Assessing and Valuing Ecosystem Services for Ocean Zoning

Tundi Agardy, Ph.D.
Sound Seas / Forest Trends

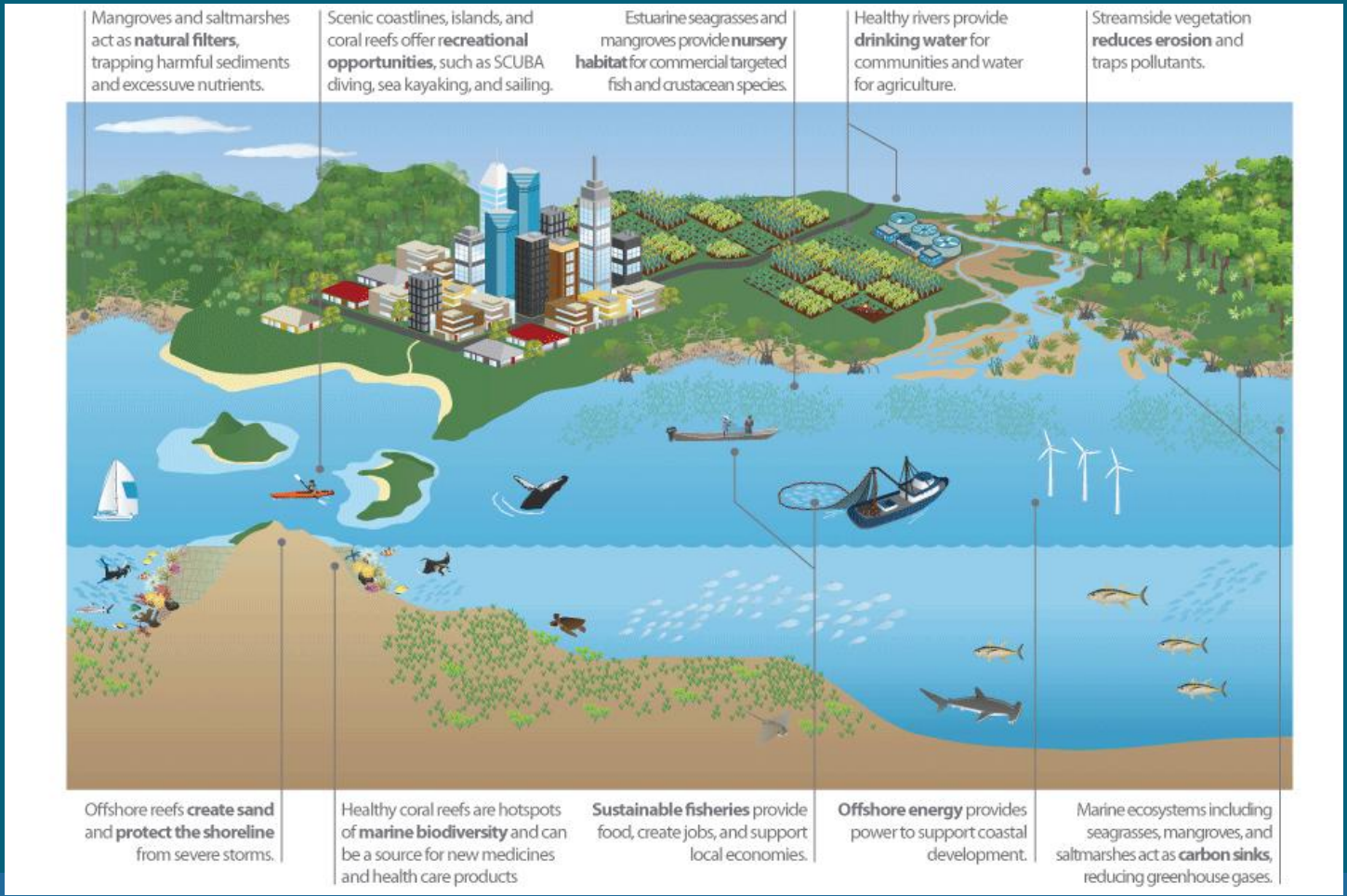
The seas are many things to many people

- A source of food
- A foundation for livelihood
- A medium for transport
- A sink for wastes
- A site for research to expand knowledge
- A way to draw inspiration for the arts
- A place for spiritual rejuvenation
- A cornucopia of resources, all for the taking

