EMERGING ENVIRONMENTAL ISSUES AND PRIORITIES FOR BIODIVERSITY CONSERVATION IN PACIFIC ISLAND COUNTRIES AND TERRITORIES (PICTS)

CBD Capacity-building Workshop for the Pacific on Ecosystem Conservation and Restoration

The University of the South Pacific Suva, Fiji, 25-29 November

Randy Thaman

The University of the South Pacific
Suva, Fiji Islands

I pay respect to, and ask for the blessings of the peoples of the Pacific Islands as the custodians of their island and ocean biodiversity and ethnobiodiversity





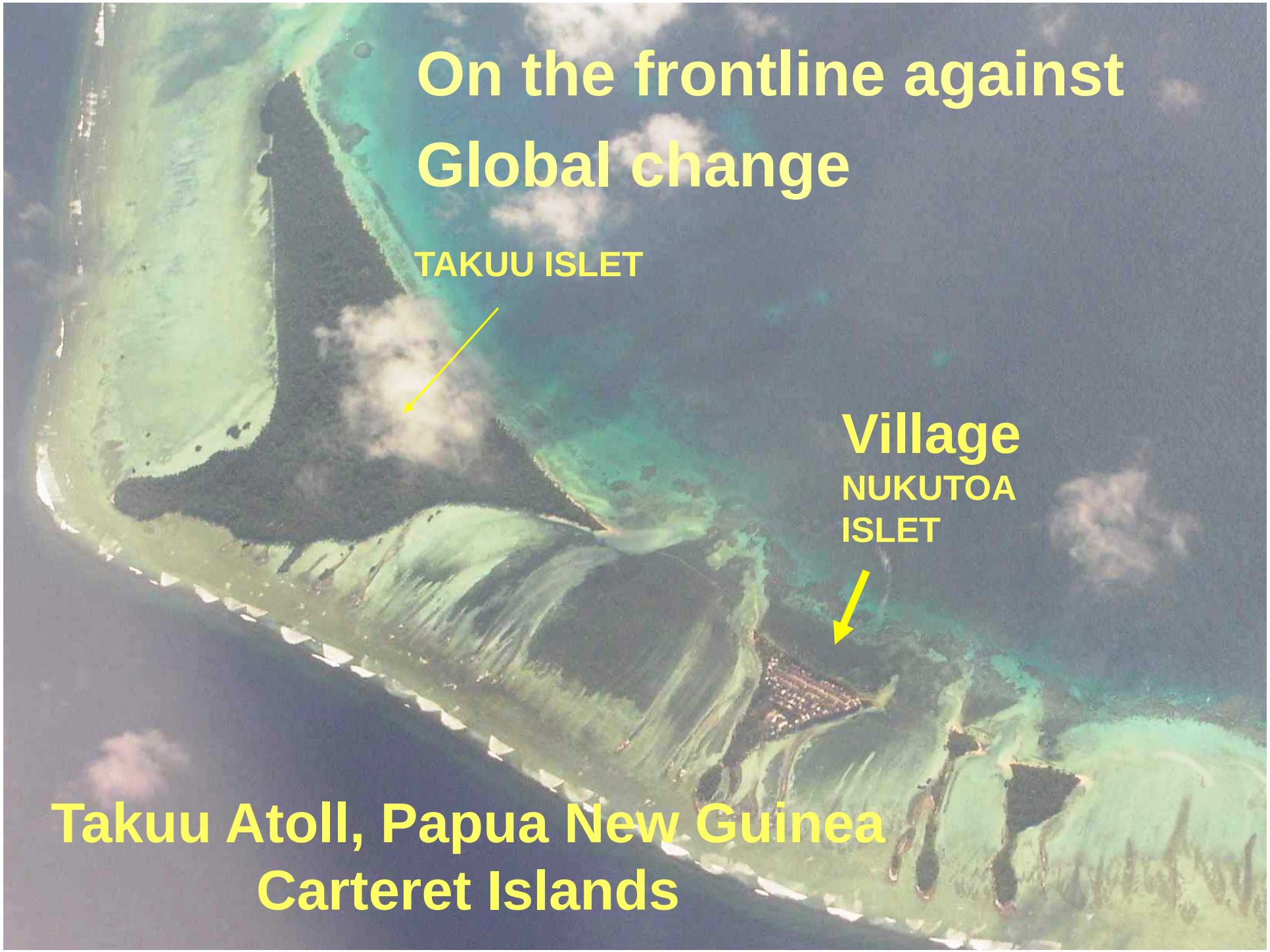




PICTS ON THE FRONTLINE AGAINST NEW THREATS

PICTS are clearly on the frontline against LOSS OF BIODIVERSITY, climate and environmental change,, extreme events, economic downturns and social change.

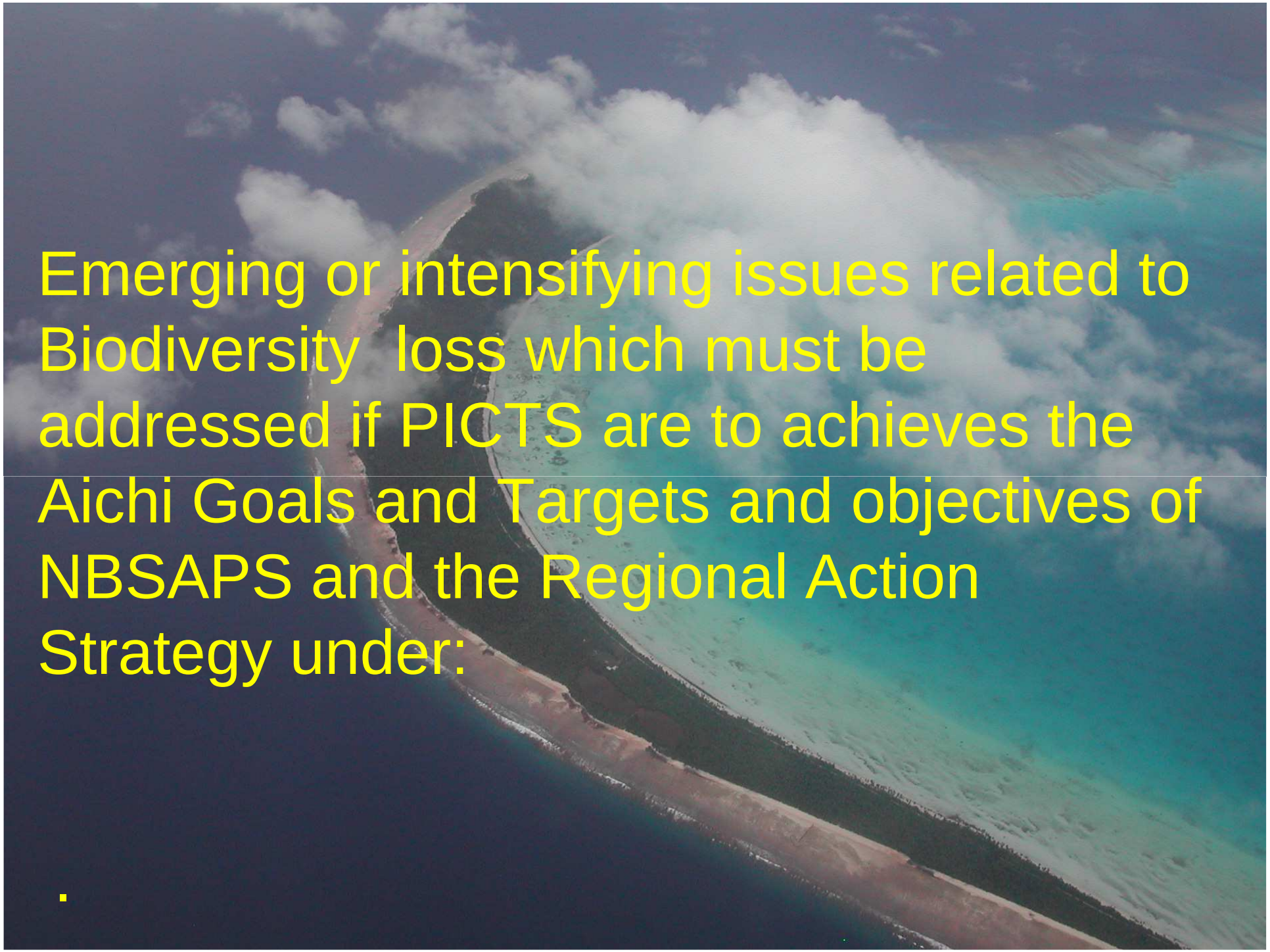
Small size, resource scarcity and depletion, isolation and very limited options for commercial and industrial development clearly require new HYBRID ADAPTIVE STRATEGIES to address existing, new and intensifying THREATS to biodiversity and sustainable island life.

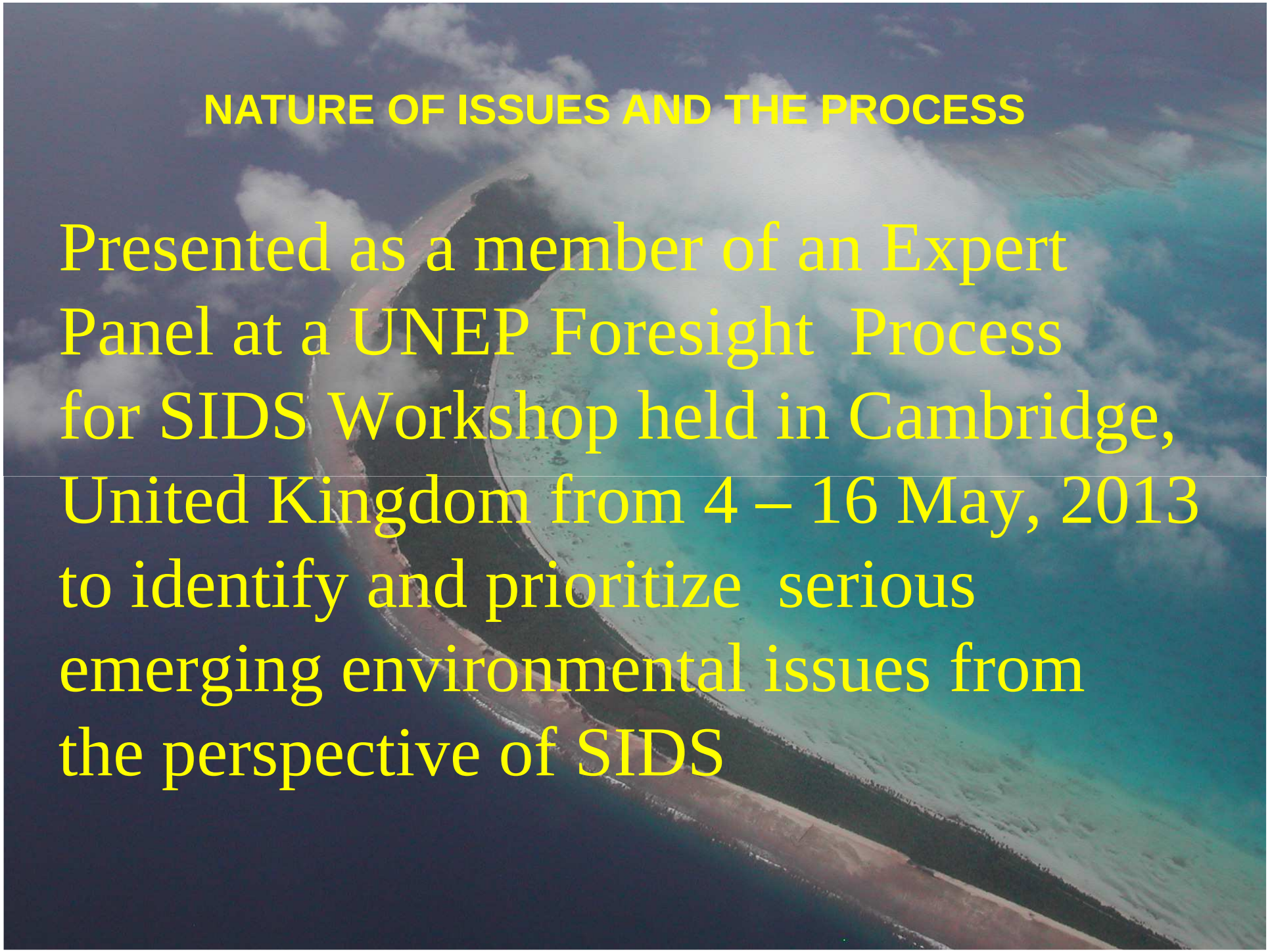

On the frontline against
Global change
TAKUU ISLET
Village
NUKUTOA
ISLET
Takuu Atoll, Papua New Guinea
Carteret Islands

