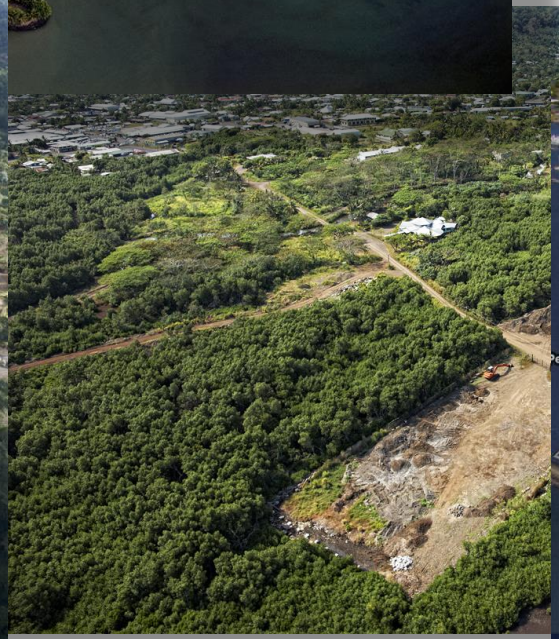
Social challenges

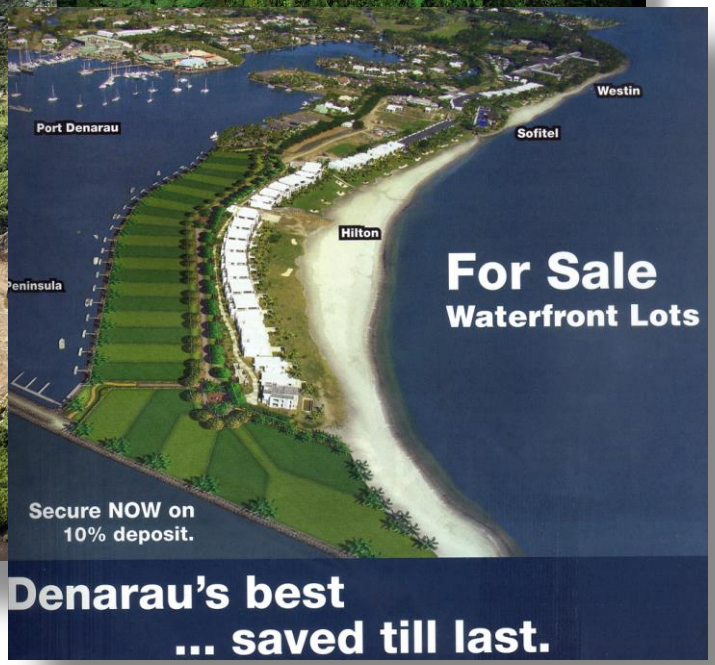
- Reduced self reliance
- Cultural transition
- Gender inequities
- Foreign logging workers


PM 6040

Marine ecosystem impacts

Damage to catchments and water supplies




Port Denarau
Westin
Sofitel
Hilton
Peninsula
For Sale
Waterfront Lots
Secure NOW on
10% deposit.
Denarau's best
... saved till last.


KIWI
POWER

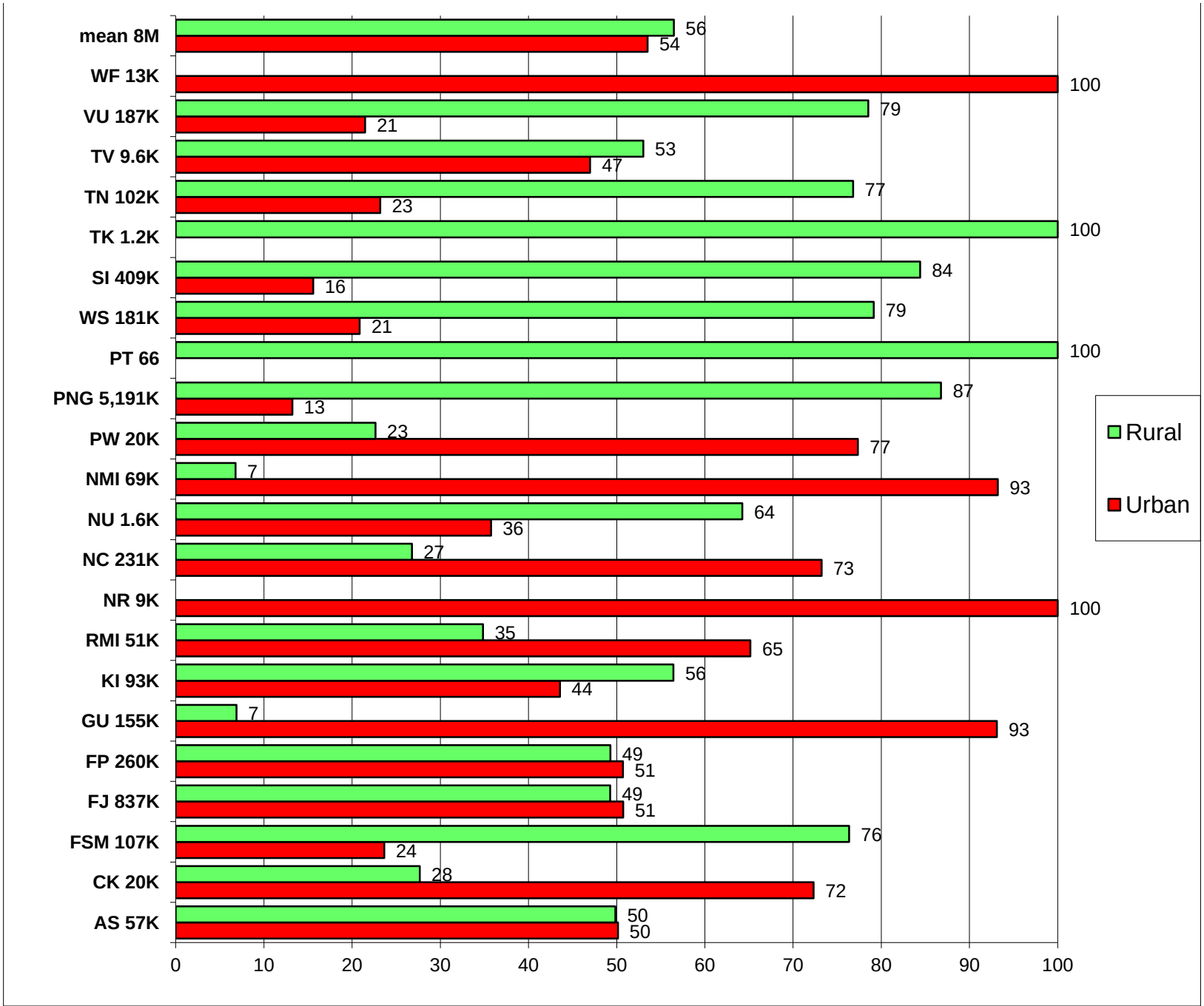

© Chris Jordan


THE SNAKE THAT ATE GUAM
By Adele Conover
You could live in this tropical paradise for 30 years and never see one. You might wonder why no birds sing in the rain forest. But you'd catch on if it snapped at your derriere while you sat on the


WANTED
GIANT AFRICAN SNAIL
LOOK FOR THEM! REPORT THEM!
888-397-1517
A major landscape and agricultural pest, even eats stucco on homes
Public health threat - known to carry rat lungworm that may cause meningitis in humans
Able to reproduce rapidly - one snail can lay 1,200 eggs in a year
Can grow to up to 8 inches in length - no natural enemies
We need your help to stop this pest!
www.freshfromflorida.com/pi
USDA
Division of PLANT INDUSTRY
Protection through Detection
Adam H. Putnam, Commissioner

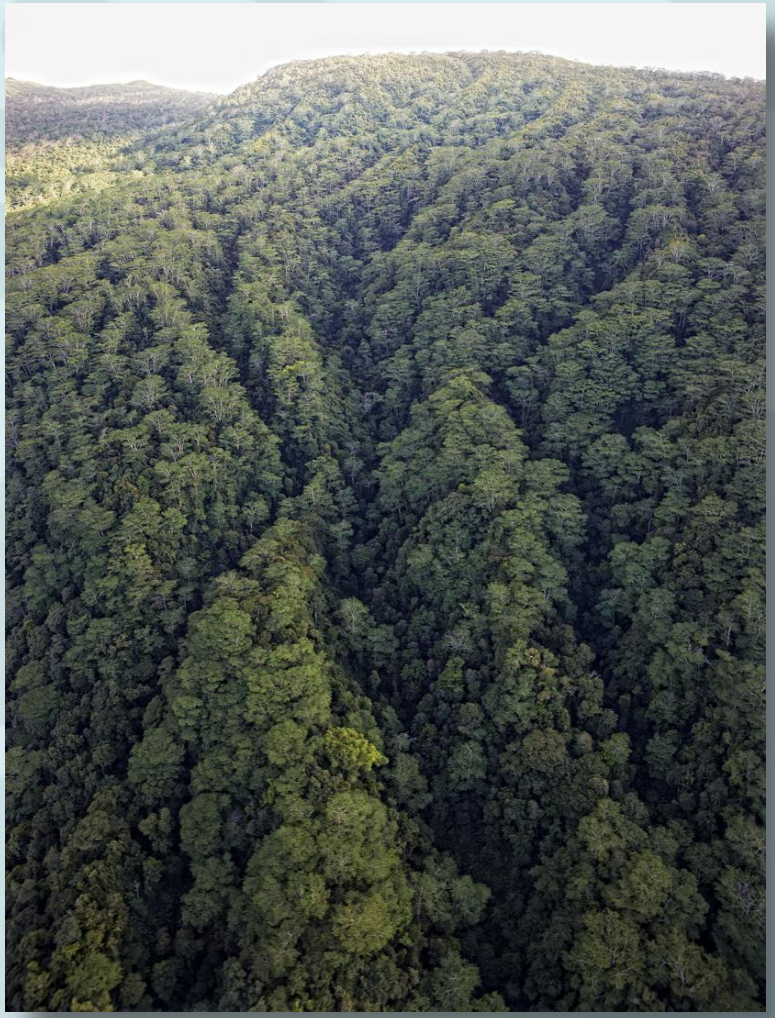

Honiara
Nuku'alofa
Port Vila
Image © 2013 TerraMetrics
© 2013 Google
Papeete
Faa'a
Fautau'a
Tipaeru'i
Bikenibeu Bikenibeu