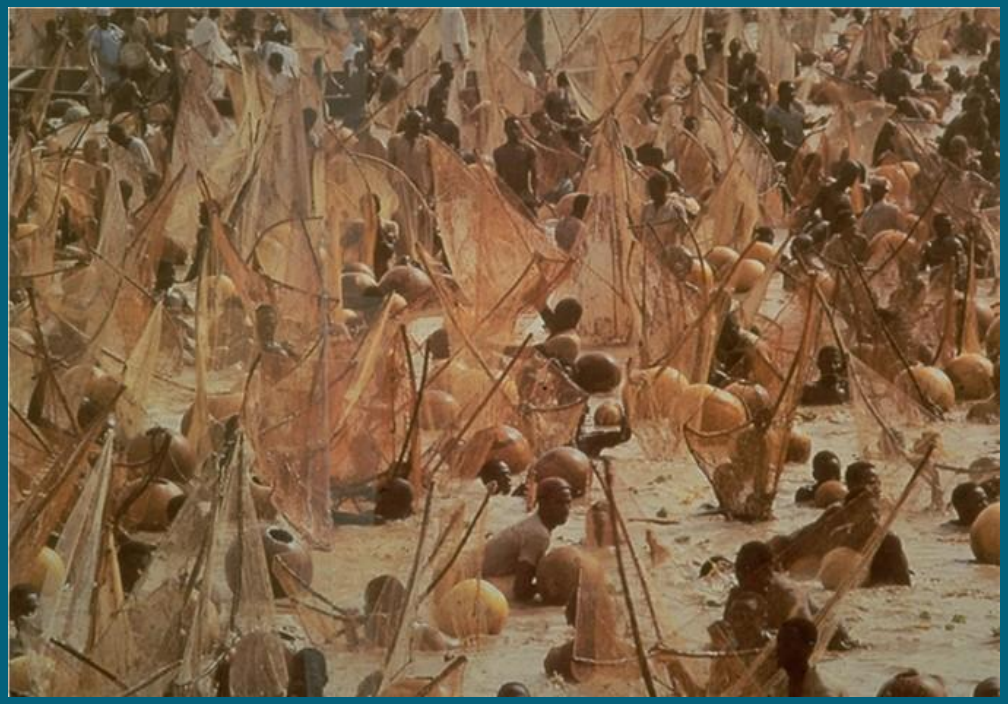
Marine and coastal ecosystems are most valued for the living marine resources they supply – and these values are the easiest to quantify

But other values, difficult to monetize,
are also important –
such as the ocean's role in Earth's life support system

These ecosystem services are especially important in tropical coastal regions



Such areas support over half the world population with the highest density and doubling rates



This thin strip of land,
accounting for only 5% of the world's land mass,
provides a disproportionate amount of the ecosystem services important to all humankind

Regulating Services:

Climate Regulation

Carbon, heat, hydrological cycles

Natural Hazard Regulation

Storm & tsunami buffers

Flood control

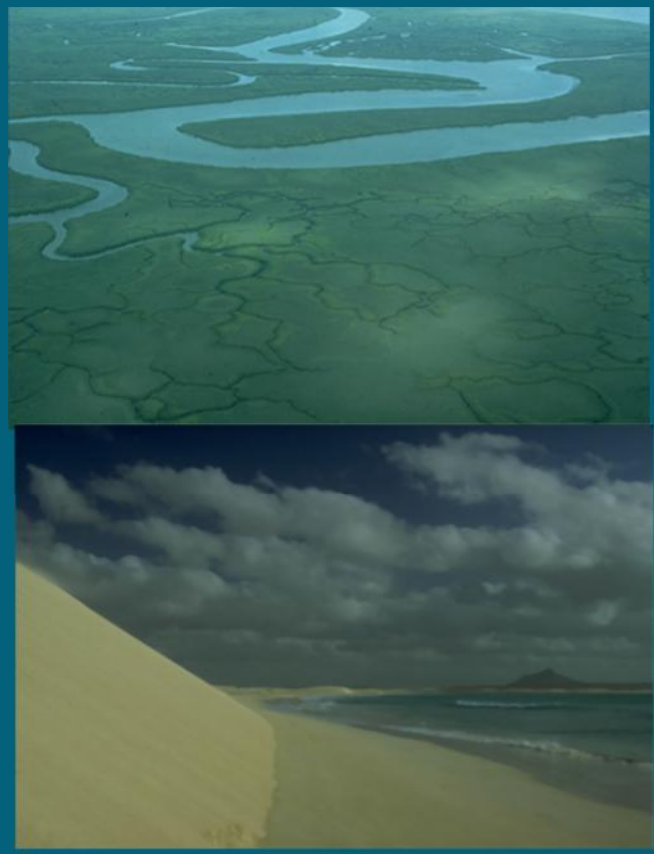
Water Purification & Waste Treatment

Coastal wetlands and shellfish remove excess nutrients and waste

Erosion Regulation:

Shoreline and beach maintenance

Disease Regulation



Cultural Services:

Important for Economic Growth Human Health

Aesthetic

Scenery and natural beauty

Educational

Understanding biodiversity, ecology, and how oceans support humanity

Recreational

Tourism, fishing, diving & snorkeling

Spiritual

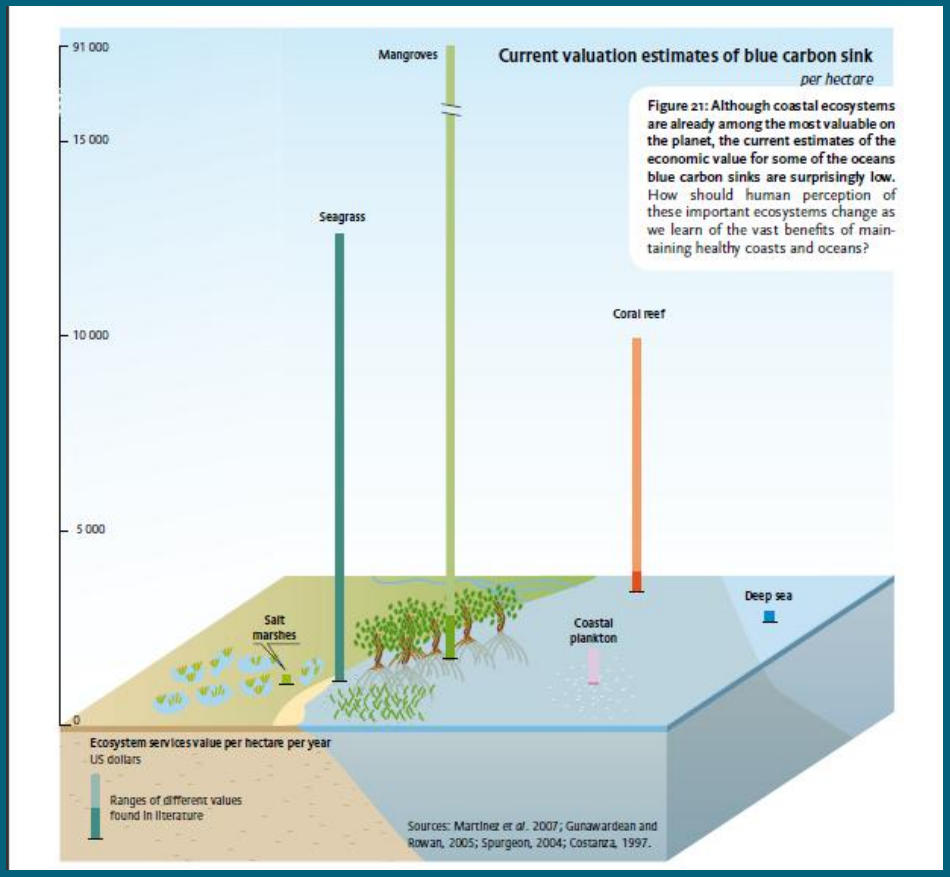
Sacred places and species

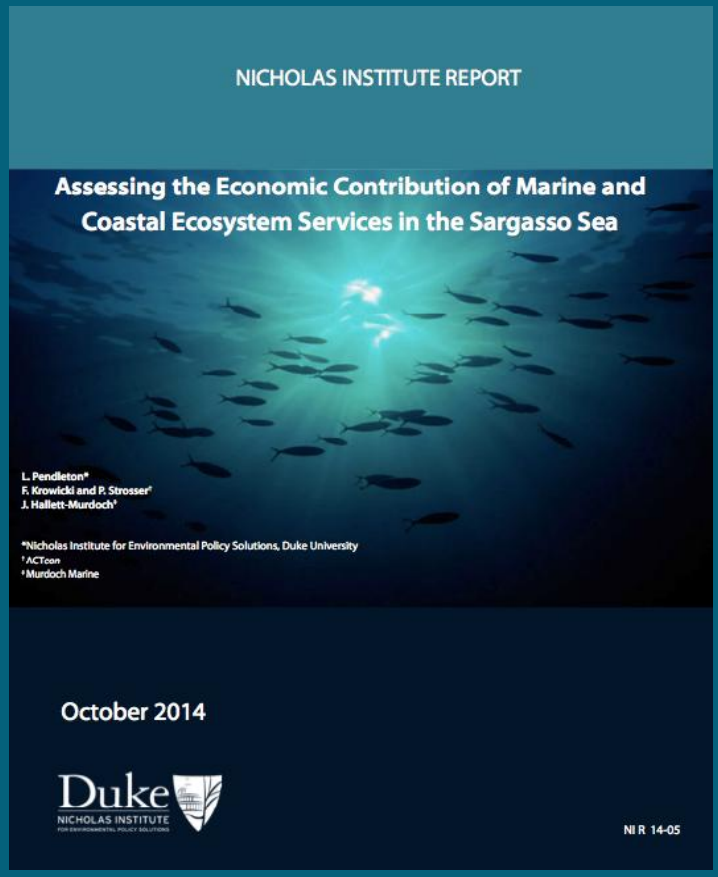
Inspiration

Rejuvenation

Valuing Marine and Coastal Ecosystem Services

can contribute to their protection, especially if this information finds its way into MSP and zoning