SYNERGIES BETWEEN TRADITIONAL KNOWLEDGE AND MODERN SCIENCE

- To achieve the Aichi Targets and Objective of the NBSAPS and the Regional Action Strategy will require building strong synergies between indigenous and local knowledge (ILK) and the best modern science and interventions

**one of the main objectives of the recently established Intergovernmental Science Policy Platform for Biodiversity and Ecosystem Services (IPBES)


Emerging or intensifying issues related to Biodiversity loss which must be addressed if PICTS are to achieves the Aichi Goals and Targets and objectives of NBSAPS and the Regional Action Strategy under:

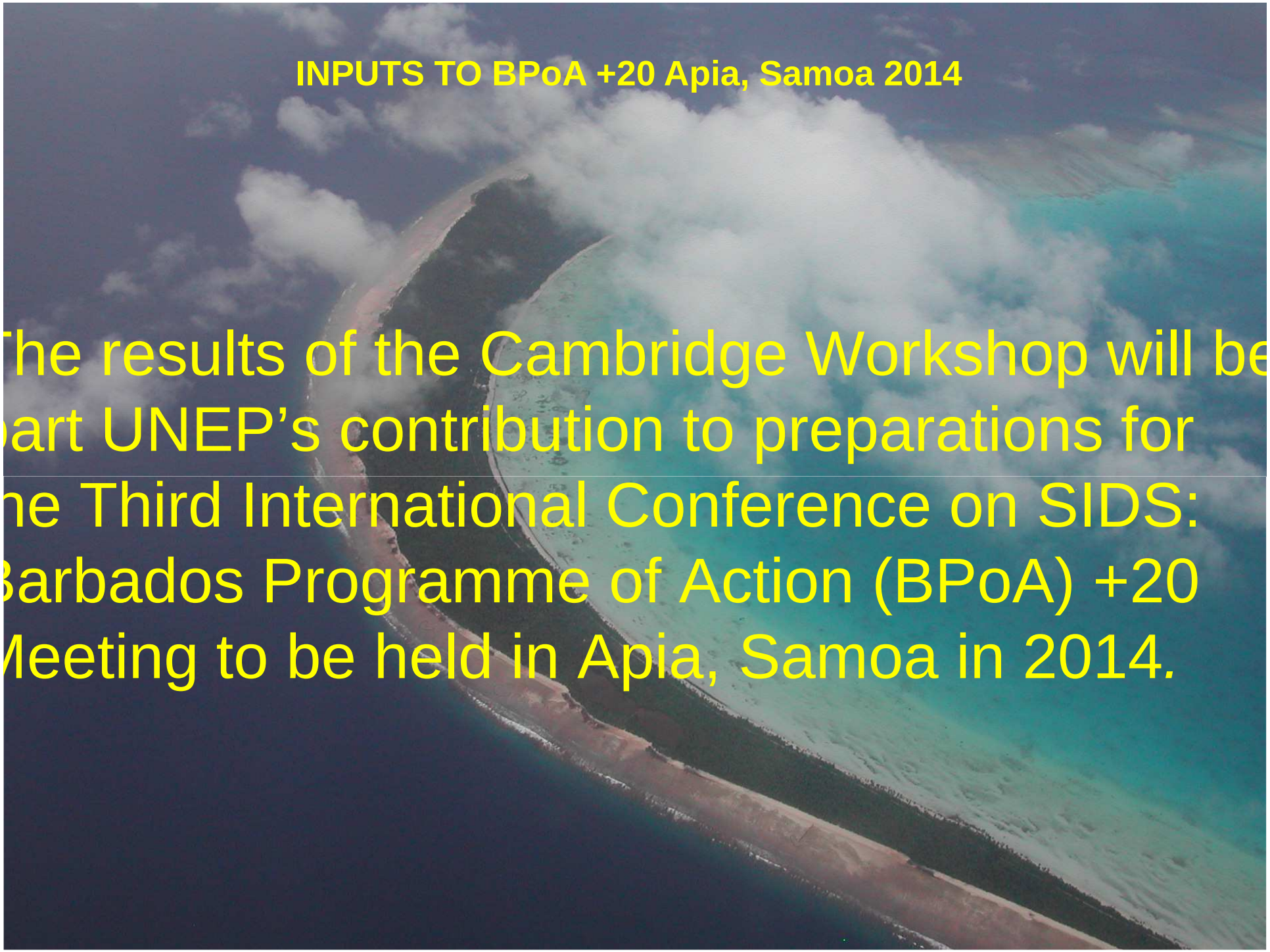


NATURE OF ISSUES AND THE PROCESS

Presented as a member of an Expert Panel at a UNEP Foresight Process for SIDS Workshop held in Cambridge, United Kingdom from 4 – 16 May, 2013 to identify and prioritize serious emerging environmental issues from the perspective of SIDS

NATURE OF ISSUES AND THE PROCESS

Approach used ito produce the report: *21 Issues for the 21st Century: Results of the UNEP Foresight Process on Emerging Environmental Issues* which was published *and widely* circulated in the run-up to Rio +20 and at Rio +20 and stimulated discussions about priorities for policy action that have already influenced the new medium-term strategy of UNEP (NEP 2012).


INPUTS TO BPoA +20 Apia, Samoa 2014
The results of the Cambridge Workshop will be
part UNEP's contribution to preparations for
he Third International Conference on SIDS:
Barbados Programme of Action (BPoA) +20
Meeting to be held in Apia, Samoa in 2014.

EMERGING OR INTENSIFYING ISSUES

1. Intensification of Impacts of Extreme Events

2. Invasive Alien Species (IAS)

3 .Overfishing of Inshore Waters

4. Loss of Indigenous and Local Knowledge and Biocultural Diversity/Ethnobiodiversity

5. Need to Protect Biodiversity Cool Spots

6. Agrodeforestation and Loss of Agrobiodiversity

7. Loss of Tropical Montane Cloud Forest

8. Increasing Degradation and Scarcity of Freshwater Water Resources

9. Breakdown in Biogenic Calcification and the Biogenic Sand and Sediment Budget

10. Coral Disease

11. Coastal Littoral and Mangrove Deforestation and Devegetation

Some of these issues were previously highlighted in the “creeping issues” indentified in the global *21 Issues for the 21st Century.*

Because all of these “environmental” “issues are directly or indirectly related to the loss of biodiversity and ecosystems services, successfully addressing these issues is seen as critical if we are to even approach reaching the Aichi Targets as part of the *Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets: “Living in Harmony with Nature”* (CBD 2011).

2010 International Year of Biodiversity

Biodiversity is life
Biodiversity is our life

1 INTENSIFICATION OF IMPACTS OF EXTREME EVENTS

- Extreme events include: tropical cyclones, floods, droughts, El Niño/La Niña (ENSO) events, king tides, earthquakes, tsunamis, volcanic eruptions, uncontrolled fires, coral bleaching and invasive species and disease infestations

- Have always been a reality, BUT THE IMPACTS ON THE ENVIRONMENT, BIODIVERSITY AND HUMAN FOOD, HEALTH AND LIVELIHOOD SECURITY ARE CLEARLY INTENSIFYING, PARTICULARLY ON ISLANDS, and constitute one of the most serious emerging obstacles to sustainable island life.

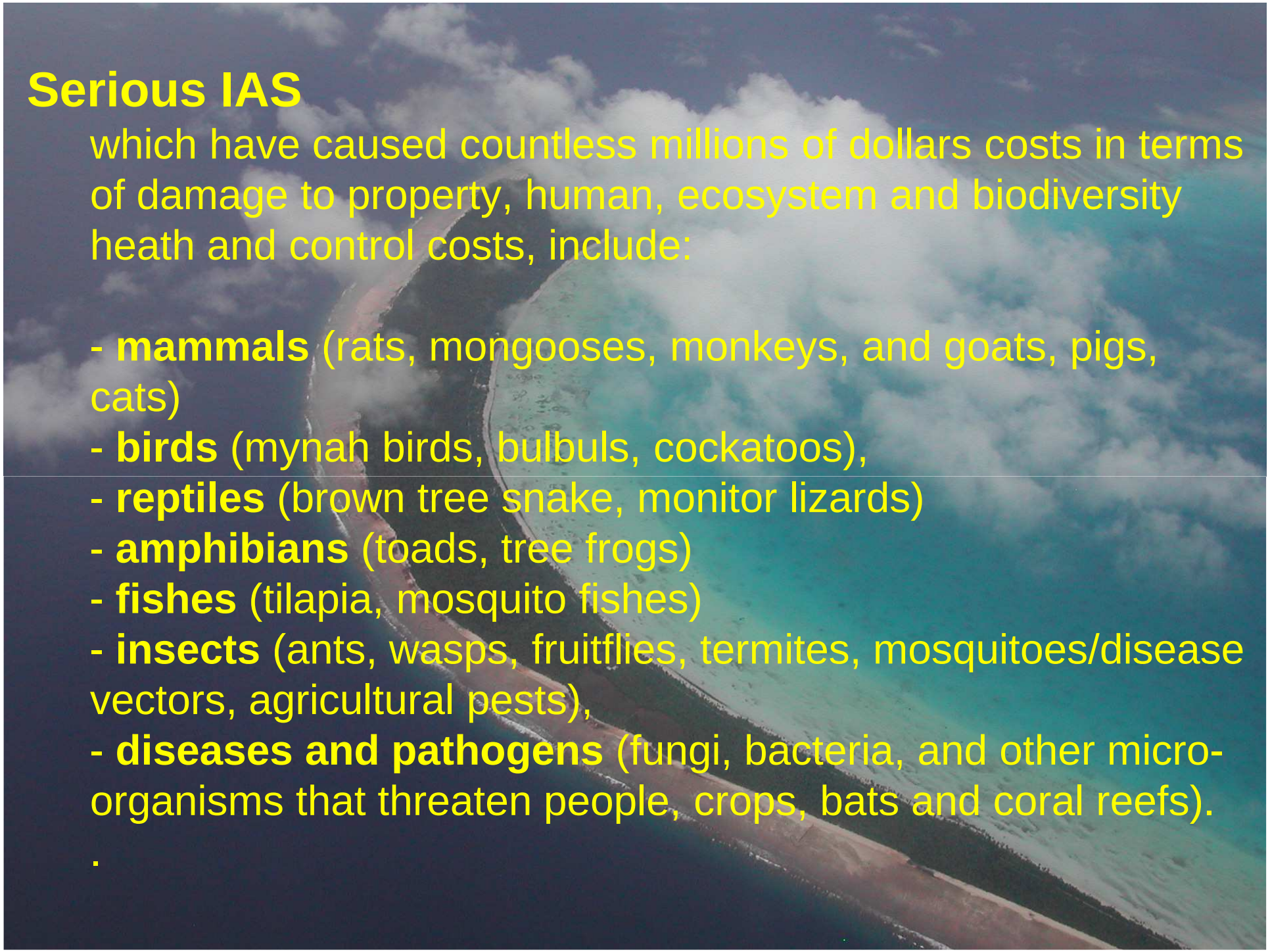

This intensification of the impacts seems to be due to negative synergies associated with increasing population pressure, environmental degradation, inappropriate environmental engineering and construction, loss of agricultural diversity, pollution, overfishing, invasive alien species, and human-induced climate change, sea-level rise and acidification of the ocean AND LOSS OF BIOCULTURAL DIVERSITY.

Trees in the aftermath of 2009 Tsunami, Samoa

2 INVASIVE ALIEN SPECIES (IAS)

- Invasive alien species (IAS) clearly constitute one of the most serious, but under-acknowledged, threats to both native and cultural biodiversity and ecosystems and human wellbeing in PICTS.

IAS have seriously undermined food, health and productive security and increased the vulnerability to environmental, economic and social change in PICTS.