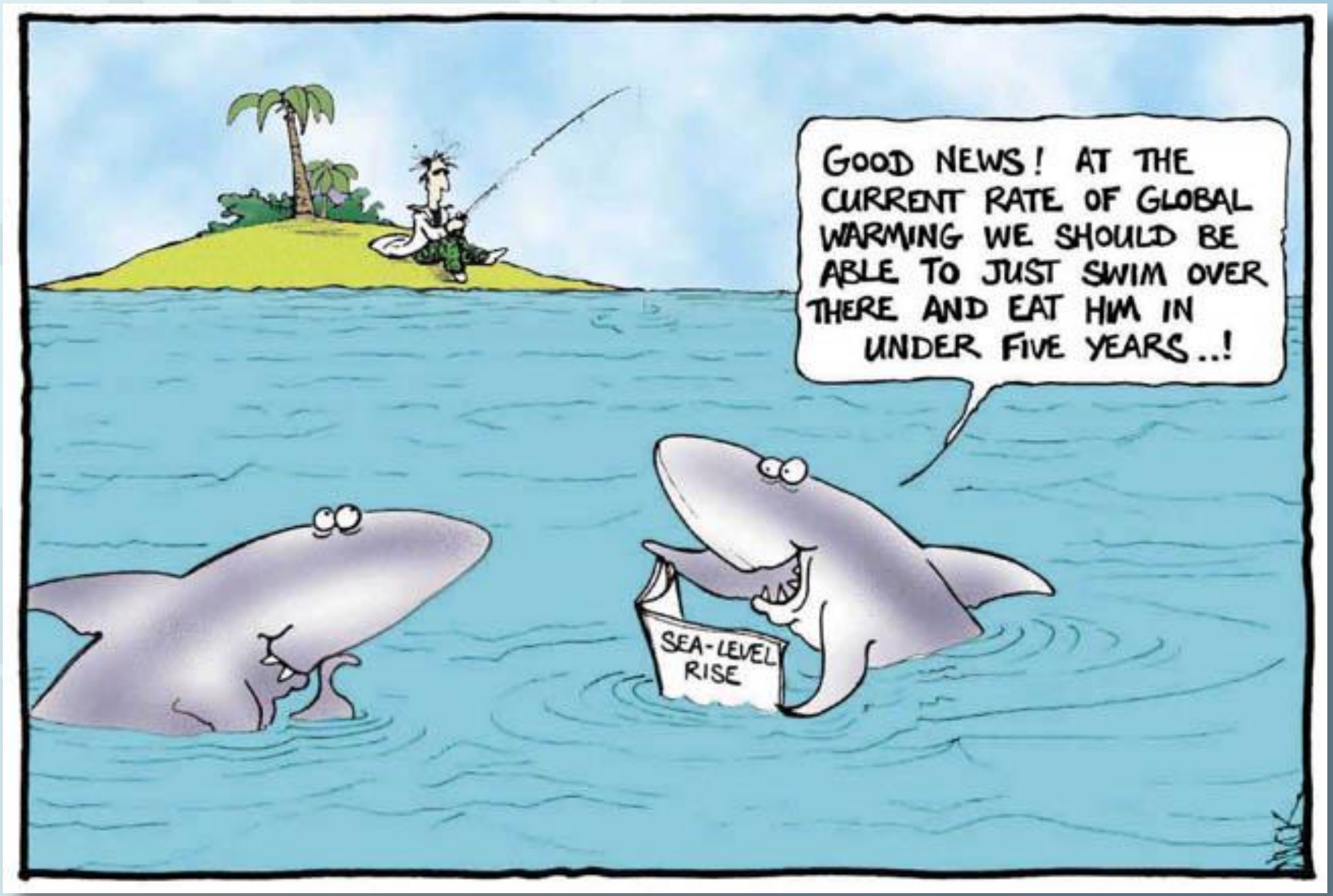
Nearly half of the region's population is now urban




POLICE

Invasive Species and Disasters




GOOD NEWS! AT THE CURRENT RATE OF GLOBAL WARMING WE SHOULD BE ABLE TO JUST SWIM OVER THERE AND EAT HIM IN UNDER FIVE YEARS..!
SEA-LEVEL RISE

Climate Change in Pacific Islands Region

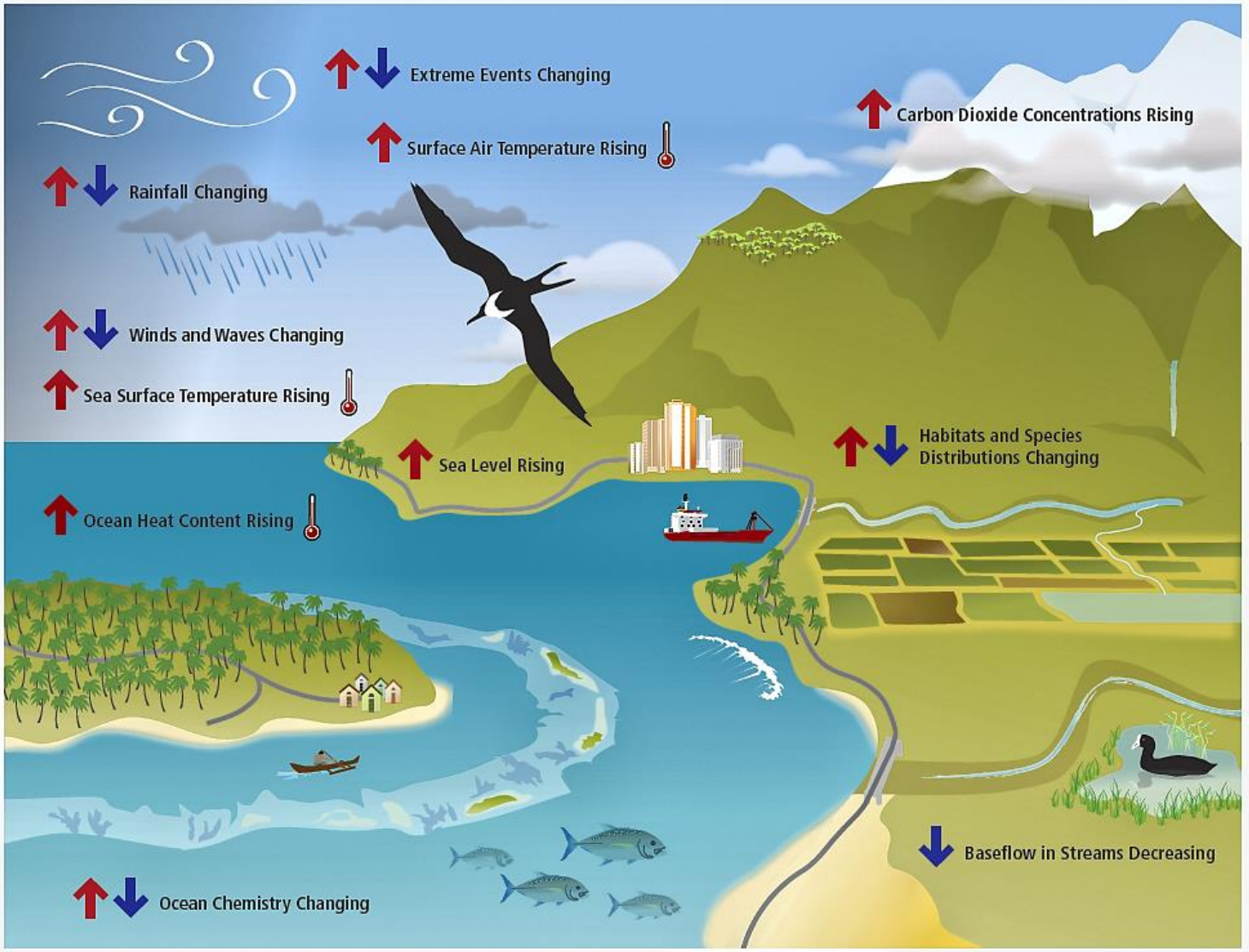


Figure A Indicators of climate change in the Pacific Islands region. (Courtesy of Susan Yamamoto, Geovision. Adapted from "Ten Indicators of a Warming World," in NOAA National Climatic Data Center, State of the Climate 2009 [report].)