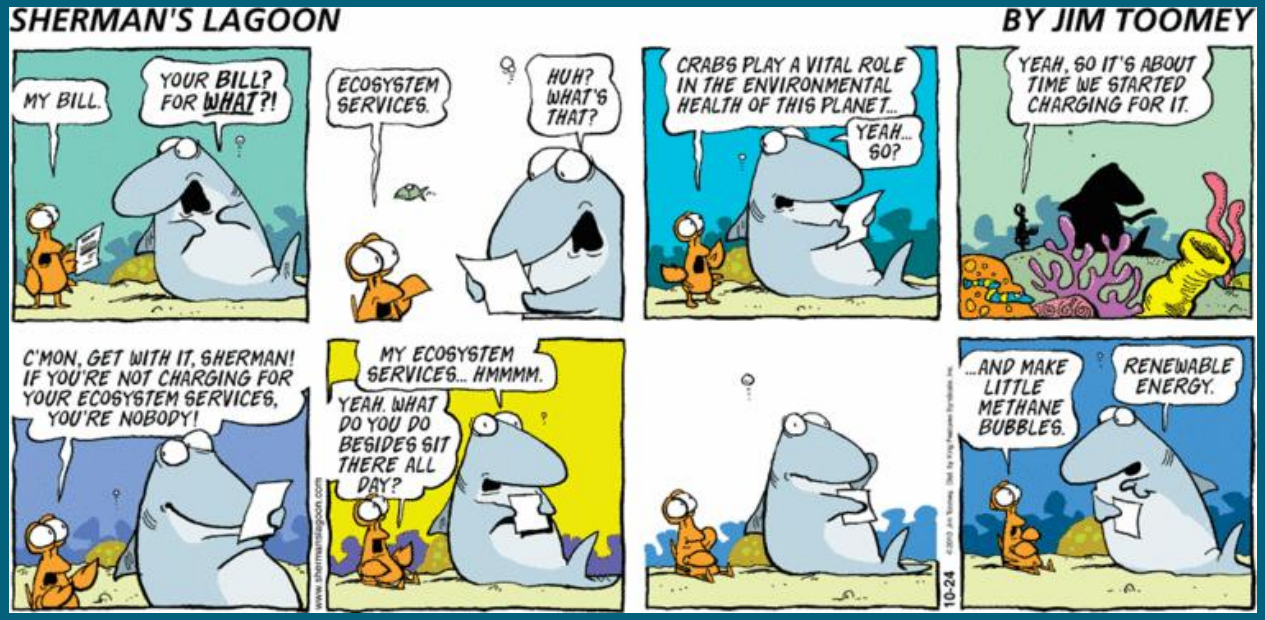


MARES

Marine Ecosystem Services Program

Conserving Ocean Ecosystems and Safeguarding Coastal Communities

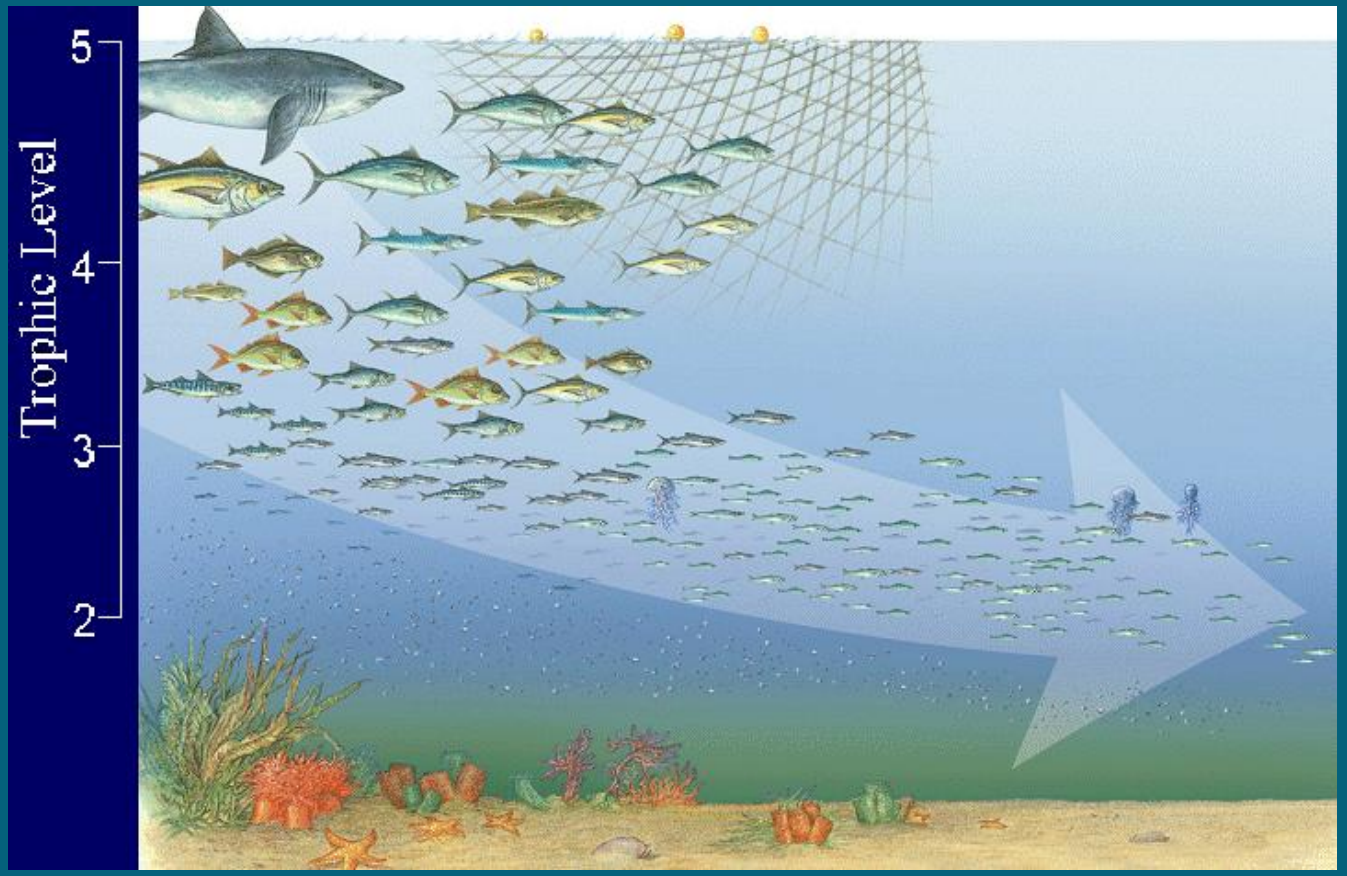
Everyone's jumping on the ES bandwagon!



Practically speaking,
how can ES information be used for zoning and management?