Serious IAS

which have caused countless millions of dollars costs in terms of damage to property, human, ecosystem and biodiversity heath and control costs, include:

- **mammals** (rats, mongooses, monkeys, and goats, pigs, cats)
- **birds** (mynah birds, bulbuls, cockatoos),
- **reptiles** (brown tree snake, monitor lizards)
- **amphibians** (toads, tree frogs)
- **fishes** (tilapia, mosquito fishes)
- **insects** (ants, wasps, fruitflies, termites, mosquitoes/disease vectors, agricultural pests),
- **diseases and pathogens** (fungi, bacteria, and other micro-organisms that threaten people, crops, bats and coral reefs).

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Cost Estimates

- Worldwide, it has been estimated that the costs of damage from IAS are over US$1.4 trillion, amounting to 5% of the global economy
- In Europe the economic losses due to IAS have been estimated to over € 12.5 billion/year.
- in the US alone the economic costs alone have been estimated at $120 billion, with over 40 million hectares, the size of California being affected

Cost of Pesticides

- The negative economic, environmental and social costs of the use of pesticides to control IAS are also a major cause of the loss of biodiversity, environmental pollution and a threat to human health – A cost that is still not on the radar screen of most of our leaders – Despite the clear message of Rachael Carson's *Silent Spring* (1962) and the loss of countless species on islands due to IAS

Island Endemics

Particularly Vulnerable

- Slide – Alan Saunders, PII

Islands are “extinction hotspots”

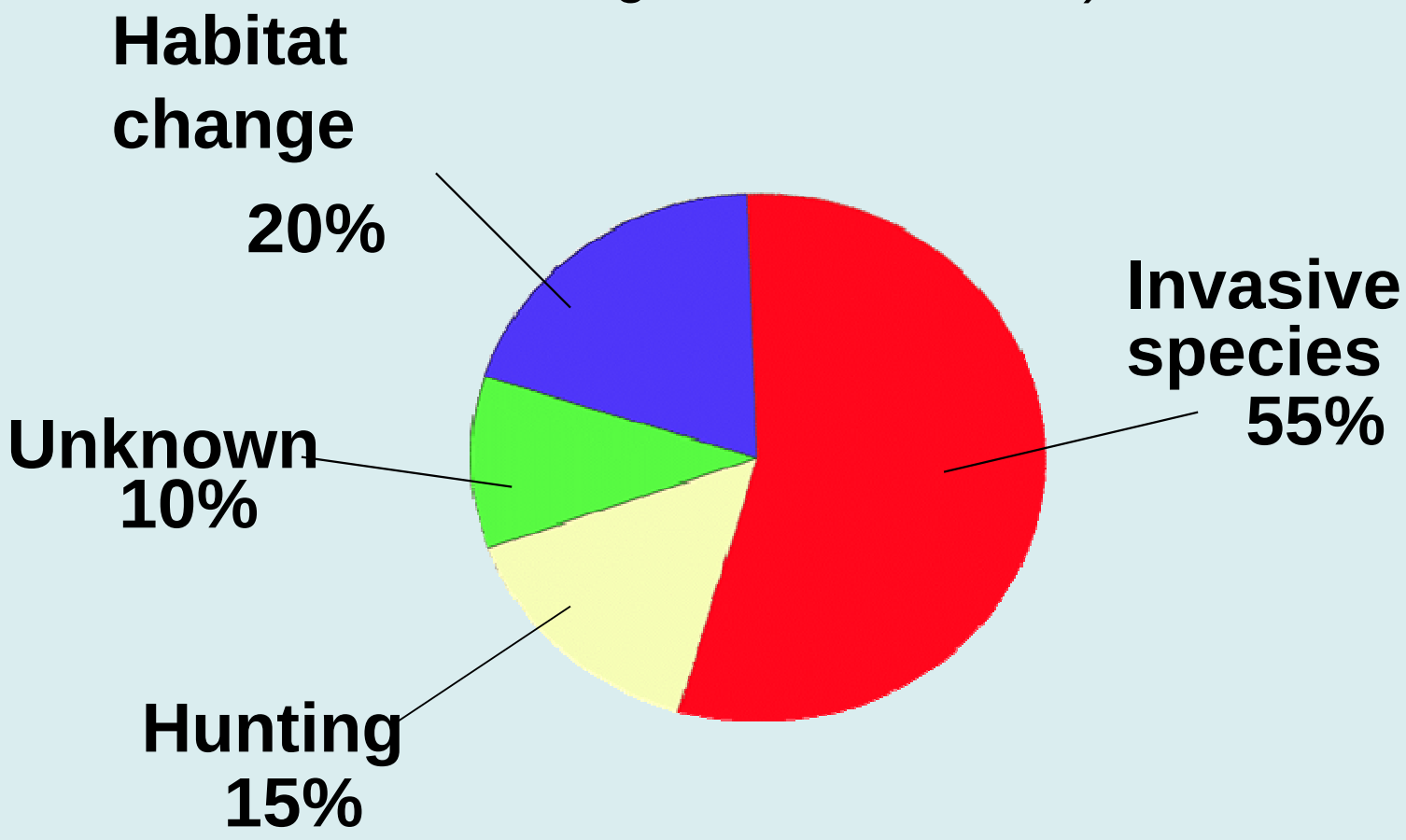
80-90% of reptile extinctions from islands

80-93% of bird extinctions from islands

50-81% of mammal extinctions from islands

- **Slide – Alan Saunders, Pacific Invasive Initiative**

Invasive species are the major cause of bird extinctions on islands (brown tree snake, avian malaria, cats, pigs, rats, mongooses, ants, etc.)



Slide – Alan Saunders, Pacific Invasive Initiative

3 Overfishing of Inshore Waters

- Overfishing constitutes a worldwide crisis that threatens biodiversity and livelihood security in PICTS.

-The world's top marine scientists underlined the seriousness of overfishing in a 2001 *Nature* article saying that "overfishing precedes all other human impacts on coastal ecosystems, including pollution, degradation of water quality, and anthropogenic climate change."

-Overfishing has led to "trophic cascades", the collapse of marine ecosystems and the disappearance or "ecological extinction" of larger, economically and culturally valuable species that were present in the past.

3 Overfishing of Inshore Waters

Most scientific studies focused on overfishing of larger, commercially important, higher trophic level, often pelagic, offshore finfish and larger marine organisms

Only limited focus on overfishing and the status of the extremely biodiverse range of smaller tropical nearshore, coral reef and freshwater finfish and invertebrate species – the inshore species that underpin ecological sustainability and food and livelihood security in most PICTS.

3 Overfishing of Inshore Waters

Recent studies have shown a, similar dramatic collapse of inshore and freshwater fisheries, with many ecologically, economically and nutritionally important species, at all trophic levels having disappeared or become economically or ecologically extinct due to overfishing and destructive fishing (e.g. dynamite, rotenone, night scuba and gillnet, trawl or trammel net fishing) combined with other environmental pressures.

LOSS OF KNOWLEDGE AND SHIFTING ENVIRONMENTAL BASELINE

- There is limited knowledge and data on how far inshore fisheries have been altered from their pre-exploitation state, even among professional fisheries biologists and conservationists, because most people have only experienced or conducted systematic surveys on present highly depleted reef and nearshore ecosystems, a problem referred to as “SHIFTING ENVIRONMENTAL BASELINES”

SHIFTING ENVIRONMENTAL BASELINE AND NEED FOR TIME-DEPTH KNOWLEDGE

- As a result, most authorities have come to accept the degraded fisheries as normal and set un-ambitious management targets that simply attempt to arrest declines, rather than rebuild the richer more productive fisheries that existed in the past.

- Must gain a clearer picture of how things have changed and what has been lost, something that can only be done by marrying ILK of older fishers (men and women) with the most up-to-date modern scientific findings on the history and ecological changes that have taken place in our nearshore fisheries.

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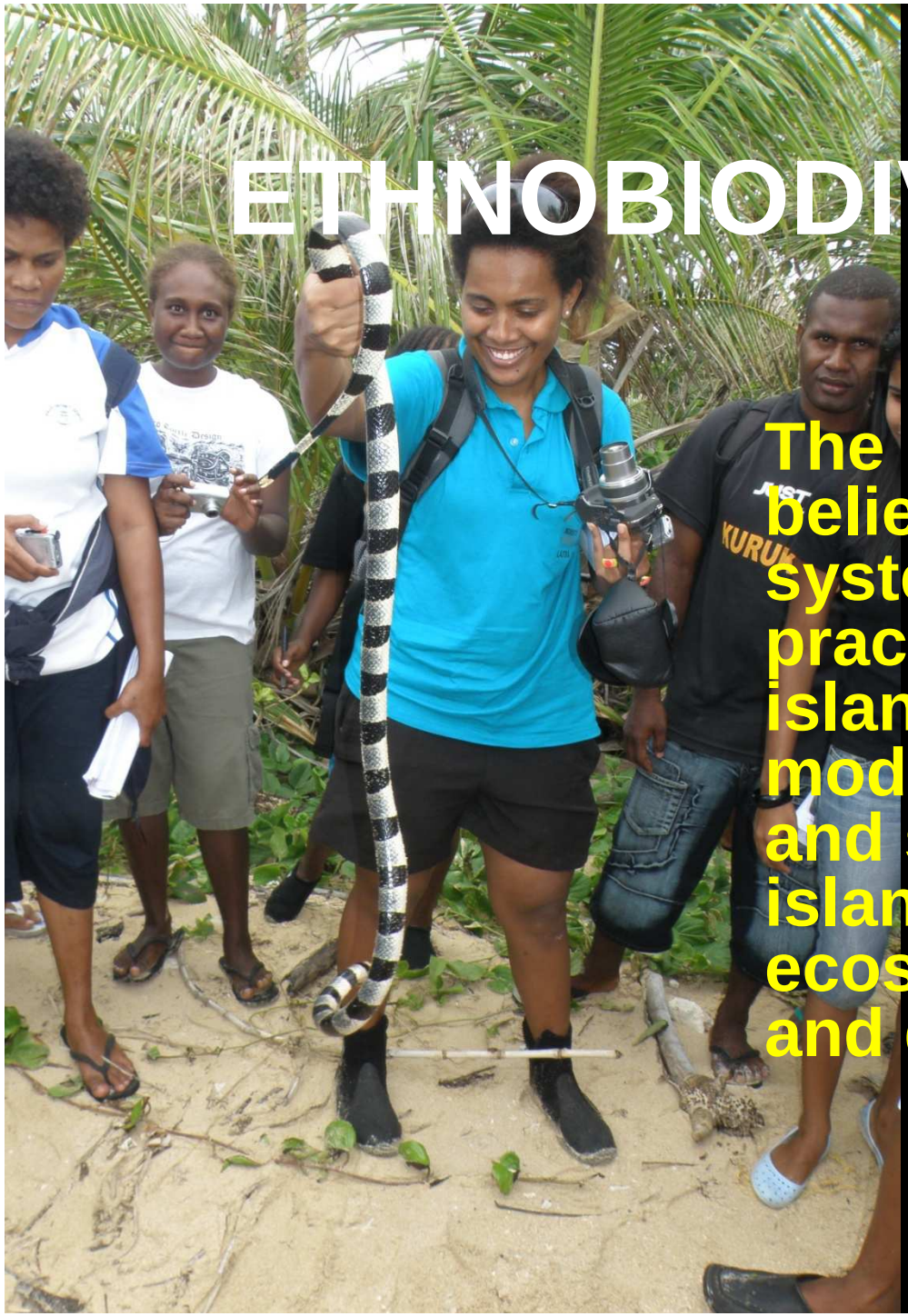
4 Loss of Loss of Indigenous and Local Knowledge and Biocultural Diversity/Ethnobiodiversity

-The loss ILK knowledge, especially "biocultural diversity" or "ethnobiodiversity", is, perhaps, the most serious obstacles to sustainable development , particularly in areas where resource-use decision making is vested in local communities.

-In most areas, the remaining traditional ILK holders (men and women) are dying and not being replaced by a younger generation that is less connected with the natural world and sustainability.