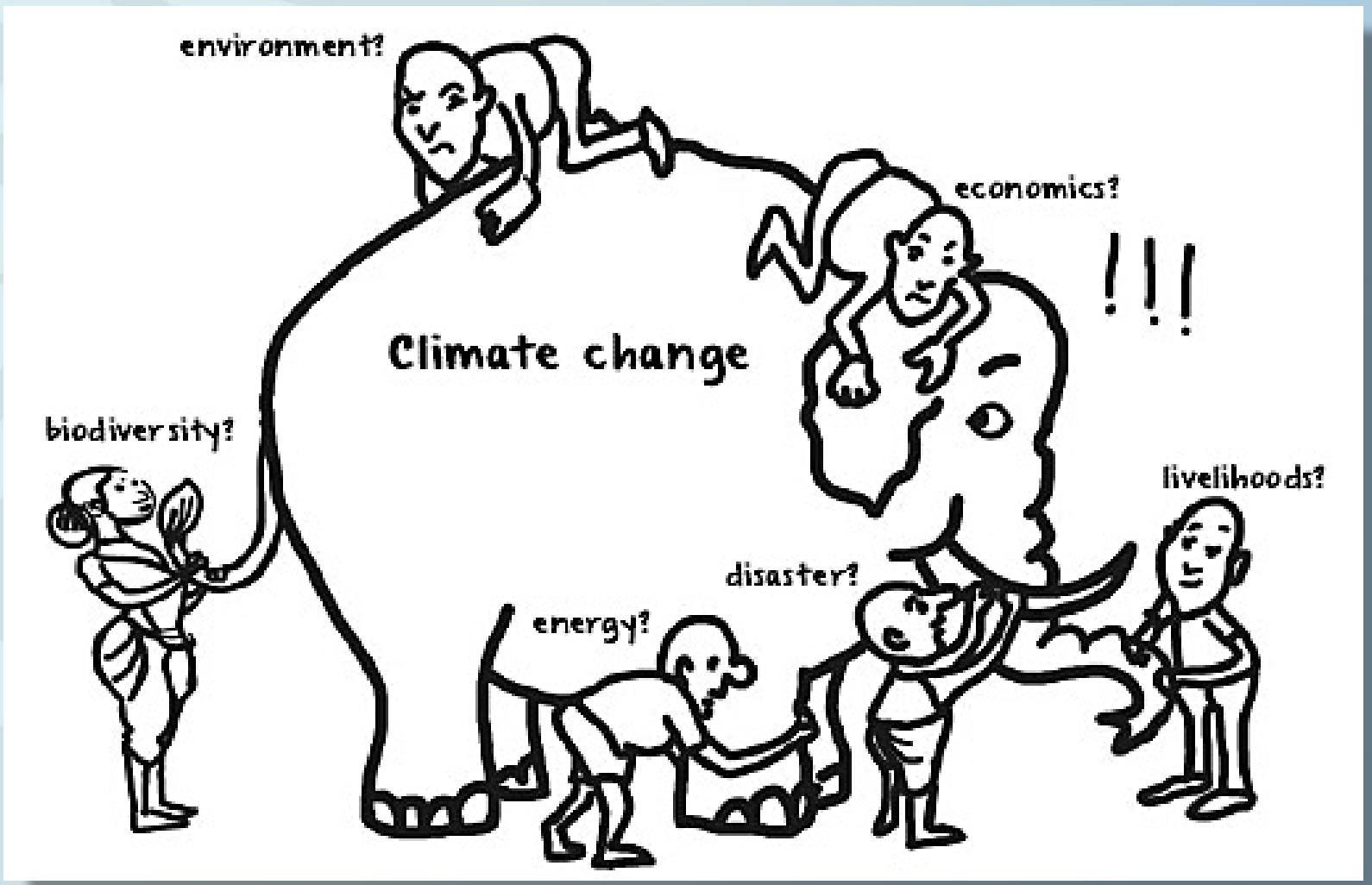
Lower Capacity for Resilience

Non-CC Impacts

Climate Change Impacts

Lower Capacity for Resilience

Are we making the links to enable effective adaptation?



Ecosystem-based Adaptation:

By taking into account the ecosystem services on which people depend for their livelihoods and social and economic security, EbA integrates sustainable use of biodiversity and ecosystem services in a comprehensive adaptation strategy (CBD 2009)

Need to fully integrate non-climate change issues

Benefits of Ecosystem-based Adaptation

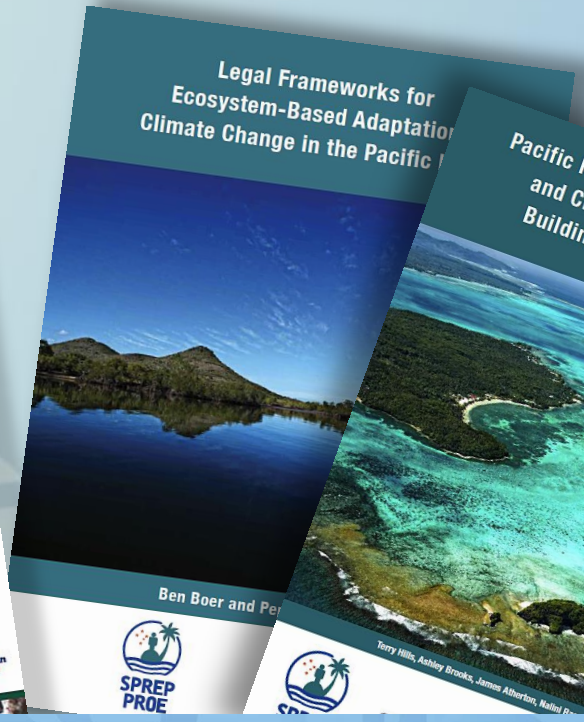
- Aligns with and enhances poverty alleviation and sustainable development strategies
- More accessible to rural and poor communities – cost effective
- Increases local engagement and action, drives resource management to rural communities
- Enables vulnerable communities to participate directly in resource management decisions

Benefits of Ecosystem-based Adaptation

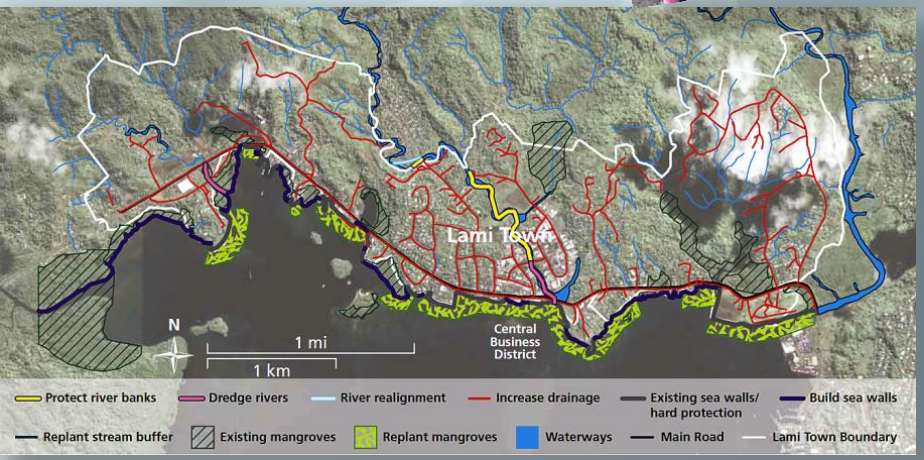
- Precautionary and addresses risk management – ensures that long-term natural resources that provide resilience are not destroyed by short-term or emergency responses to crisis
- Provides both protective and provisioning services
- Can contribute to climate change mitigation
- Builds on existing investments in biodiversity conservation


A comparative analysis of
ecosystem-based adaptation
and engineering options
for Lami Town, Fiji


Ecosystem-based adaptation and
climate change vulnerability
in Choiseul Province, Solomon Islands
Synthesis report
USAID
SPREP
giz
The Nature Conservancy
Australian AID