When done well, zoning can allow uses while focusing controls on the human activities that undermine ecosystem values

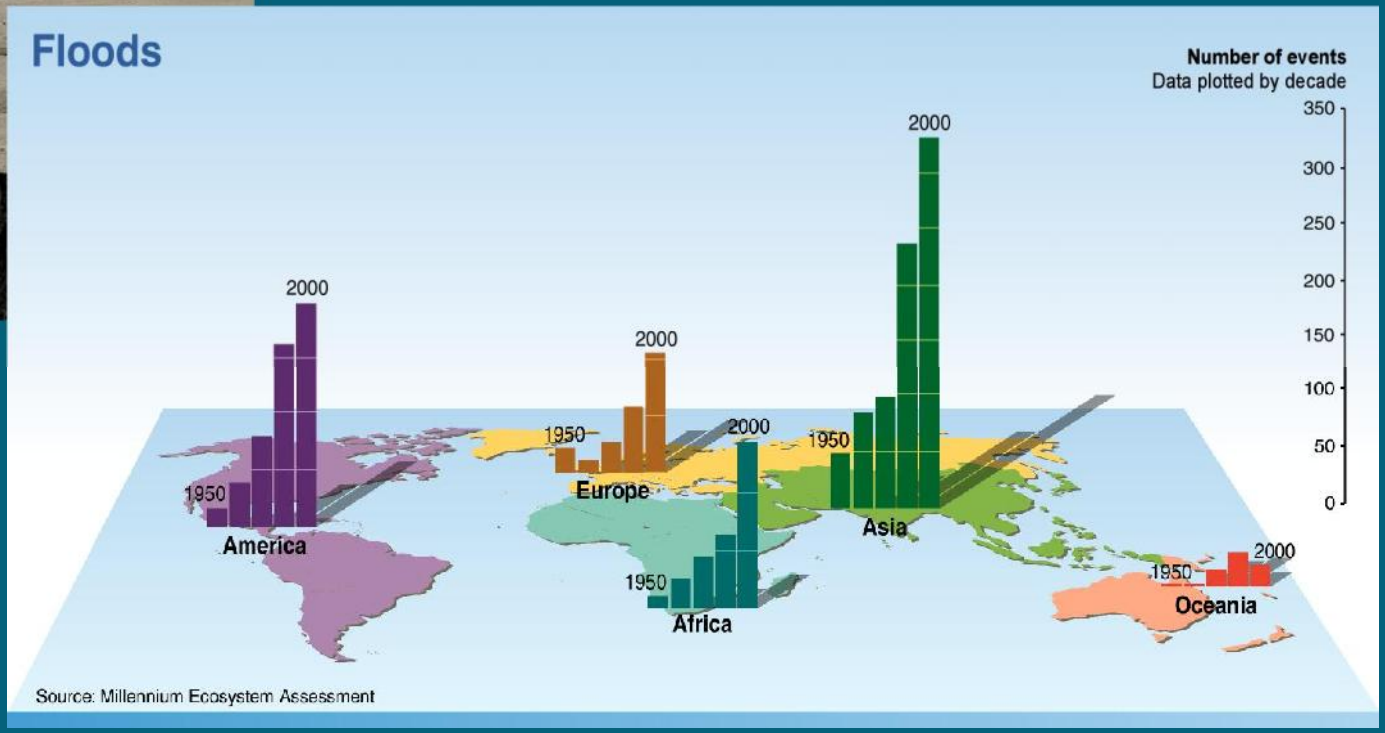
Overfishing and destructive fishing



Unsustainable coastal development/ habitat conversion

Eutrophication and other effects of pollution

Plus, the compounding effects of climate change



Ocean zoning that is based on an understanding of how ecosystems support human well-being helps orient policies towards both sustainability and equity

What is Ocean Zoning?

An integrated, place-based approach for allocating marine resources and space, while protecting the ecosystems that provide these.

A natural extension of ICZM

Can be undertaken at any scale, but most commonly used within MPAs, to design networks of MPAs, within state and national waters, or in transboundary regions / semi-enclosed seas.

In the best cases, it is dynamic rather than fixed – leading to adaptive management.