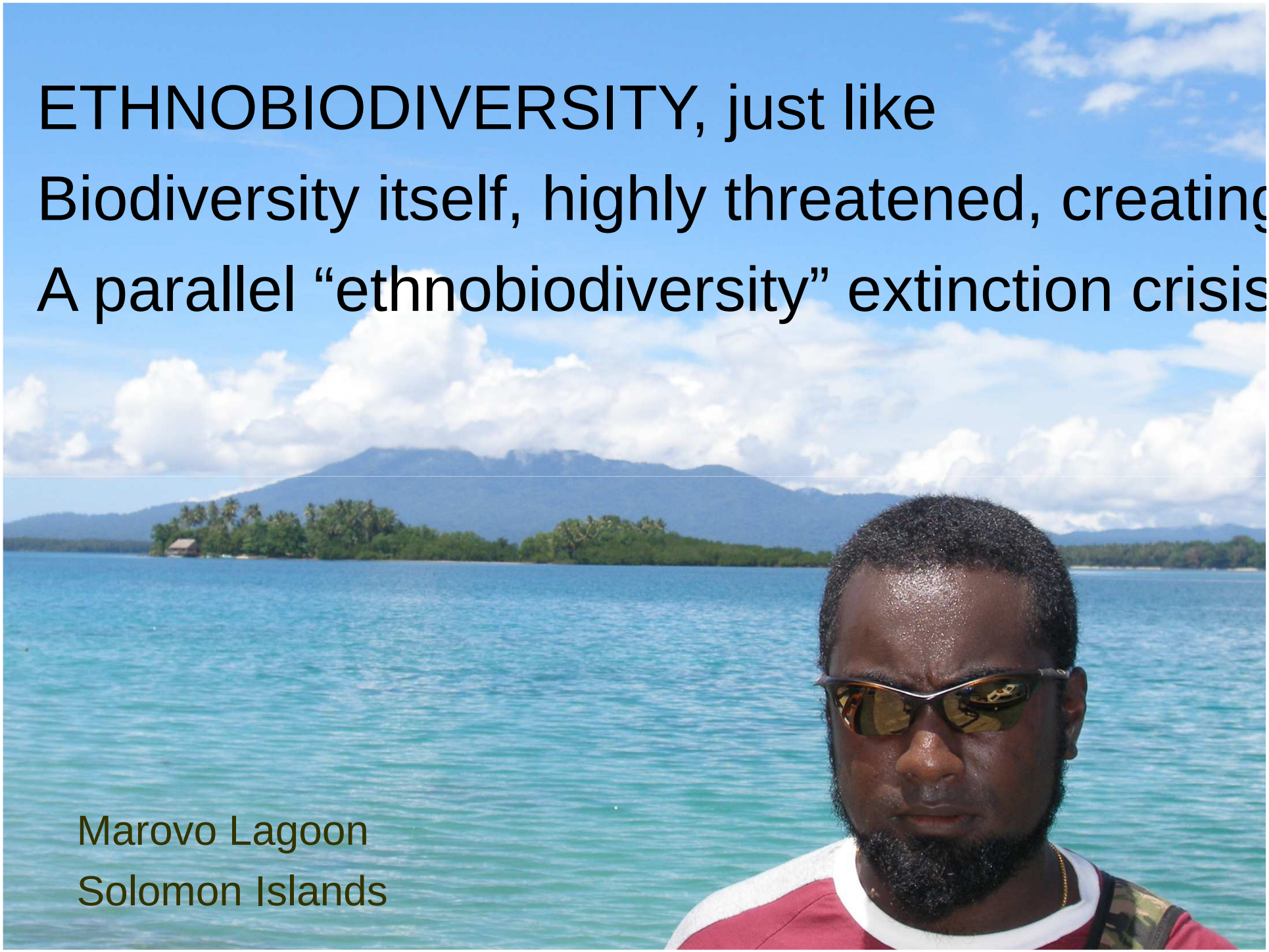
- Along with them dies ILK that has been accumulated over thousands of years in close contact with the island environment.



ETHNOBIODIVERSITY

The knowledge, uses, beliefs, resource-use systems and conservation practices and language that island societies, including modern scientists (“hard” and social), have for their island and marine ecosystems, species, taxa and genetic diversity.

ETHNOBIODIVERSITY, just like
Biodiversity itself, highly threatened, creating
A parallel “ethnobiodiversity” extinction crisis



Marovo Lagoon
Solomon Islands

5 Need to Protect Biodiversity Cool Spots

-Most global conservation efforts have focused on the Earth's "biodiversity hotspots.

-There is a critical need to address the very serious biodiversity crisis in the Earth's "biodiversity cool spots" – atolls, small islands and humanized areas that have very limited species diversity and little or no endemism .

. But where a very high proportion of their very limited biodiversity, the only biodiversity thesy have as a basis for sustainable development, is highly threatened!!


BUT . .Islands also include the Earth's most biodiversity poor and highly threatened . . .
Biodiversity "COOL SPOTS"!
. . .that are almost all WETLAND!!
Aranuka Atoll, Republic of Kiribati

6 Agrodeforestation and Loss of Agrobiodiversity

- Interspecies and intraspecies agricultural biodiversity is being lost due to over a century of monoculturalization, mechanization, pest and disease infestations and the use of inorganic fertilizers and pesticides in island agricultural systems.

-Of particular concern is the breakdown of traditional tree-rich agroforestry systems due to “agrodeforestation”, a process that degrades traditional agroforestry systems in which a wide range of food trees and other culturally and ecologically valuable trees, plants and wild and domesticated animal life were deliberately planted and protected within a matrix of staple food crops and other ground crops.

6 Agrodeforestation and Loss of Agrobiodiversity

-In many PICTS, particularly on atolls and small, highly populated islands there is little or no remaining forest, with most trees being found in outside of forests in agricultural lands, villages and other areas.

-For these islands the remaining trees are among the most important sources of a wide ecologically, economically and culturally irreplaceable trees and products; and remain the primary foundation for food, health and productive security.

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

GENETIC DIVERSITY: All genetic types or cultivated varieties of plants, animals and organisms found in these ecosystems


•Palau Women’s agroforest


•Sugarcane Farms and Agroforests, Fiji Islands


•Giant Swamp Taro, Kiribati

Pulaka – Insurance, knowledge and taste to address salinity, flooding, drought, economic and social crises!


Taro, Samoa Loss of all traditional cultivars
And cessation of all export in early 1990s

Kau Salusalu or Saluaki – Bau Island

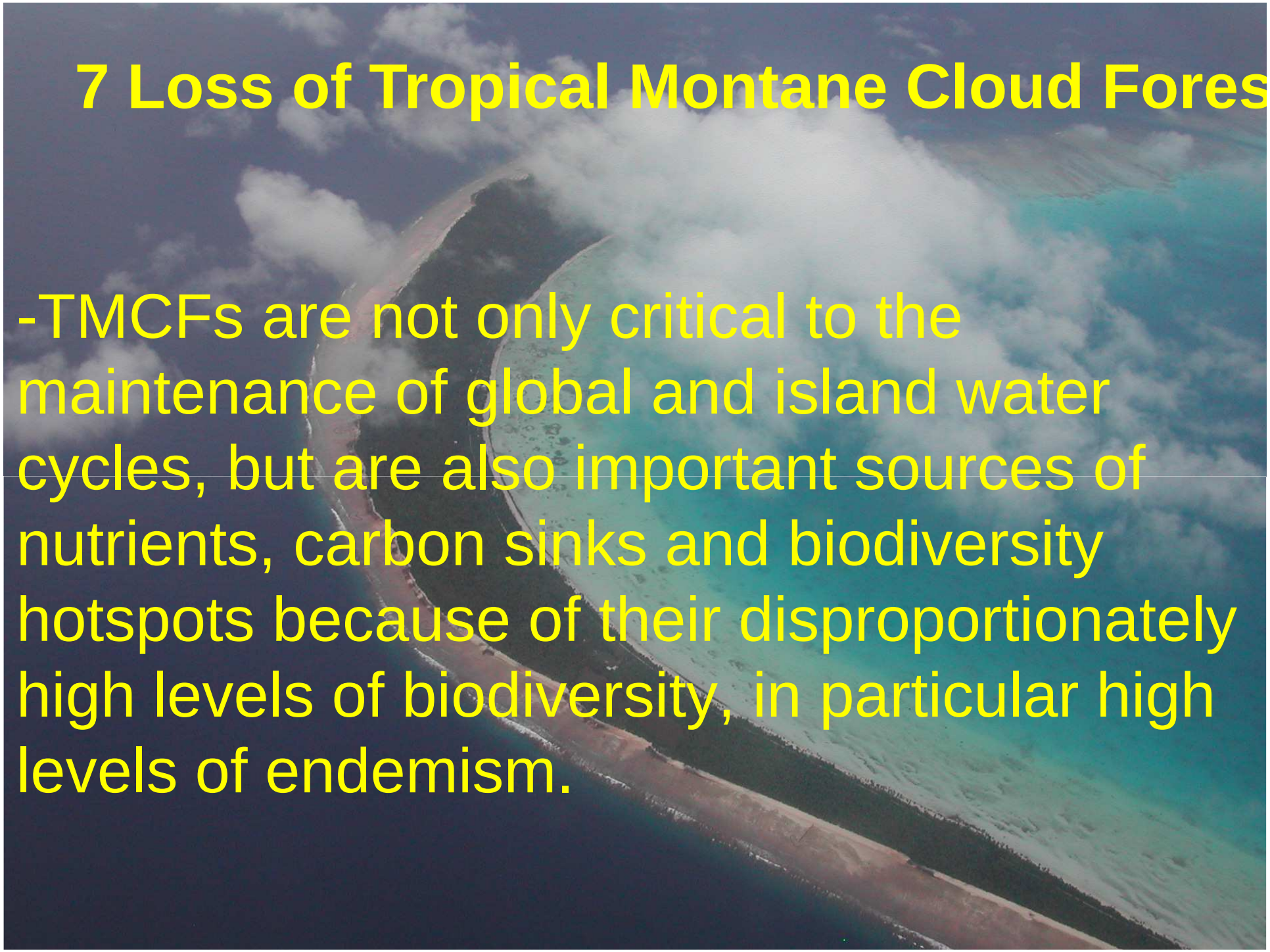
7 Loss of Tropical Montane Cloud Forest

Cloud Forest, Mt. Tomaniivi
Viti Levu, Fiji Islands

7 Loss of Tropical Montane Cloud Fores

- Loss of tropical montane cloud forest (TMCF) is the tropical high island equivalent of retreat of glaciers or loss of snowpack in higher latitudes.

-Loss of TMCF or retreat upward of the “dew line”, due to exploitation, degradation and global warming, reduces hidden (“occult”) rain, which is due to the cloud forest “sponge effect” of extracting moisture form clouds and slowly releasing it into the hydrologic system.



7 Loss of Tropical Montane Cloud Fores

-TMCFs are not only critical to the maintenance of global and island water cycles, but are also important sources of nutrients, carbon sinks and biodiversity hotspots because of their disproportionately high levels of biodiversity, in particular high levels of endemism.

7 Loss of Tropical Montane Cloud Fores

-As the climate warms, the lower limit of the cloud forest (“dew line”) move up on -slands

-The Dew line is significantly lower on smaller islands and coastal areas due to a “telescoping of altitudinal zones”s, which is known as the Massenerhebung or mountain mass elevation effect, which causes cloud forest at higher elevations on large mountain masses than on small isolated peaks, especially those in or near the sea.

***For example, in Fiji cloud forest is found below 400 m on Mt. Korobaba near the sea in southeastern Viti Levu, the main island of Fiji, but at over 1000 m on Mt. Tomaniivi in the interior of the island and on ridges as low at 250 m on Gau Island.