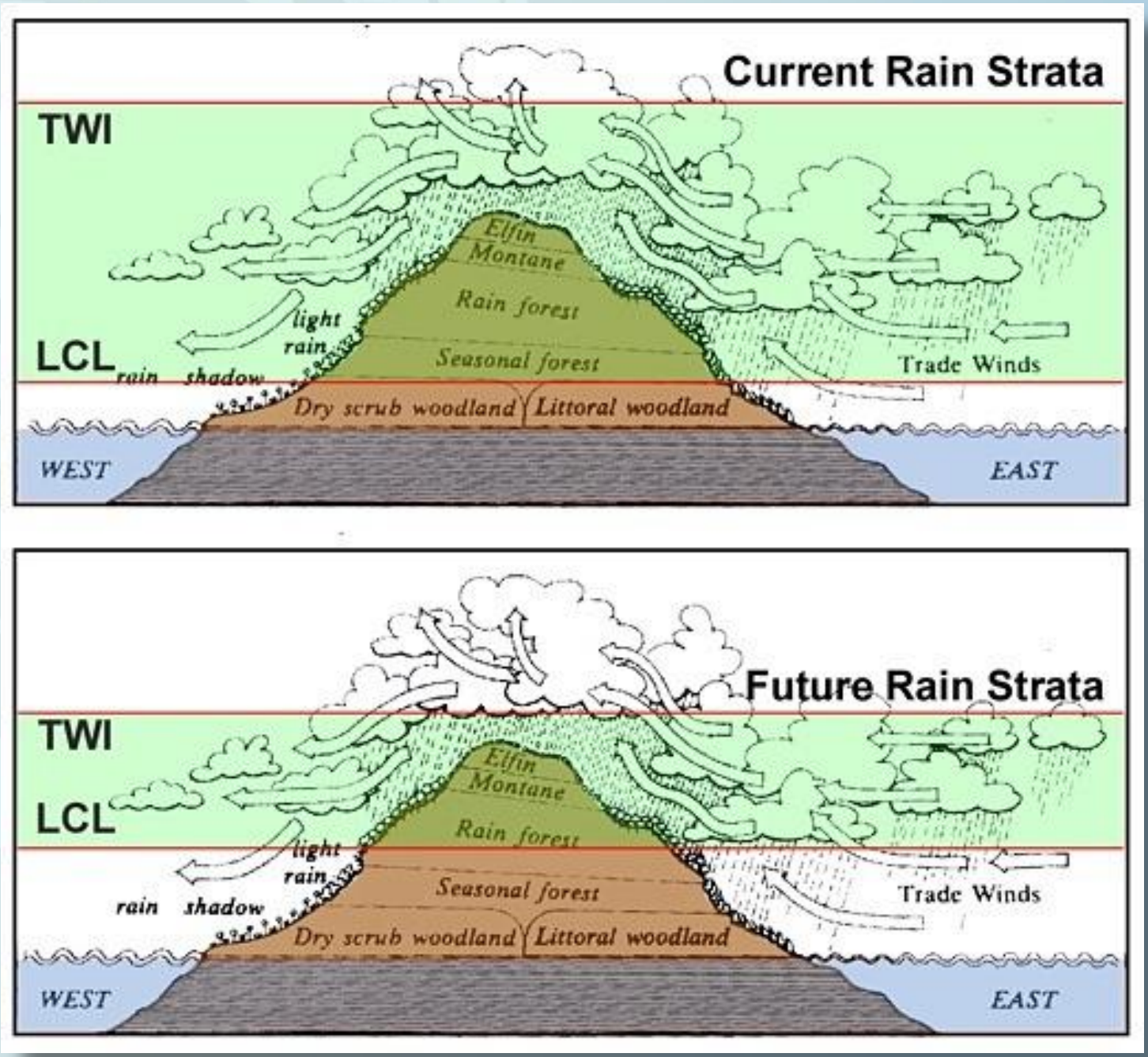

Legal Frameworks for
Ecosystem-Based Adaptation
Climate Change in the Pacific
Ben Boer and Pe
SPREP
PROE

Pacific Island Biodiversity, Ecos
and Climate Change Adaptatio
Building on Nature's Resilienc
Terry Hills, Ashley Brooks, James Atherton, Nalini R

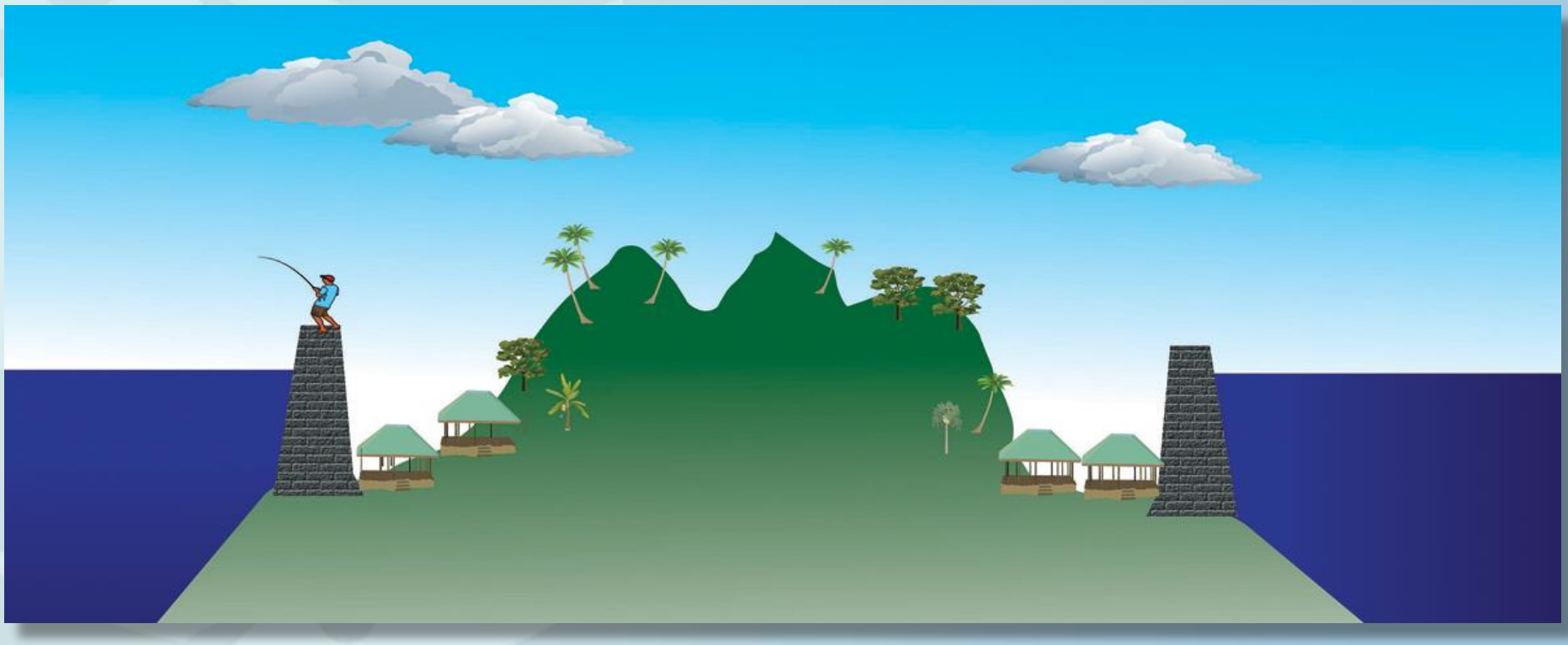

Lami Town
Central
Business
District
N
1 mi
1 km
Protect river banks
Dredge rivers
River realignment
Increase drainage
Existing sea walls/
hard protection
Build sea walls
Replant stream buffer
Existing mangroves
Replant mangroves
Waterways
Main Road
Lami Town Boundary