Zoning Around the World Takes Many Forms

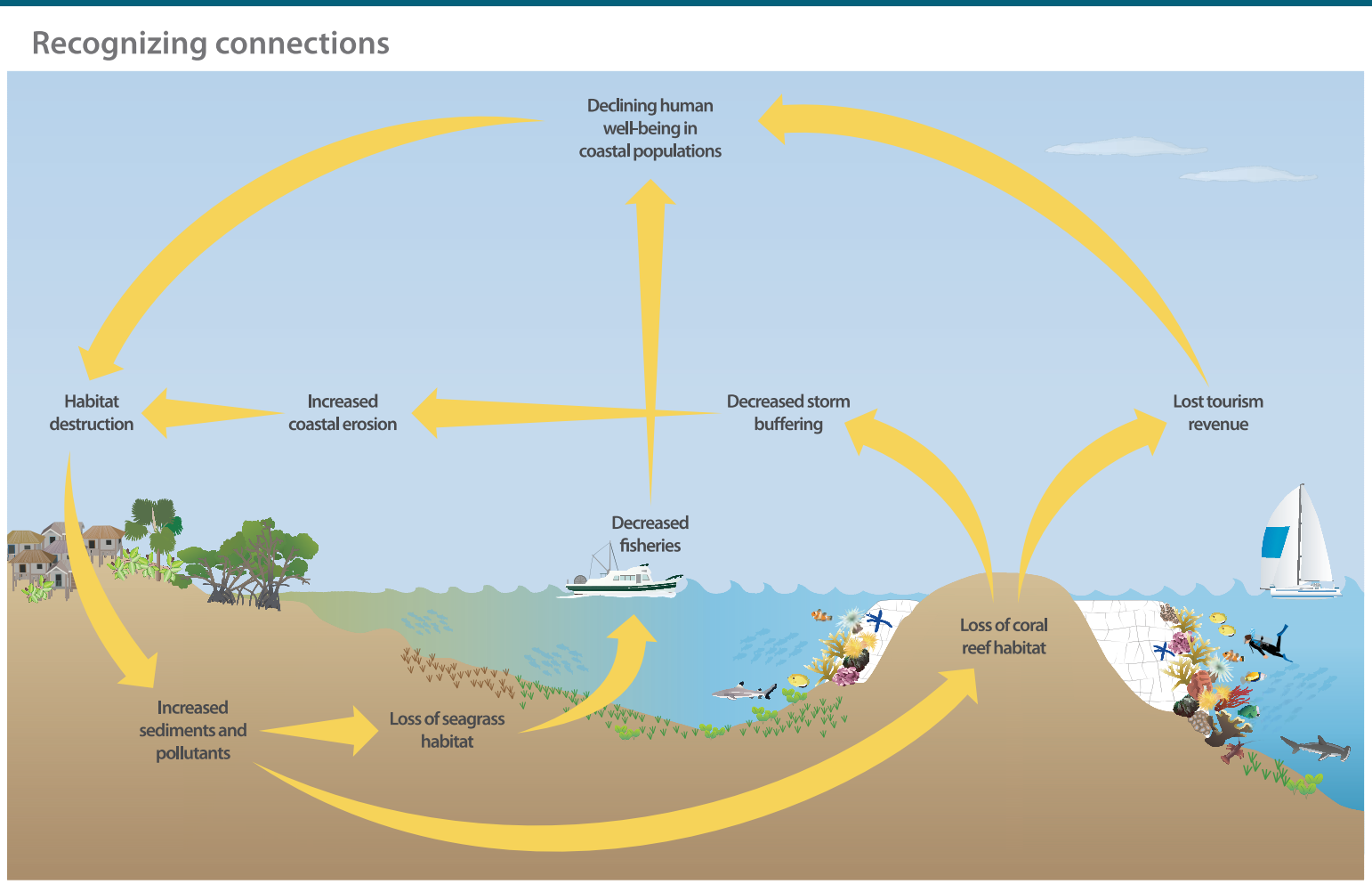
What science do we need to assess benefits and implement zoning to safeguard them?

- Ecology: understanding functioning, productivity, balances, thresholds, connectivity
- Stressors: identifying how ES is affected
- Resilience: predicting how systems will fare in the future
- Values: economic and non-monetary
- Spatial dimension: what / where the most important areas are
- Situational analysis of enabling conditions: existing policies and regulations, governance frameworks, information flows

Variety of Planning Processes, and Implementation Through Zoning

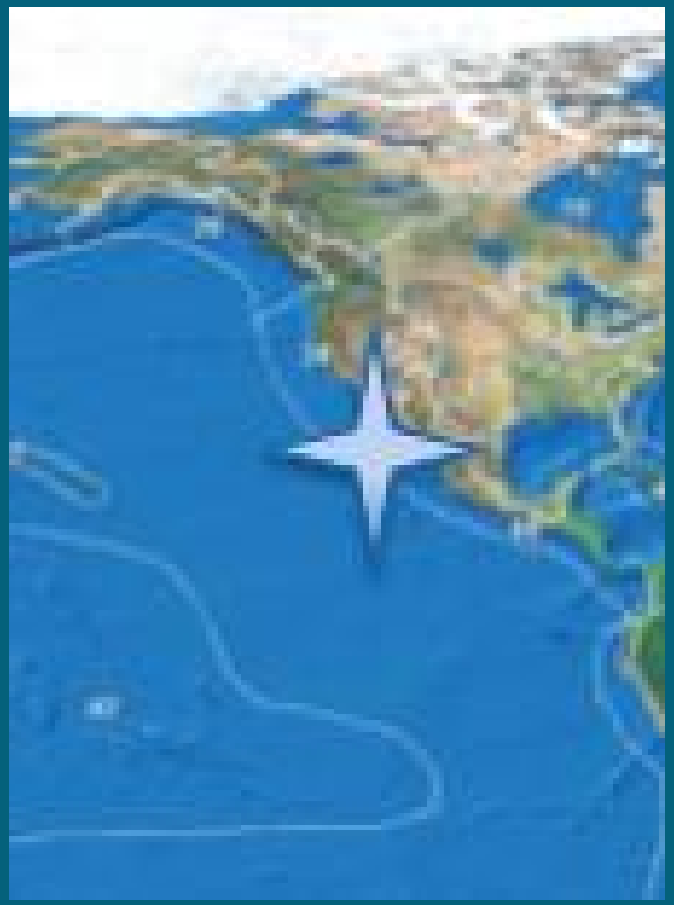
- Different scales of planning
- Different degrees of participation
- Different visions/ objectives for MSP, from strict nature conservation to empowerment of local communities to a full blue growth agenda

A common thread:



Three different examples of how ES information is used in planning and zoning:

Marismas Nacionales Mexico




© Jaime Rojo / WWF

How water connects us:
Example impacts of decisions in our watershed

The economic viability of commercial fisheries such as snook, corvina, and pargo in the Gulf of California are dependent on mangroves as fish nursery habitats, which can be affected by changes to water quality and water quantity as a result of decisions made upstream.

- Upstream activities include agriculture, forestry, hydropower, land development, hydrology modification, and aquaculture.
- Upstream decisions are linked to mangroves through rivers, streams, and groundwater.
- Decisions about expansion or alterations to upstream activities will affect mangrove ecosystems and the ecosystem services that they provide.