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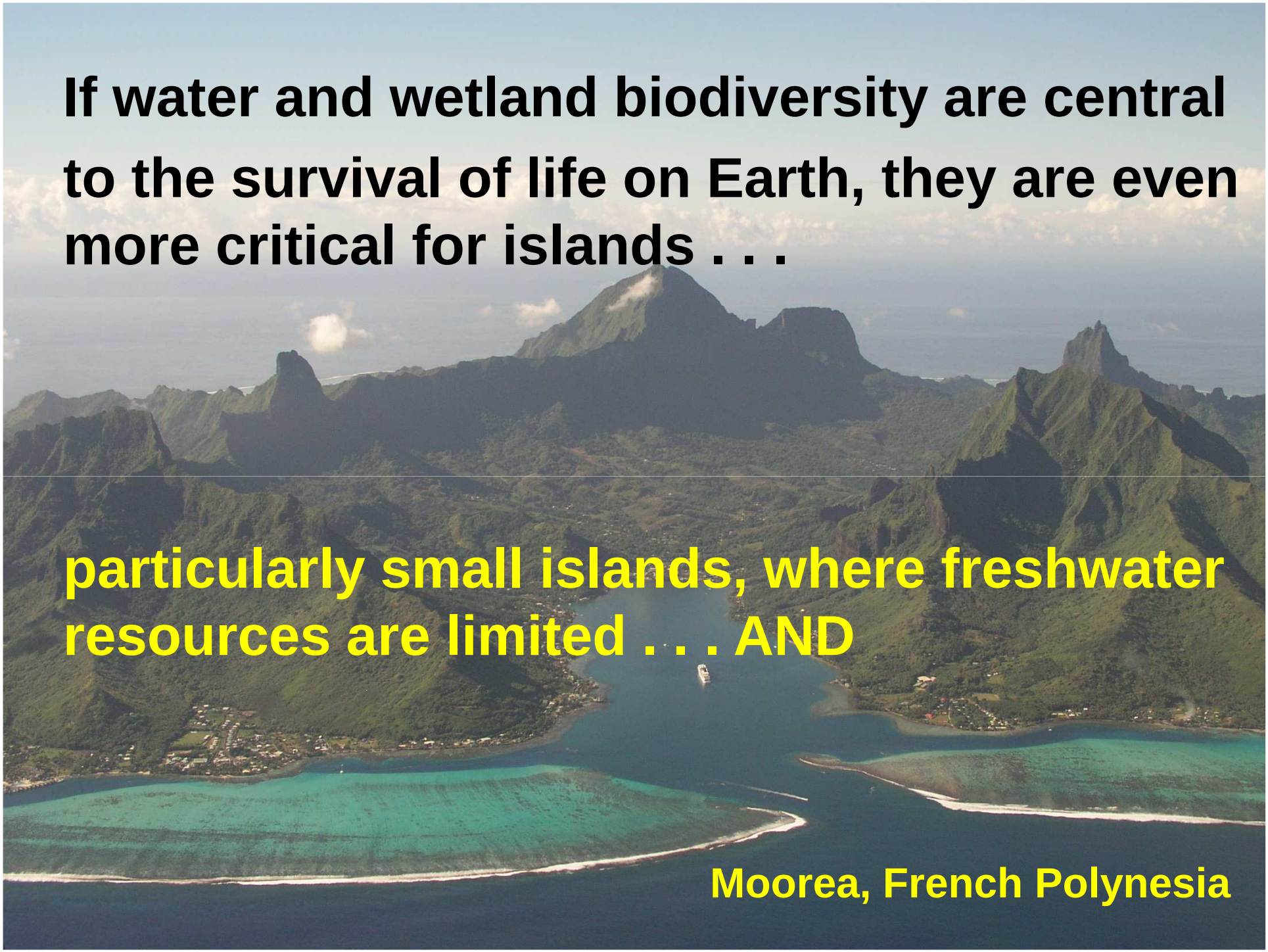
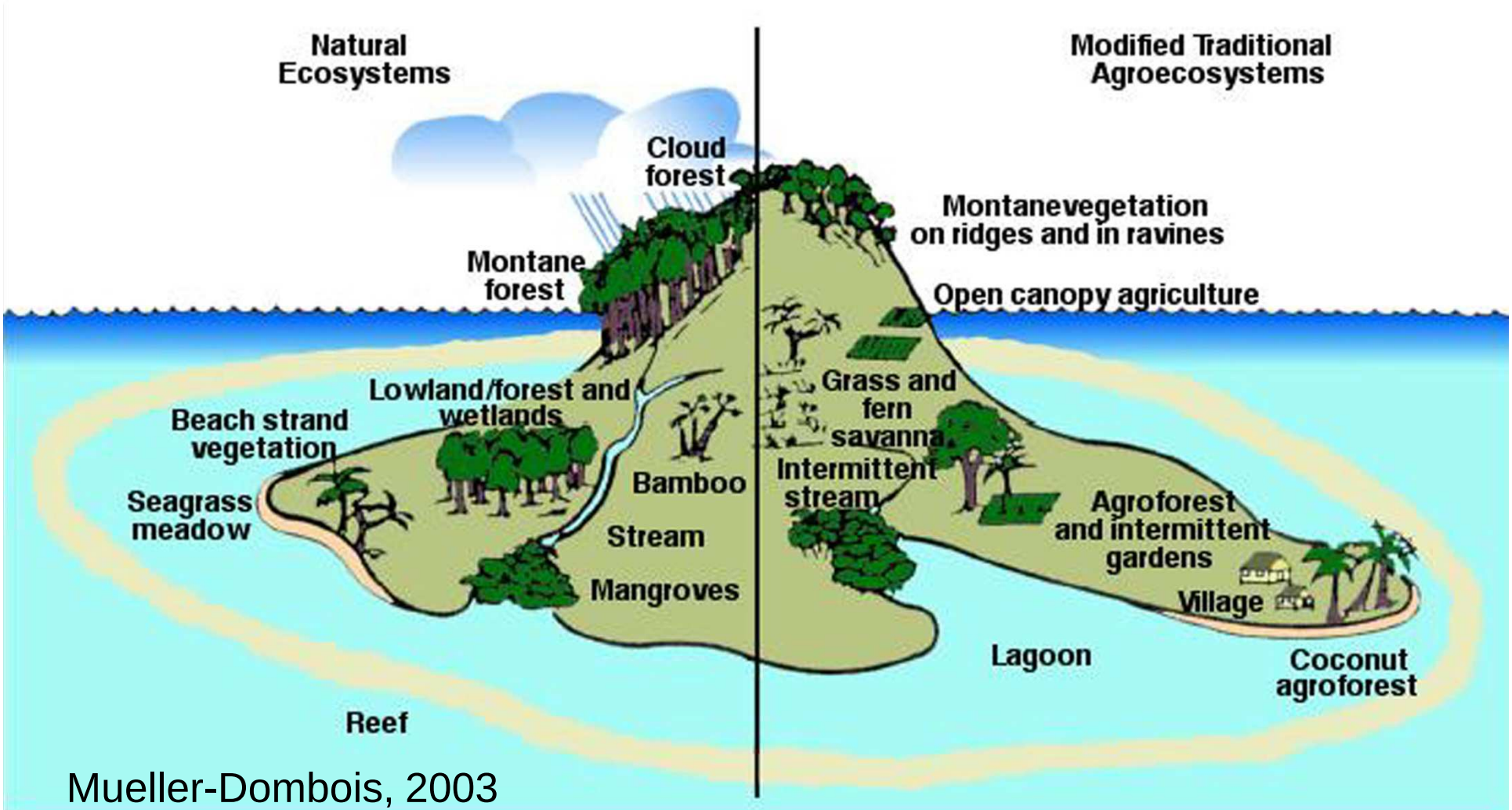
8 Degradation and Scarcity of Freshwater Resources and Wetland

- Freshwater major limiting factor for island terrestrial ecosystems, human health and modern development
- Surface and groundwater resources are limited, fragile and easily damaged by human or natural disturbance
- Water stress will have wide-ranging impacts includin on biodiversity, human health, agricultural productior and aquatic ecosystems.


If water and wetland biodiversity are central to the survival of life on Earth, they are even more critical for islands . . .
particularly small islands, where freshwater resources are limited . . . AND
Moorea, French Polynesia


. . . where connectivity and linkages between the land and sea, and between our mountains, forests and agricultural areas and our reefs, lagoons and beaches are so strong and vital.
Sigatoka River, SW Viti Levu, Fiji Islands

Ridge to Reef *Ahu Pua'a* Concept, Hawai'i



Mueller-Dombois, 2003

8 Degradation and Scarcity of Freshwater Resources and Wetland

This is due to:

- increasing demand from growing populations, tourism, urbanization and industrialization and land use change

- overextraction, salinization and pollution of both surface and groundwater supplies.

8 Degradation and Scarcity of Freshwater Resources and Wetland

- This situation will worsen with climate change for atolls, low-lying islands and coastal communities, where the most critical threat is increasing groundwater salinization, including wave washover during episodic wave and tidal events, such as king tides.

- Atolls likely to become the first uninhabitable places owing to salinisation of groundwater and then eventually 'vanishing', with the consequent forced migration of atoll islanders as environmental refugees.

9 Breakdown in Biogenic Calcification and the Biogenic Sand and Sediment Budget

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- High percentage of beach, lagoon and offshore sand and sediment (up to 100% in many cases) is biogenic and composed of the carbonate skeletal remains of dead marine organisms, most notably foraminifera, calcareous and coralline algae, corals, mollusks, echinoids and sponges.

9 Breakdown in Biogenic Calcification and the Biogenic Sand and Sediment Budget

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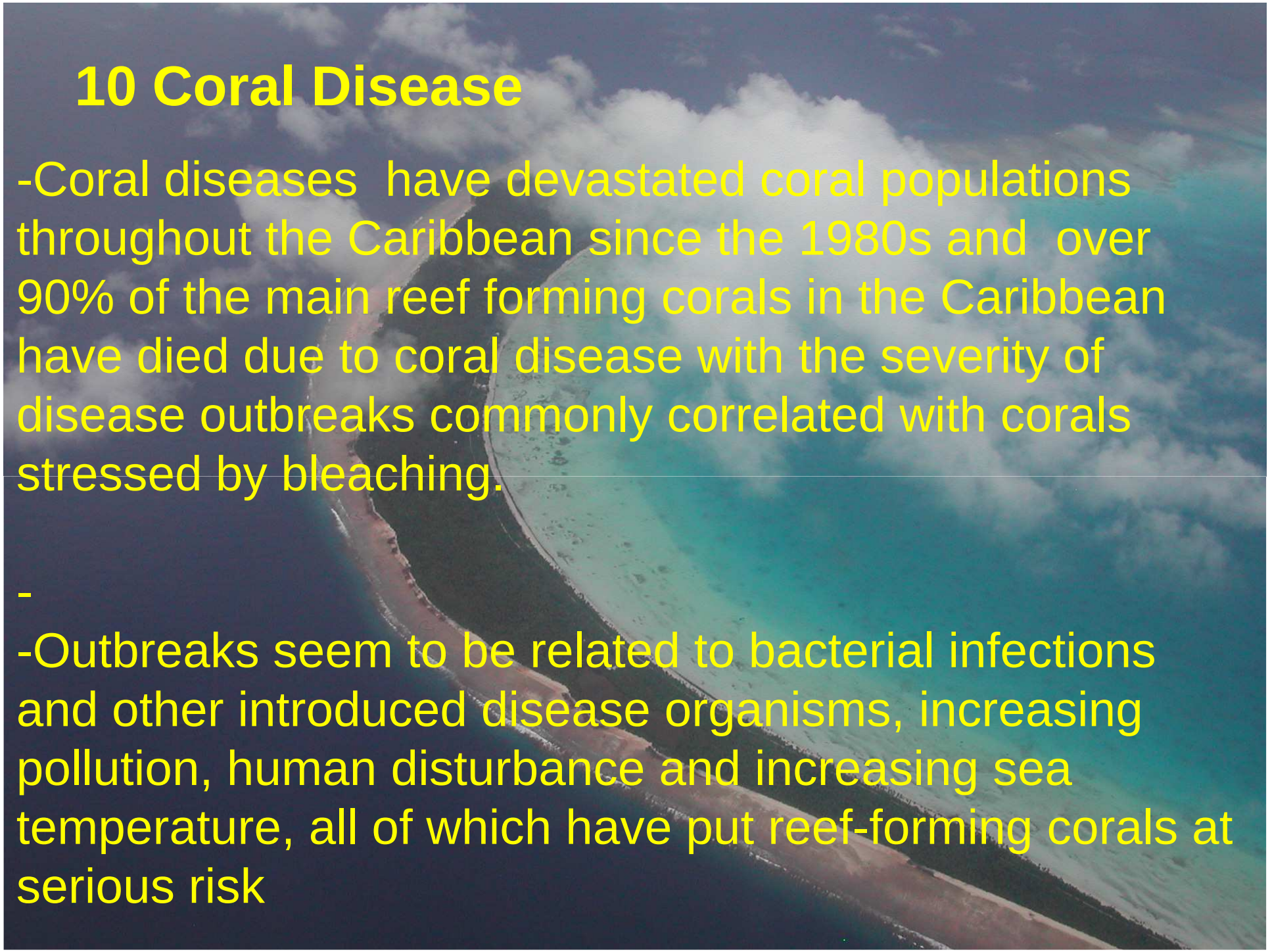
-Although most natural beach and offshore sediment systems are in a state of dynamic equilibrium, in many PSIDS coastal erosion is accelerating and beaches are not returning as they have in the past, lagoon sediments may not be replenishing and the rate of infilling of coral reefs with sediments that allows for vertical accretion may be reducing.