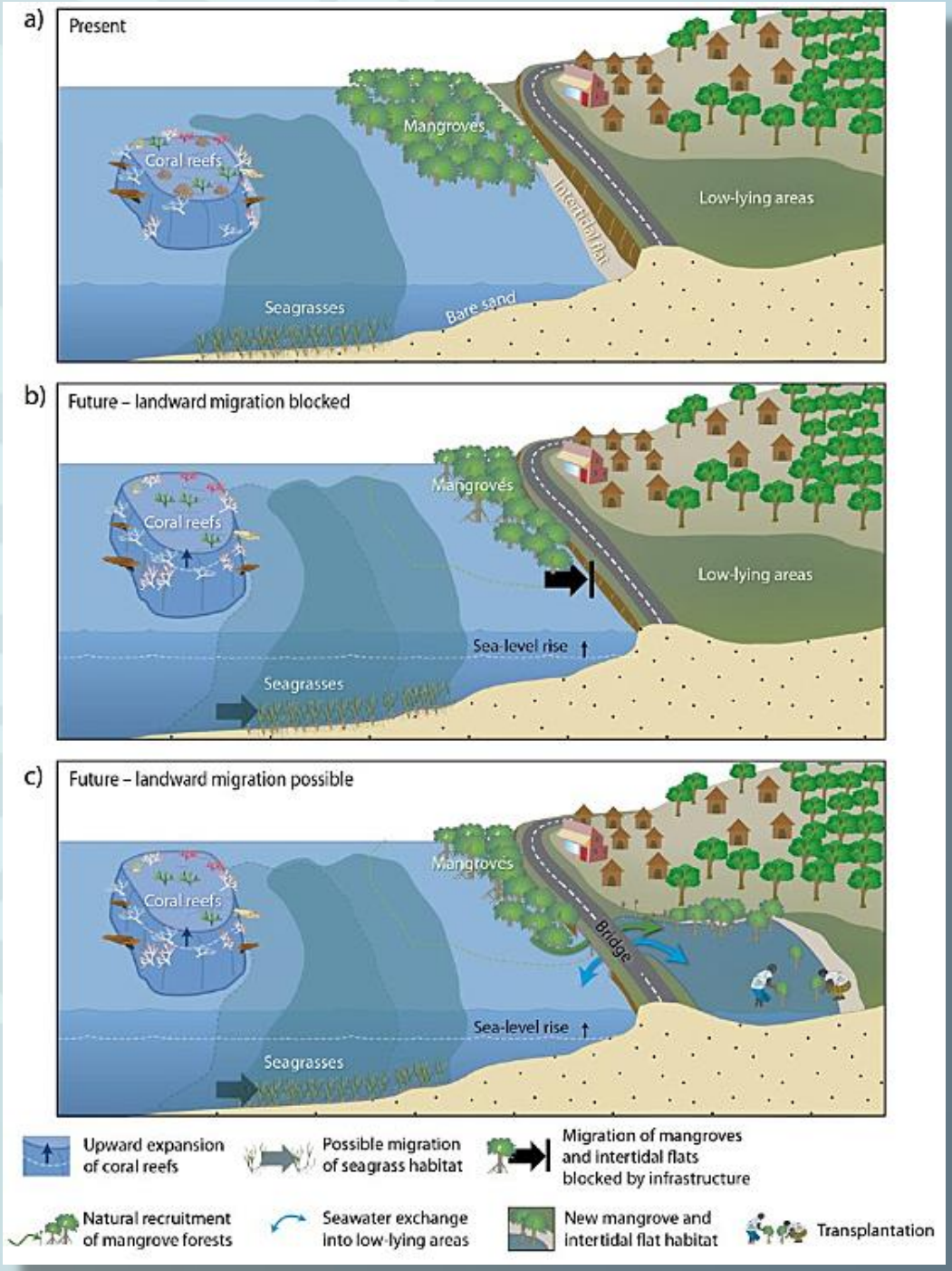

Village without
adaptation
Most vulnerable to climate change impacts
No management of ecosystem services
Village with hard engineering
adaptation options
Effective in reducing potential damage
No management of ecosystem services
Village with ecosystem
based adaptation (EbA)
Natural buffers reduce climate change impacts
With secondary benefits from ecosystem services
UPSLOPE
Deforestation:
- causes greater landslide risk & higher flood levels
- results in biodiversity loss
RIVERSIDE
Removal of riverside vegetation:
- causes reduced freshwater quality
- increases flooding risk
COASTAL
Removal of coastal vegetation & mangroves:
- causes erosion & coastal flooding
- degrades fish & crustacean habitat
MARINE
Inappropriate watershed management:
- reduces water quality
- degrades health of fisheries and reefs
Improved drainage:
- reduces landslide risk & groundwater recharge
- but can increase sediment flows to rivers and reefs
Artificial banks, dredging & river realignment:
- reduces flooding risk
- but can cause poor freshwater quality & loss of biodiversity
Seawalls:
- reduce erosion in targeted areas
- but can cause erosion nearby & reduce fish & crustacean habitat
- heavy building material can be projected inland by tsunamis & storm surges
Increased aquaculture & access to fisheries technology:
- supplements declining fisheries
Intact & replanted forests:
- reduce landslide risk & less sediment flow to rivers & reefs
- provide building material, crops & firewood & store carbon
Intact & replanted riverside vegetation:
- reduces sediment flows & flooding risk
- protects freshwater supply & biodiversity
Intact & replanted coastal vegetation & mangroves:
- reduce coastal erosion & flooding
- provide building material, crops, firewood & store carbon
Integrated ridge to reef management:
- protects intact habitats & biodiversity
- supports healthy fisheries & reefs
Original illustrations: Sevaluni Tura Symbiotic: Courtesy of the Integration and Application Network University of Maryland Center for Environmental Science (ian.umces.edu/symbiotic)

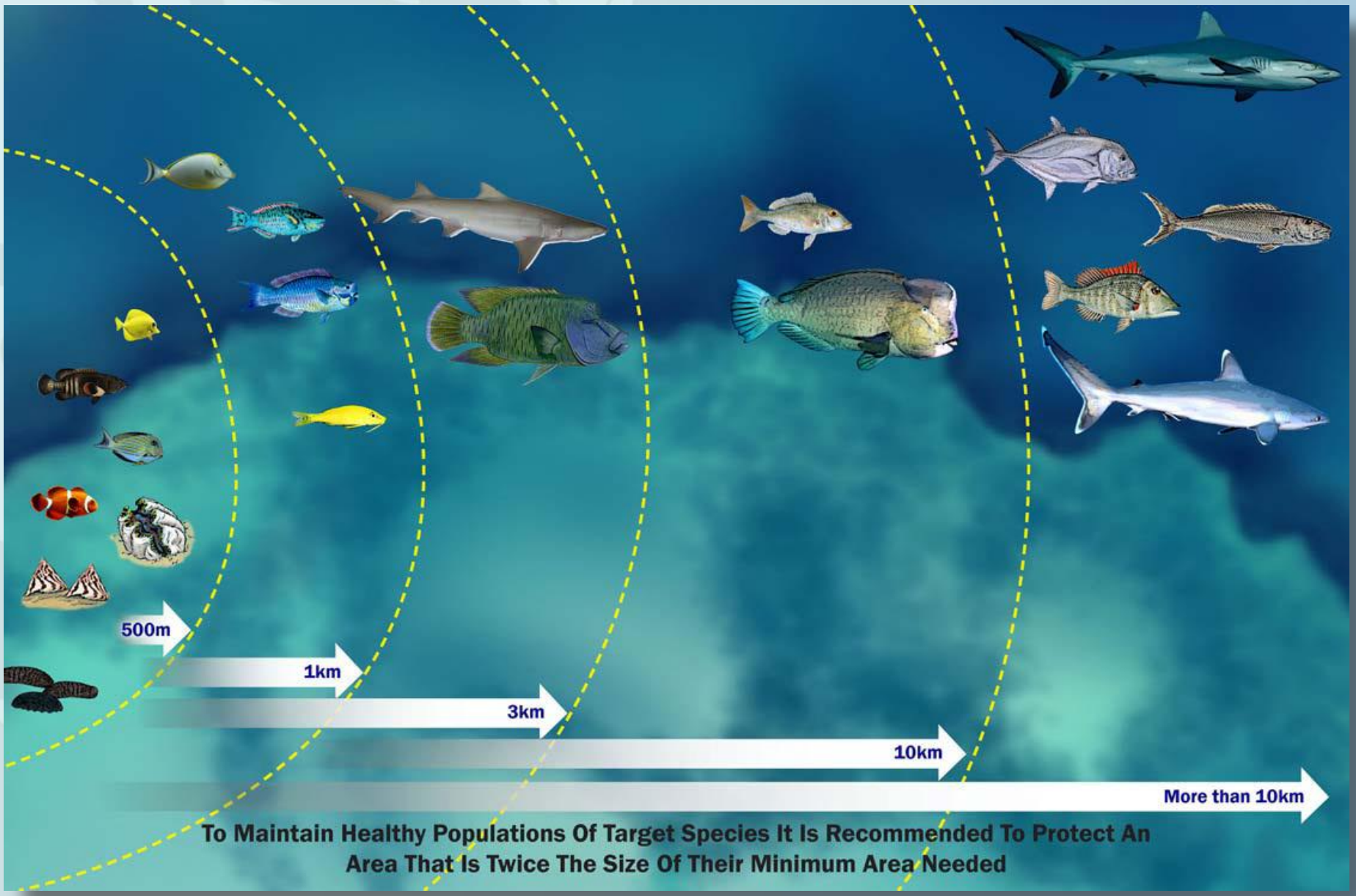
Understand the Implications


Current Rain Strata
TWI
LCL
Elfin
Montane
Rain forest
Seasonal forest
Dry scrub woodland
Littoral woodland
light
rain
rain
shadow
Trade Winds
WEST
EAST
Future Rain Strata
TWI
LCL
Elfin
Montane
Rain forest
Seasonal forest
Dry scrub woodland
Littoral woodland
light
rain
rain
shadow
Trade Winds
WEST
EAST

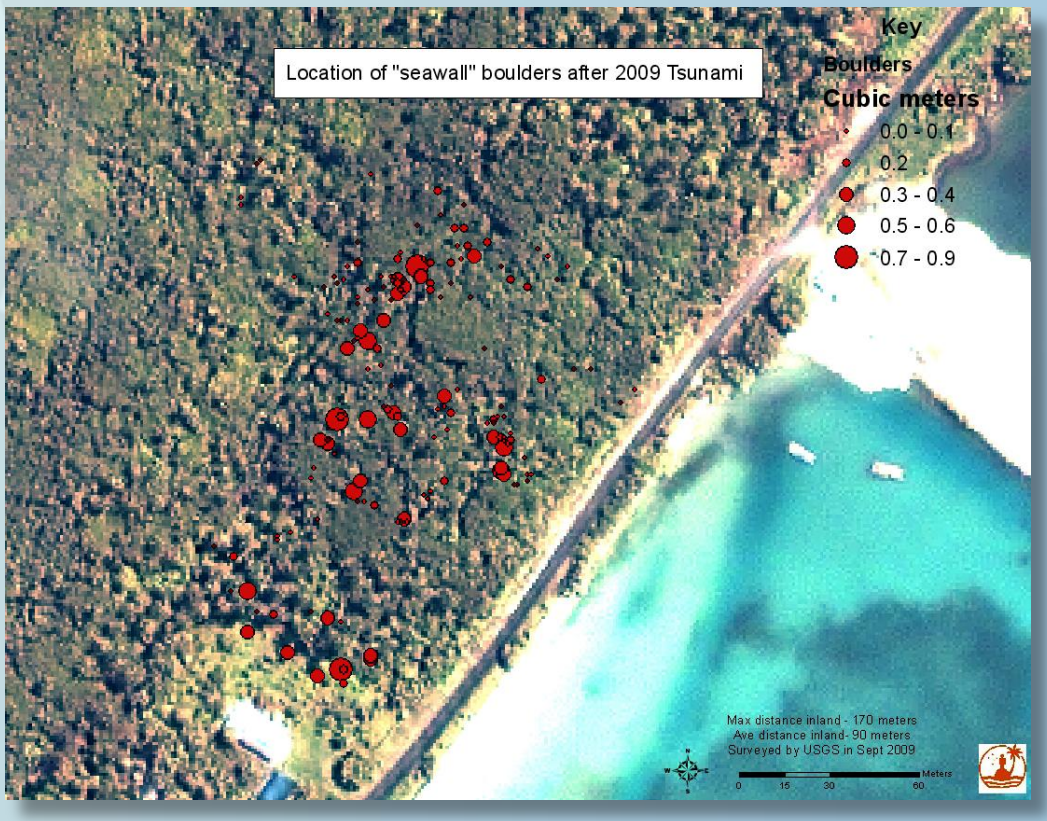
Understand the Options




a)
Present
Mangroves
Coral reefs
Intertidal flat
Low-lying areas
Seagrasses
Bare sand
b)
Future – landward migration blocked
Mangroves
Coral reefs
Low-lying areas
Sea-level rise
Seagrasses
c)
Future – landward migration possible
Mangroves
Coral reefs
Bridge
Sea-level rise
Seagrasses
Upward expansion of coral reefs
Possible migration of seagrass habitat
Migration of mangroves and intertidal flats blocked by infrastructure
Natural recruitment of mangrove forests
Seawater exchange into low-lying areas
New mangrove and intertidal flat habitat
Transplantation