Current ecosystem services

Forests help maintain water quality and quantity of mangrove habitat as they stabilize sediments, filter pollutants and nutrients, and regulate water flows.

Most agriculture in the Mololoa watershed is currently rainfed, with some small earthen dams and irrigation canals.

Wetlands recharge groundwater and regulate water flows (maintaining salinity gradients) & sediment supply to mangroves. They also filter pollutants & nutrients, and export organic matter for downstream foodwebs.

Mangroves provide nursery habitat for commercial fish & shrimp species. They also filter pollutants & nutrients, provide flood and coastal protection, carbon storage, and support marine biodiversity.

The productivity and economic viability of commercial fisheries is dependent on healthy mangrove ecosystems.

Impacts of building a dam on ecosystem services

Building dams to increase irrigation will divert water away from forests, wetlands, and mangrove habitats. Dams also restrict sediment supply that is essential for maintaining mangrove habitat and coastal protection.

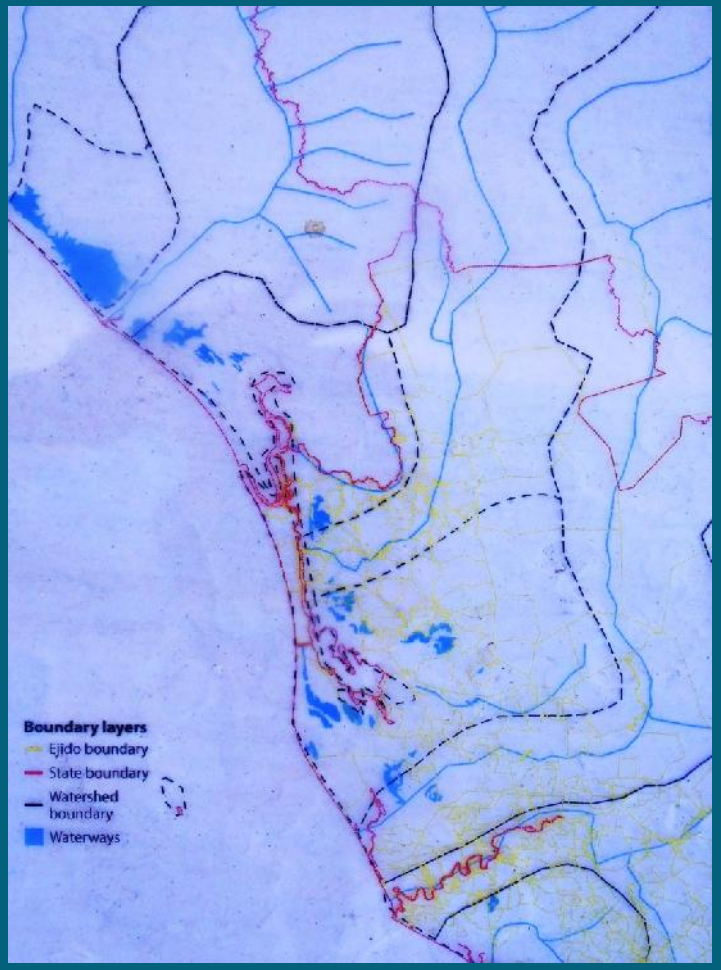
Expanding irrigation agriculture will replace existing habitats, divert water, and increase nutrients, toxins, and sediment inputs to downstream habitats.

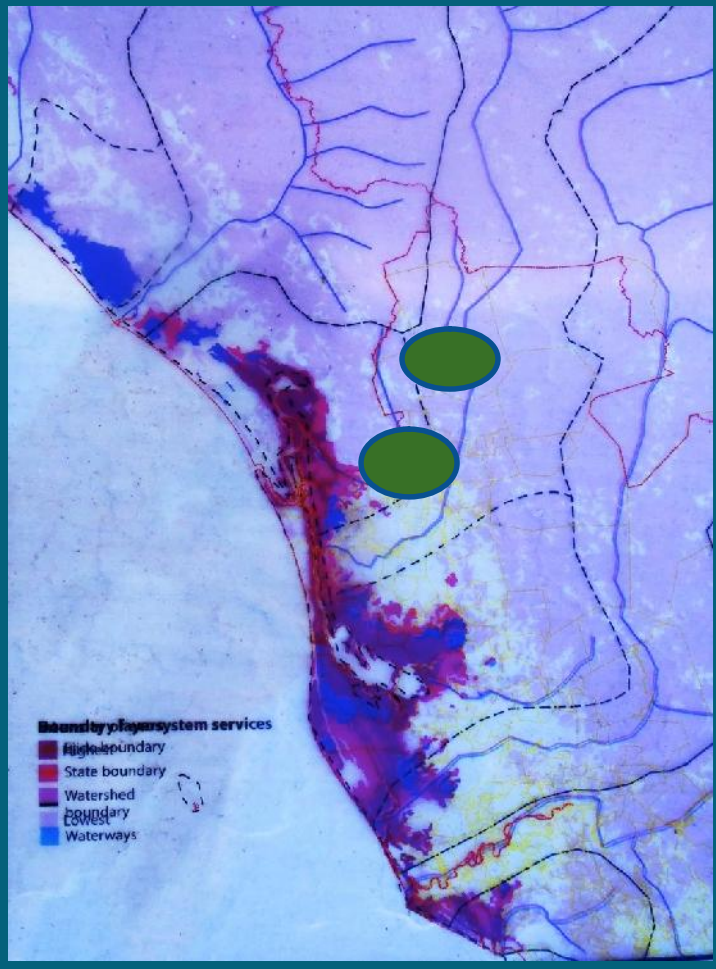
Reduction of freshwater inputs reduces ability of wetlands to recharge groundwater, reducing water flows and sediment supply to mangroves.