9 Breakdown in Biogenic Calcification and the Biogenic Sand and Sediment Budget

-On atolls and smaller islands where the sand is largely biogenic, there is increasing evidence that the loss of beaches is due to the loss of diversity and abundance of organisms that are the sources of biogenic sand.

-Studies on the atolls of the Pacific, such as Tuvalu, indicate that the loss of forams, calcareous algae (e.g., *Halemeda* spp.) that contribute to most of the beach sand and lagoon sediment are decreasing in abundance and diversity due to pollution (eutrophication), improper coastal engineering (e.g., causeway/bridge development)which interrupts along shore and ocean-lagoon circulation.

Te Puka Islet, Funafuti, Tuvalu



10 Coral Disease

-Coral diseases have devastated coral populations throughout the Caribbean since the 1980s and over 90% of the main reef forming corals in the Caribbean have died due to coral disease with the severity of disease outbreaks commonly correlated with corals stressed by bleaching.

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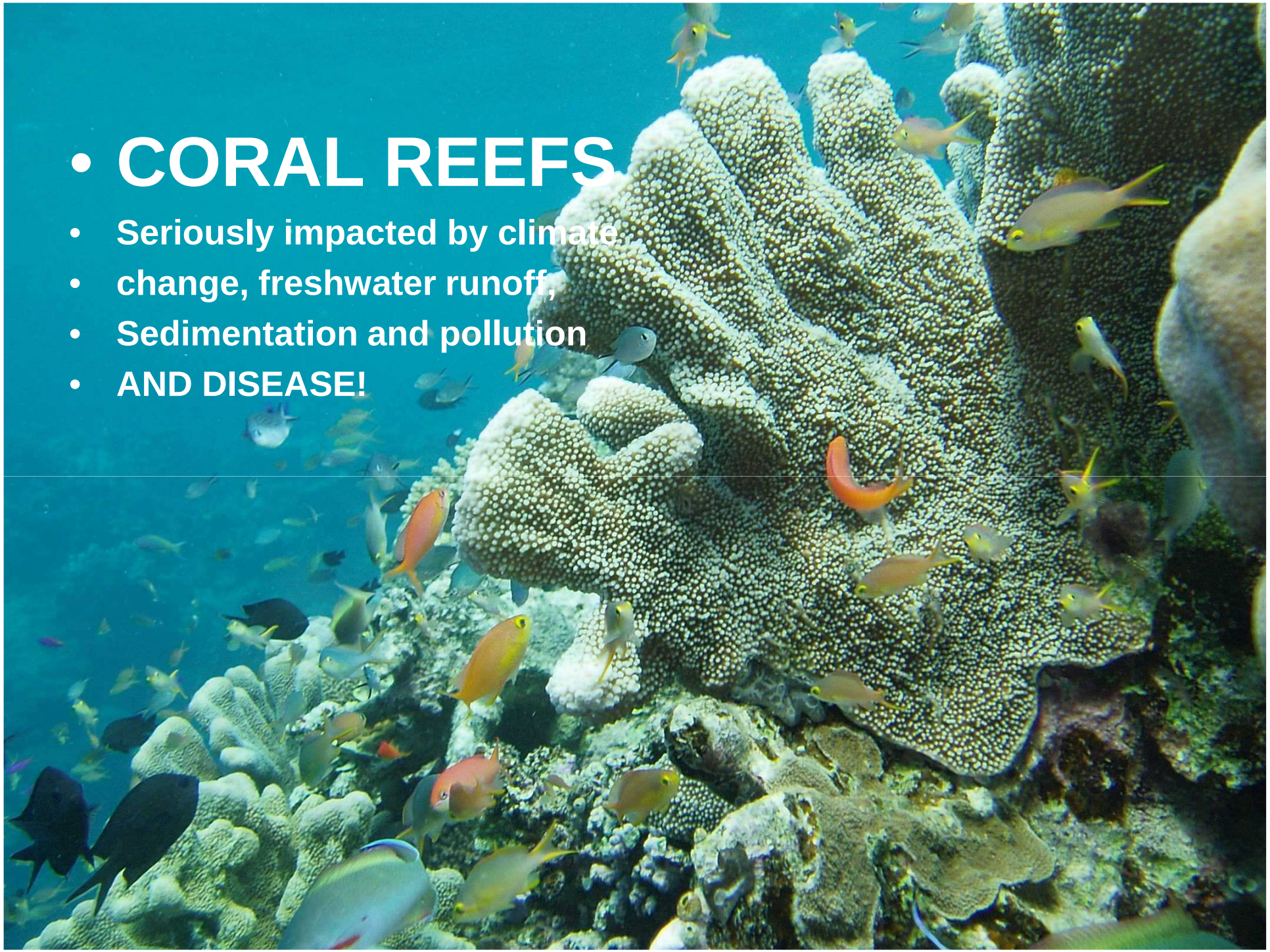
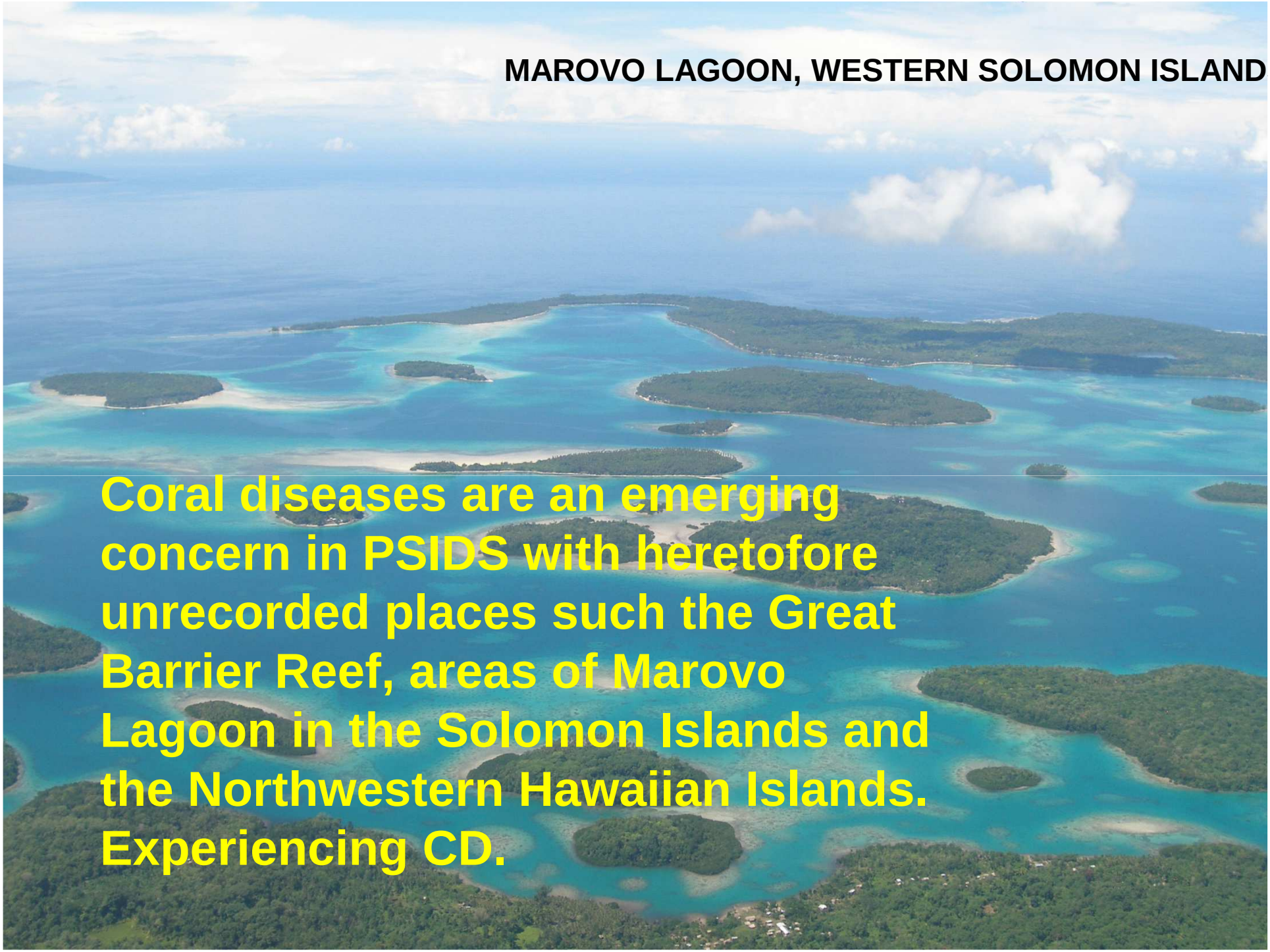
-Outbreaks seem to be related to bacterial infections and other introduced disease organisms, increasing pollution, human disturbance and increasing sea temperature, all of which have put reef-forming corals at serious risk


• CORAL REEFS
• Seriously impacted by climate
• change, freshwater runoff,
• Sedimentation and pollution
• AND DISEASE!


MAROVO LAGOON, WESTERN SOLOMON ISLAND
Coral diseases are an emerging concern in PSIDS with heretofore unrecorded places such the Great Barrier Reef, areas of Marovo Lagoon in the Solomon Islands and the Northwestern Hawaiian Islands. Experiencing CD.

11 Coastal Littoral Deforestation/Degradation

- Coastal littoral deforestation/devegetation and loss of littoral biodiversity is accelerating due to overexploitation or conversion to agricultural, urban or industrial uses and invasive species

-One of the most serious contributing factors to the increasing vulnerability of island communities to global change.

-Coastal and mangrove forests are clearly on the frontline against climate change and most other extreme events.