500m
1km
3km
10km
More than 10km
To Maintain Healthy Populations Of Target Species It Is Recommended To Protect An
Area That Is Twice The Size Of Their Minimum Area Needed


HITACHI
ALTA


Location of "seawall" boulders after 2009 Tsunami
Key
Boulders
Cubic meters
0.0 - 0.1
0.2
0.3 - 0.4
0.5 - 0.6
0.7 - 0.9
Max distance inland - 170 meters
Ave distance inland- 90 meters
Surveyed by USGS in Sept 2009
Meters
0
15
30
60

Increasing Recognition of Need for Ecosystem Approach

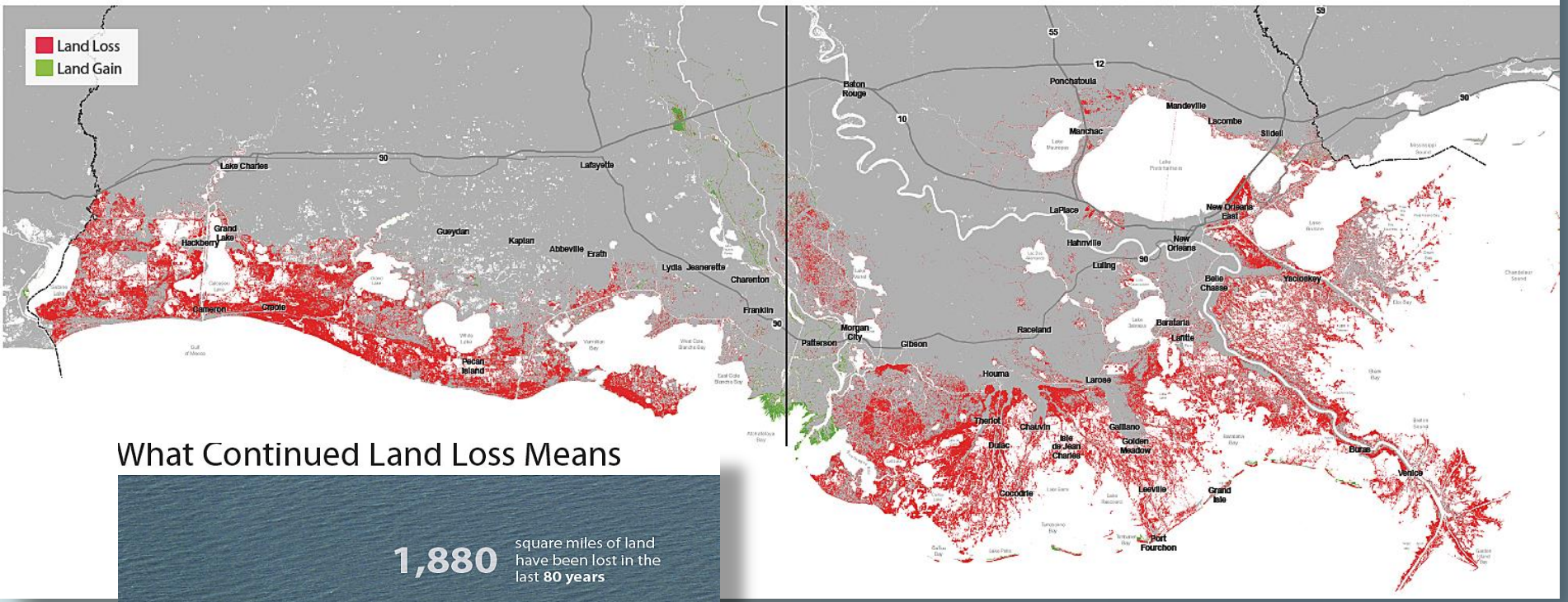
Maldives

Sea wall around Malé cost $54 million, or $12.4 million per km.
Maldives has 2,002 km coastline – seawall $24.8 billion enterprise.
With current annual GDP, it would take more than three decades to raise the funds

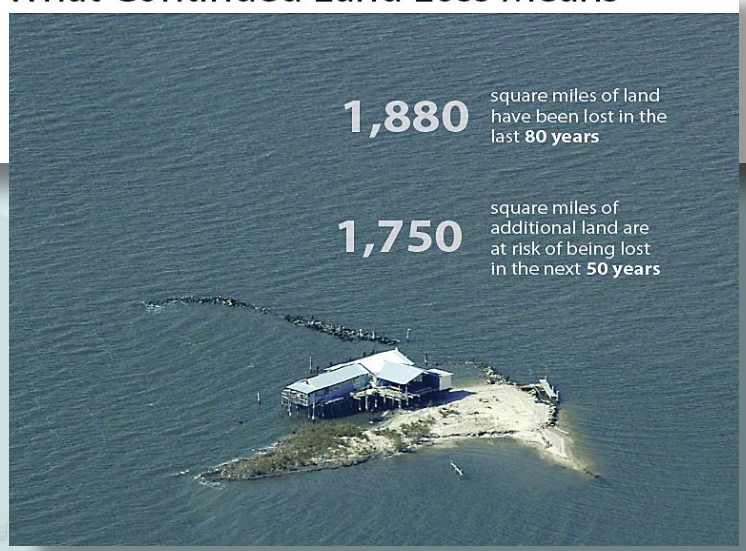
Louisiana, USA

Louisiana is Experiencing a Coastal Crisis

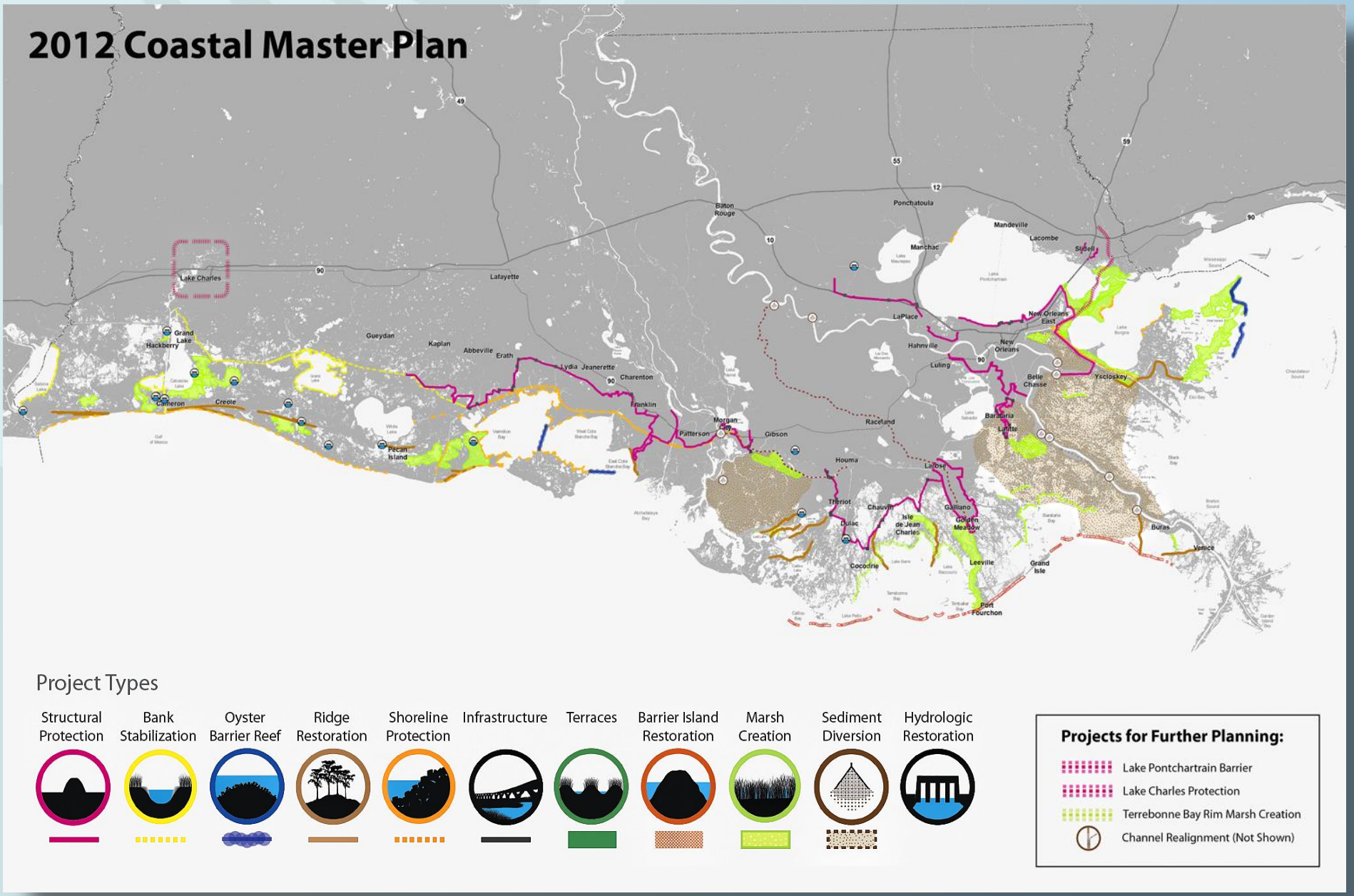
Predicted Land Change over the Next 50 Years