-Even though mangroves have been given increasing prominence in terms of their importance in coastal protection and providing environmental services, COASTAL LITTORAL FORESTS ARE FAR MORE THREATENED AND HAVE FALLEN INTO THE GAPS IN CC AND CONSERVATION INITIATIVES PSIDS

Ethnobotany of Coastal Littoral Plants
Coastal Littoral Vegetation

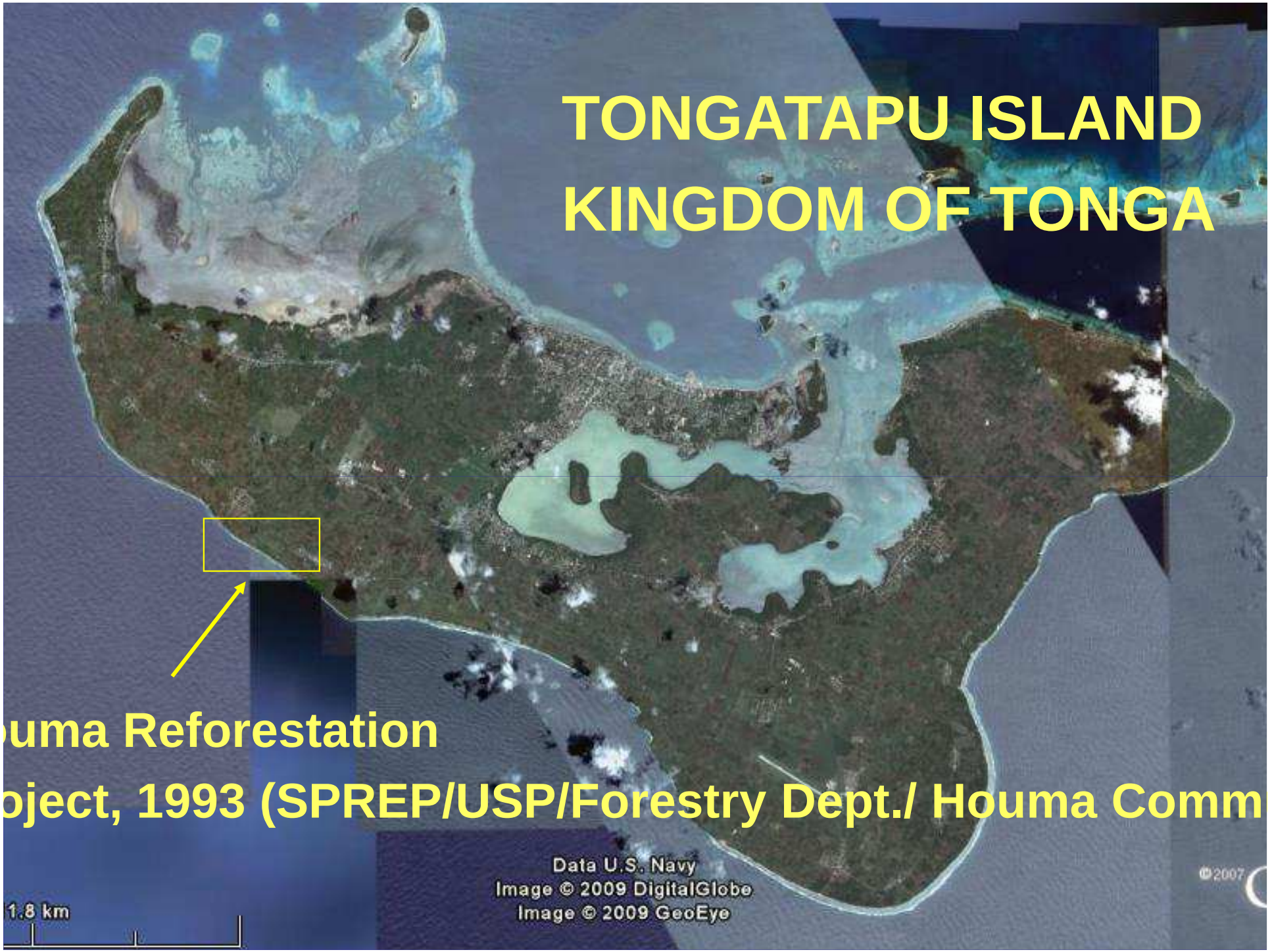
Cultural Utility of Coastal Plants

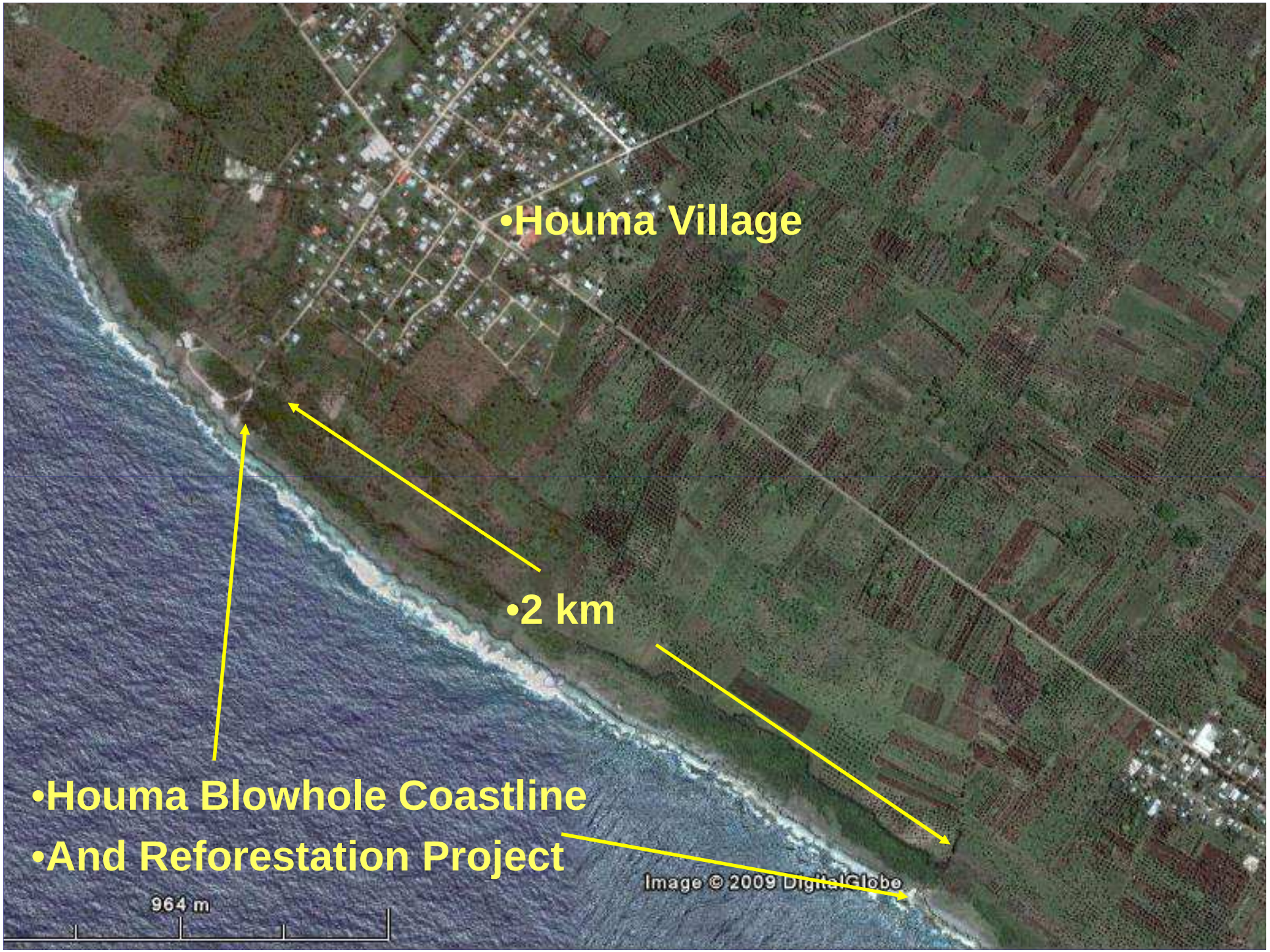
- 75 different purpose/use categories for 140 common Pacific Island coastal plants almost all of which are found on atolls.
- Frequency of usage for the 140 plants was 1024, an average of 7.3 purpose/use categories per plant, ranging from no reported uses for only two species to as many as 125 for the coconut
- Another 17 species have 20 or more reported uses
- 29 species have at least 7 uses each

Most Widely Reported Uses of Pacific Island Coastal

- Medicine
- general construction
- body ornamentation
- Fuelwood
- ceremony and ritual
- cultivated or ornamental plants
- Toolmaking
- food
- boat or canoe making
- dyes or pigments
- magic and sorcery
- fishing equipment
- cordage and fibre
- games or toys
- perfumes and scenting coconut oil
- fertiliser and mulching
- Woodcarving
- weapons or traps
- food parcelisation or wrapping, subjects of legends, mythology, songs, riddles, and proverbs, domesticated and wild animal feed, handicrafts, cooking equipment, clothing, fish poisons, items for export of local sale, adhesives or caulking, and musical instruments

- **113 OF 140 species (81%) reportedly used medicinally**
- **A quarter (27) are used medicinally for a variety of purposes, often the same purposes, wherever they are found throughout the Pacific, as well as in southeast Asia the ancestral homeland of Pacific peoples**
- **The effectiveness of these medicines has been recorded scientifically in writing by Chinese “doctors” and Indian Auryvedic medicinal practitioners for over 800 years (!).**
- **In most rural communities, there is little or no access to modern medicines and an almost exclusive dependence on traditional medicines to treat all diseases, sicknesses, injuries and other complaints.**


TONGATAPU ISLAND
KINGDOM OF TONGA
uma Reforestation
oject, 1993 (SPREP/USP/Forestry Dept./ Houma Comm
Data U.S. Navy
Image © 2009 DigitalGlobe
Image © 2009 GeoEye
©2007
1.8 km


•Houma Village
•2 km
•Houma Blowhole Coastline
•And Reforestation Project
964 m
Image © 2009 DigitalGlobe


•Other Indigenous
•Tree Species
•Double Row of Casuarina
Image © 2009 DigitalGlobe
© 2007 Google

Houma Blowhole Coast, Coastal Reforestation Project, 1993 – 20,000 trees planted along 2 km of coast (Revisit, August 2004)

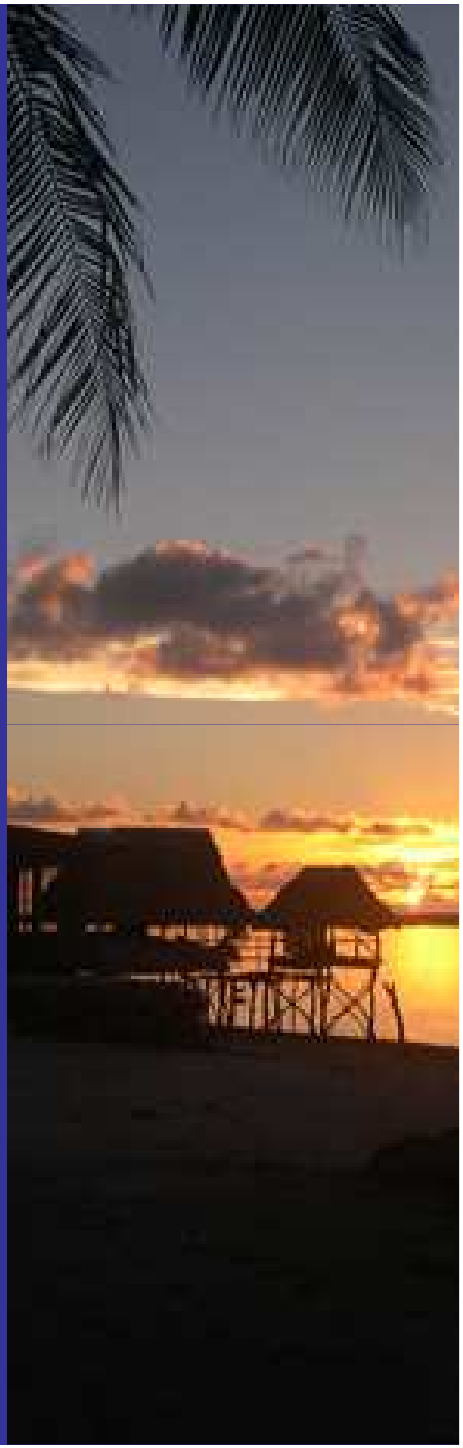
Houma Blowhole Coast, Coastal Reforestation Project, 1993 – 20,000 trees planted along 2 km of coast, Cost $US10,000 (Revisit, August 2004)