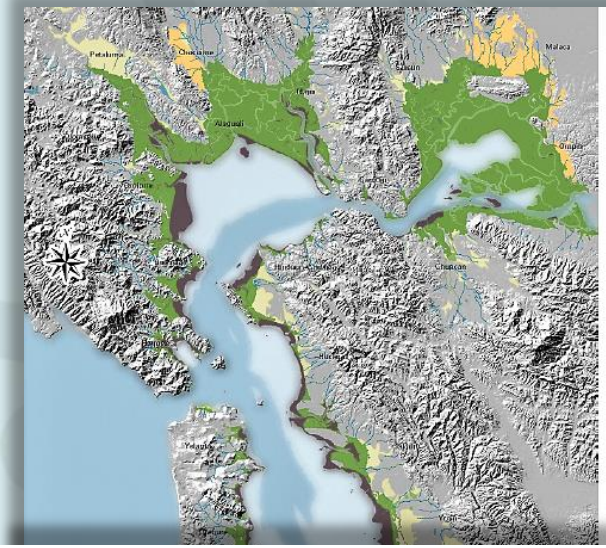
What Continued Land Loss Means

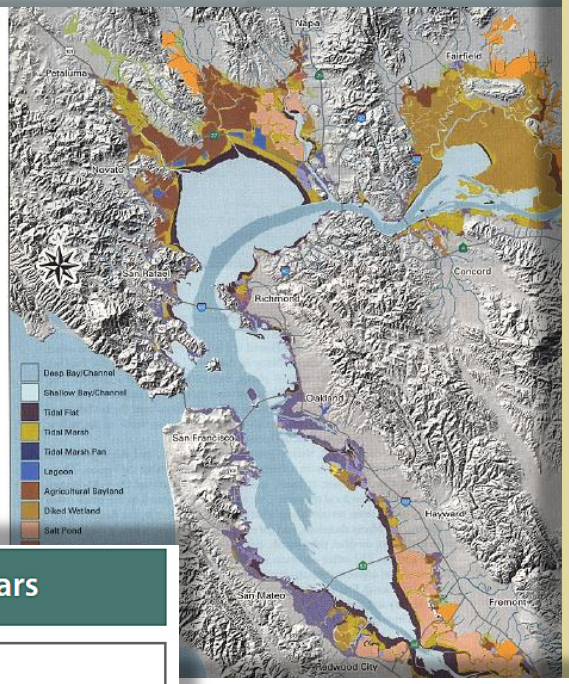


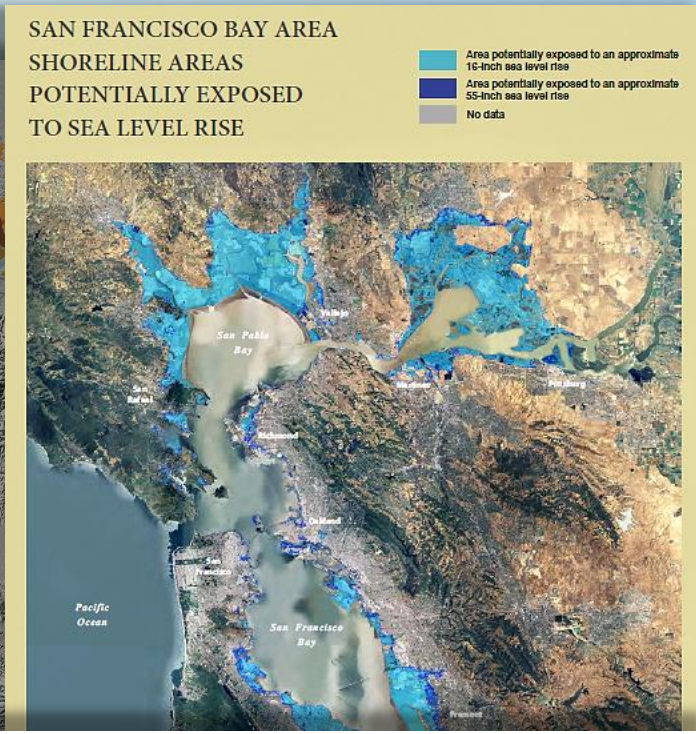
Louisiana, USA

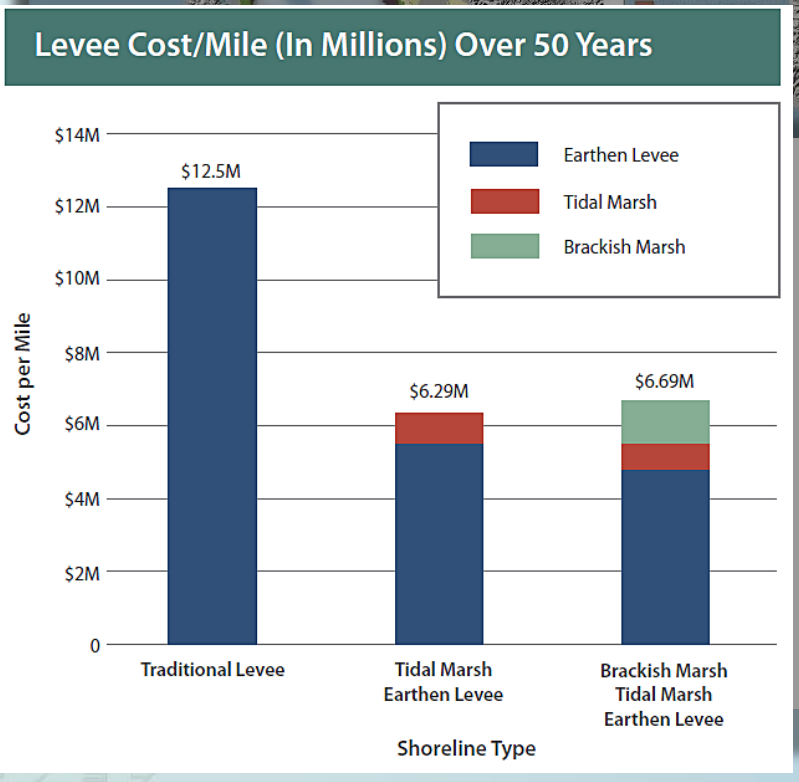


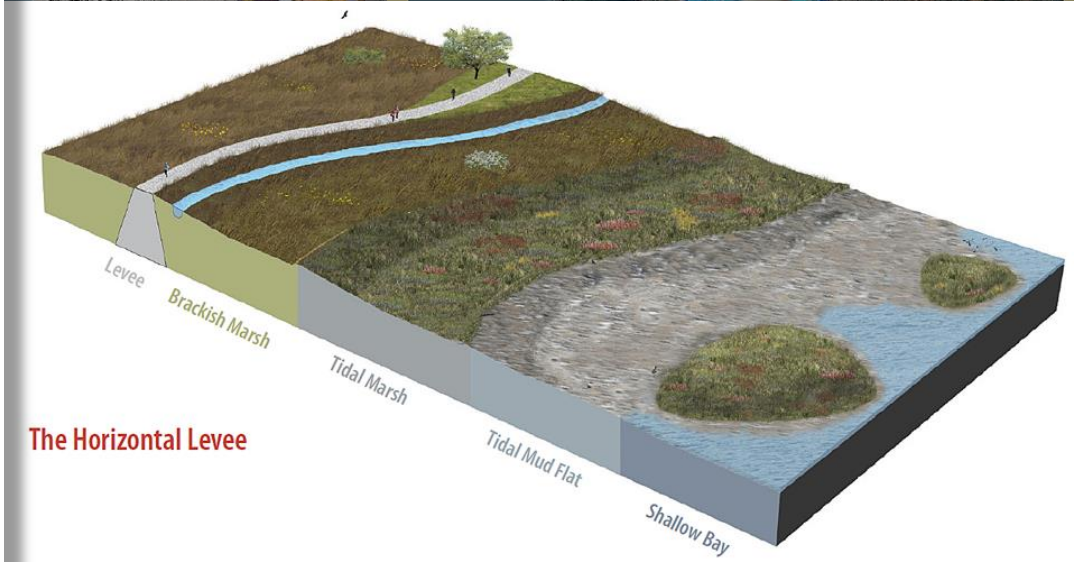
San Francisco Bay, USA











What Needs to Change

- **Integration** of **climate change adaptation options** with the **ecosystem approach**
- **Holistic** – all **adaptation options** reviewed in the context of **sustainability**: **livelihoods, ecosystem services protected**
- **Non-climate change issues receive equal weight** in government policy and its implementation
- Donors to fund holistic **national level approaches**
- Governments need to undertake **national scale long-term resilience-focused development planning**
- **Ecosystem and socio-economic resilience analysis and mapping (ESRAM)** completed to integrate CC and non-CC threats into **ecological and social vulnerability *and opportunity*** assessments as a basis for adaptation planning at national, provincial and community levels

Fiji

National Climate Change Policy: Adaptation Objective 5.5 ***"support the ecosystem-based approach throughout Fiji, recognising that ecosystem services, such as food security, natural hazard mitigation and physical coastal buffer zones, increase resilience"***

Vanuatu

Climate Change and Disaster Risk Reduction Policy : ***"effective natural resource management can minimize the threat of climate change to ecosystems whilst enhancing livelihoods resilience….***
Embedding action and planning within an ecosystem, strengthening all interrelated parts and components (social, biological, economic)"

Solomon Islands

National Climate Change Policy: ***"healthy and functioning ecosystems are crucial for the achievement of adaptation and mitigation objectives"***

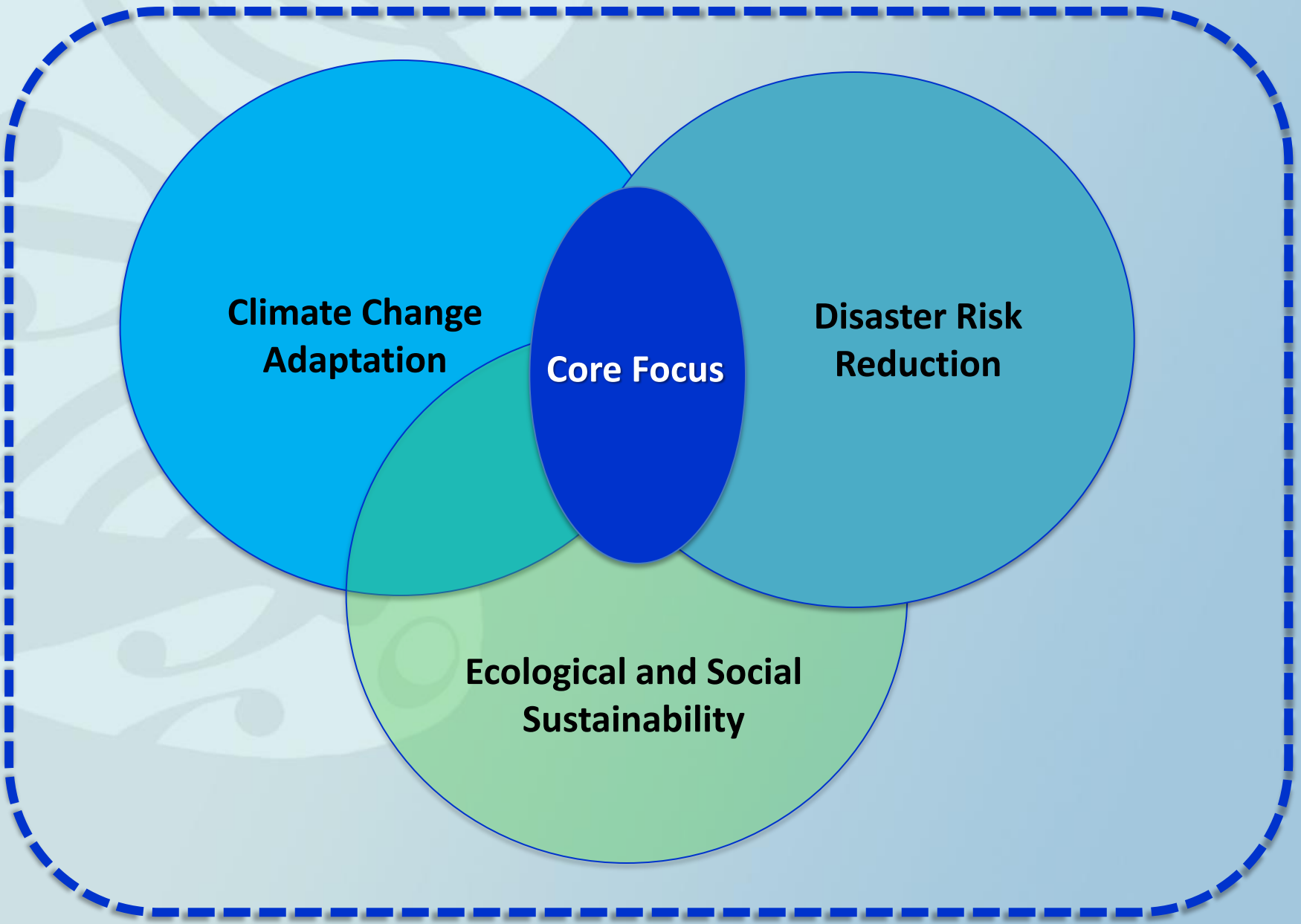
Landscape Scale that includes Community and Ecosystem Focus

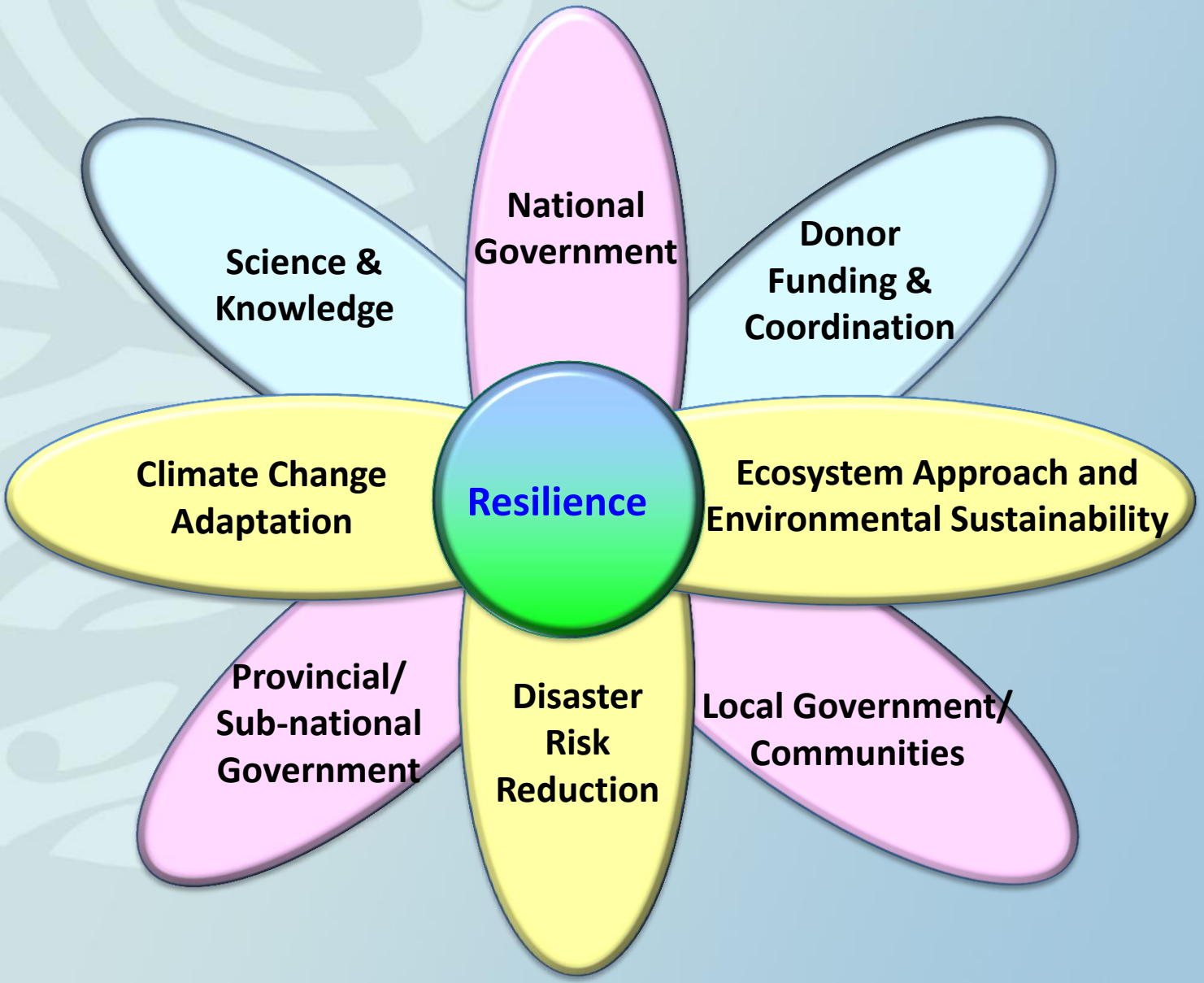
National policy implementation ⟷ **Sub-national policy implementation** ⟷ **Community engagement**

Country-wide integrated planning

Whole-of-island integrated planning, ridge to reef approach, watershed management, etc

ECOSYSTEM APPROACH




National Government
Donor Funding & Coordination
Ecosystem Approach and Environmental Sustainability
Local Government/ Communities
Disaster Risk Reduction
Provincial/ Sub-national Government
Climate Change Adaptation
Science & Knowledge
Resilience

Thank You!