12 Capacity Building for Biodiversity and Sustainable Island Development

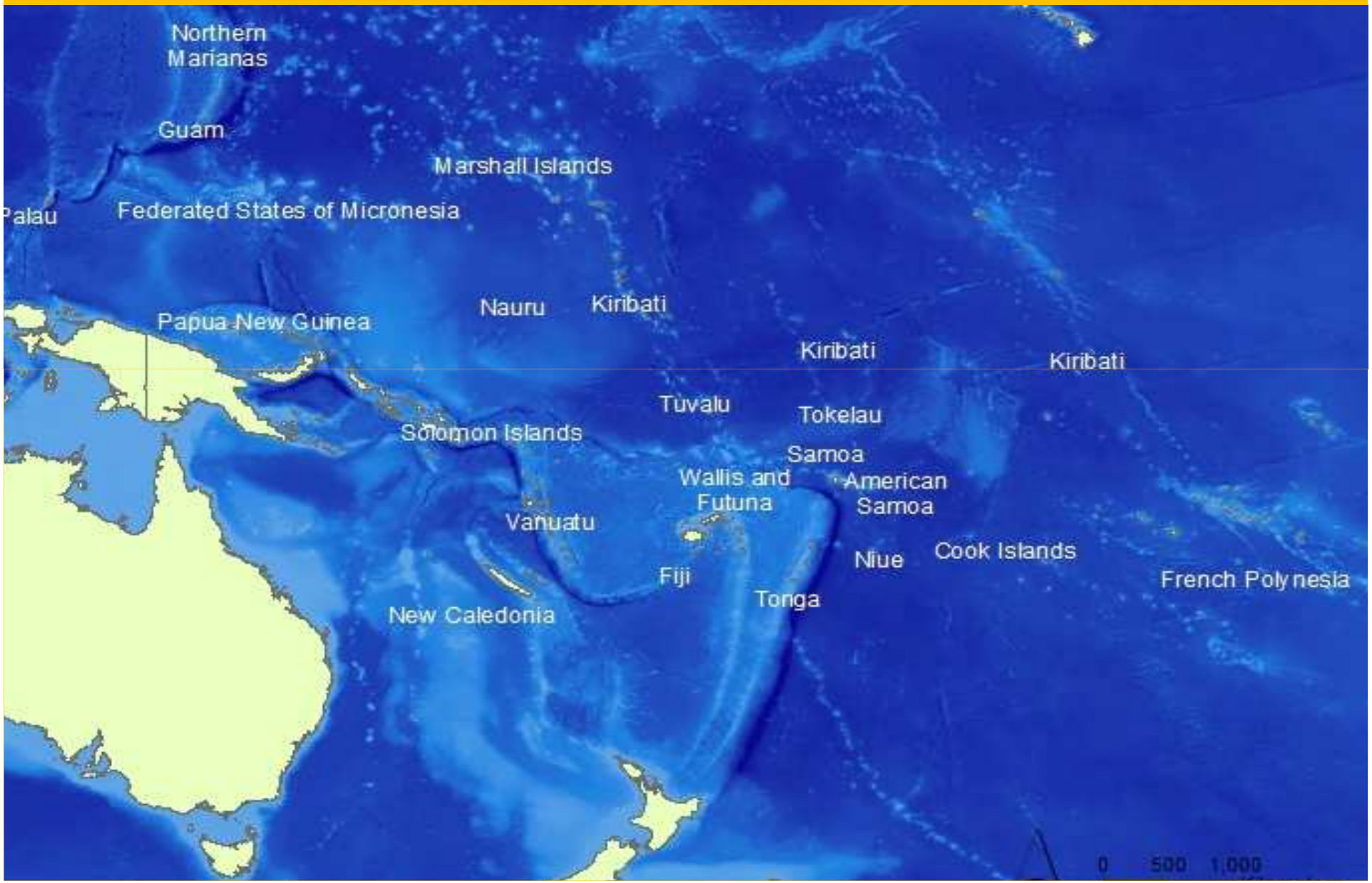
Excerpt from
Formal Statement (Commitment) made by USP at the Launching of the Global Island Partnership during COP 8, Curitiba, Brazil, 28 March 2006

- We stress the critical need for capacity building and the creation of the human resources required by all partner organizations. Without these, governments, NGOs, the private sector, local communities and other stakeholders will not have the capacity to realize the commitments of the goals of the Strategic Plan 2011 -- 2020, the Island Biodiversity Program of Work ad the Strategy of GLISPAp.

- **As the largest teaching and research organization in the Pacific Islands, USP makes a commitment, by the year 2010, to have at least 10% of our yearly output of graduates with degrees, diplomas and other short-term training in fields relevant to the successful implementation of the Global Island Partnership – HAVE ALREADY REACHED THIS!!**

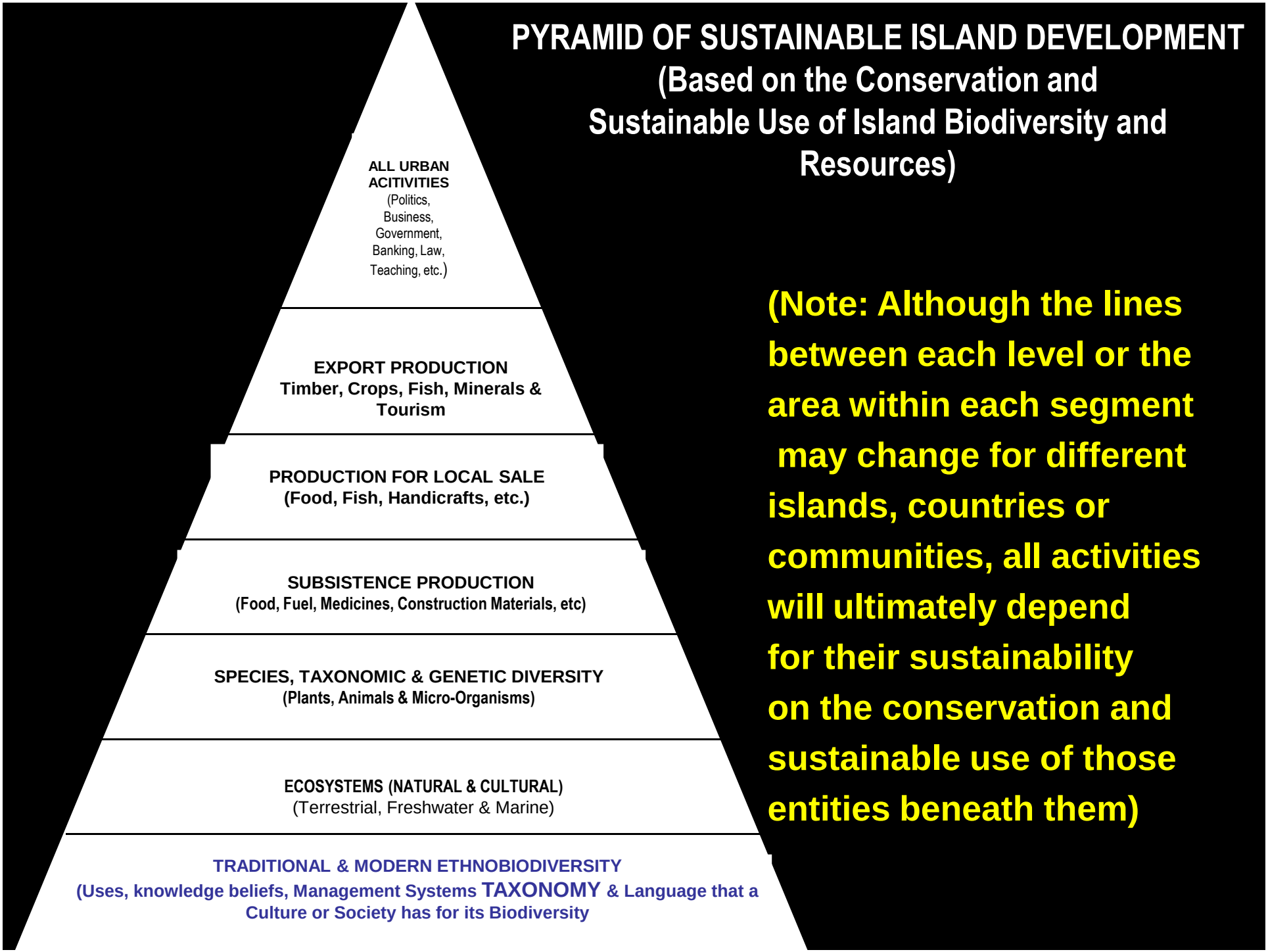


PICTS and the 12 USP Countries

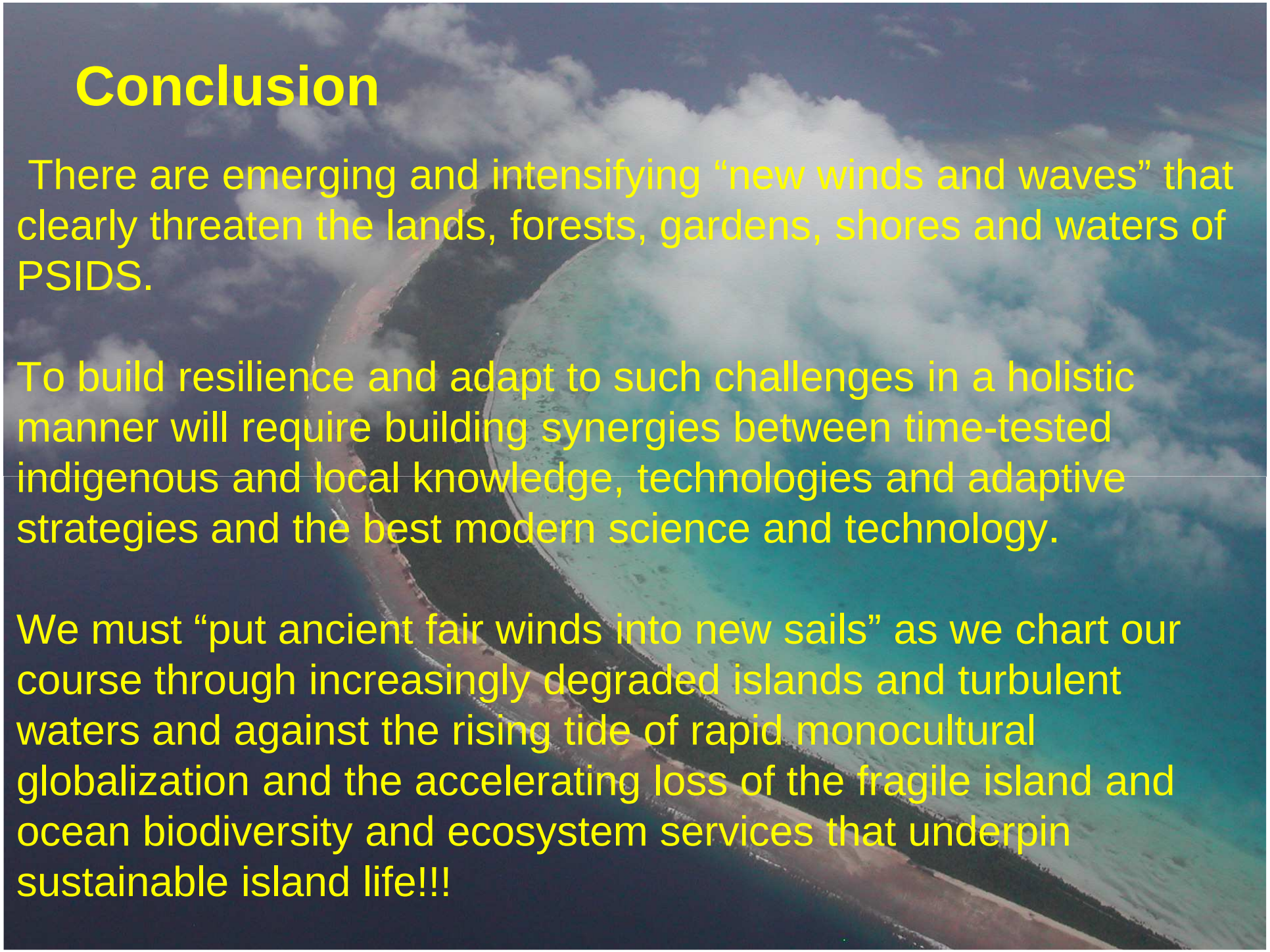


OUR PI GRADUATES – FOUNDATION FOR CONSERVATION AND SUSTAINABLE USE OF OUR ISLAND BIODIVERSITY

PYRAMID OF SUSTAINABLE ISLAND DEVELOPMENT
(Based on the Conservation and Sustainable Use of Island Biodiversity and Resources)



(Note: Although the lines between each level or the area within each segment may change for different islands, countries or communities, all activities will ultimately depend for their sustainability on the conservation and sustainable use of those entities beneath them)



Conclusion

There are emerging and intensifying “new winds and waves” that clearly threaten the lands, forests, gardens, shores and waters of PSIDS.

To build resilience and adapt to such challenges in a holistic manner will require building synergies between time-tested indigenous and local knowledge, technologies and adaptive strategies and the best modern science and technology.

We must “put ancient fair winds into new sails” as we chart our course through increasingly degraded islands and turbulent waters and against the rising tide of rapid monocultural globalization and the accelerating loss of the fragile island and ocean biodiversity and ecosystem services that underpin sustainable island life!!!

FAKAFETAI LASI/LAHI

VINAKA VAKALEVU !