Increased salinity causes mangrove death, reducing nursery habitat of commercial fish & shrimp species.

The productivity and economic viability of commercial fisheries is reduced.

Hydrology and ejido limits coupled to ES mapping show areas where interventions are needed

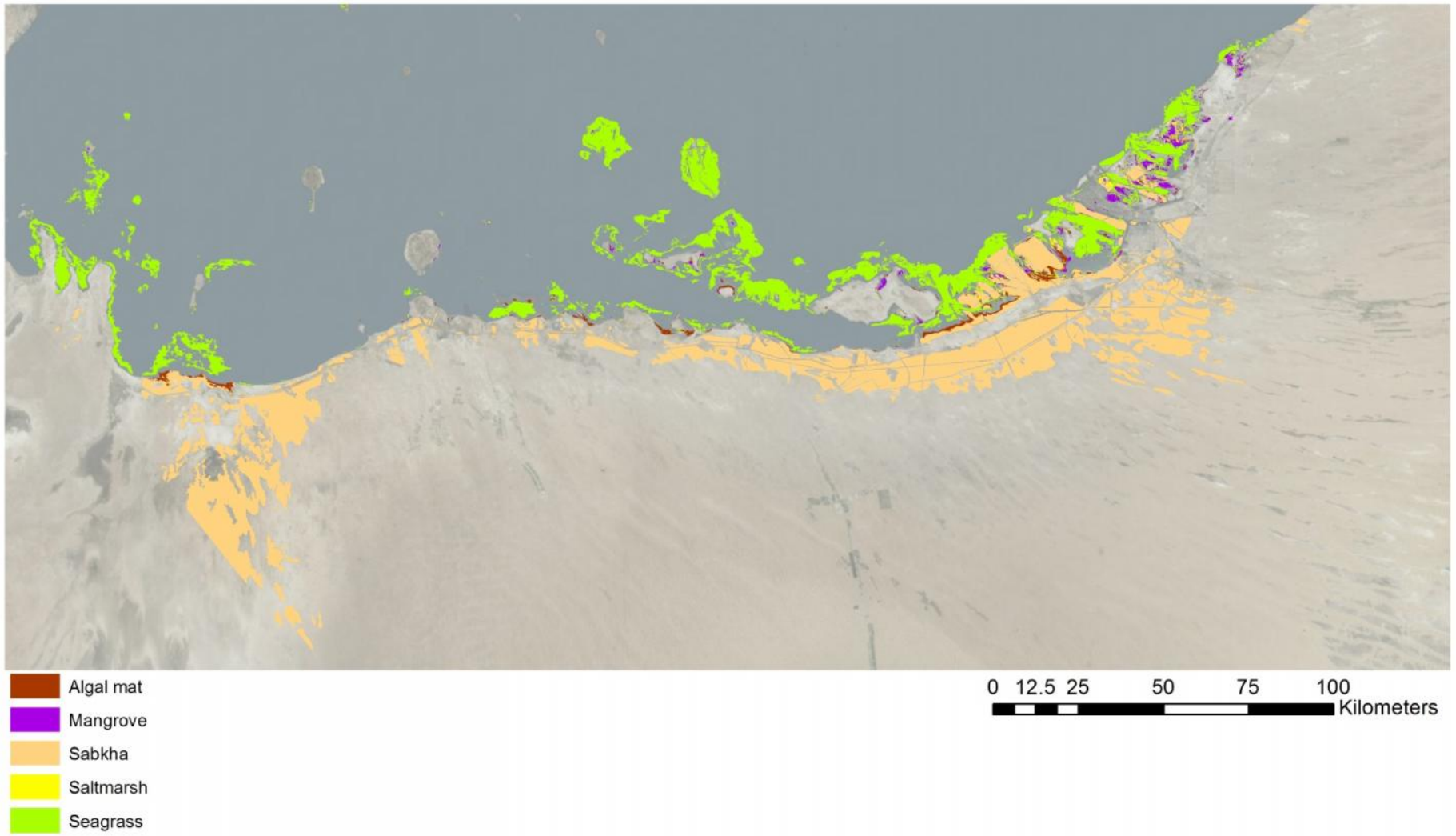




Implications for use of ES in planning:

Target area for planning needs to encompass sources of threats that need to be managed, sometimes going beyond the marine domain. In this case, initial planning in the Gulf of California had to be extended high into watersheds….

Abu Dhabi ESA


Algal mat
Mangrove
Sabkha
Saltmarsh
Seagrass
0 12.5 25 50 75 100
Kilometers

ES Assessment initially focused on a single ES
-- Blue Carbon –

Other Ecosystem Services assessed as co-benefits

- Shoreline stabilization
- Beach production and maintenance
- Waste filtration and water quality maintenance
- Support to fisheries (estuarine, coastal, and pelagic)
- Recreation and ecotourism
- Sites for maritime industry development (wind, wave, biofuel; aquaculture; desalination; tourism, etc.)
- Livelihoods for local people
- Opportunities for learning, connecting with nature

Areas of high ecosystem service value / multiple benefits

Implications for using ES in zoning:

Identification of areas of high ecosystem services values can be used in creating new MPAs, directing land reclamation away from these areas, and developing marine-based ecotourism for more sustainable ‘blue growth’

St Kitts/ Nevis

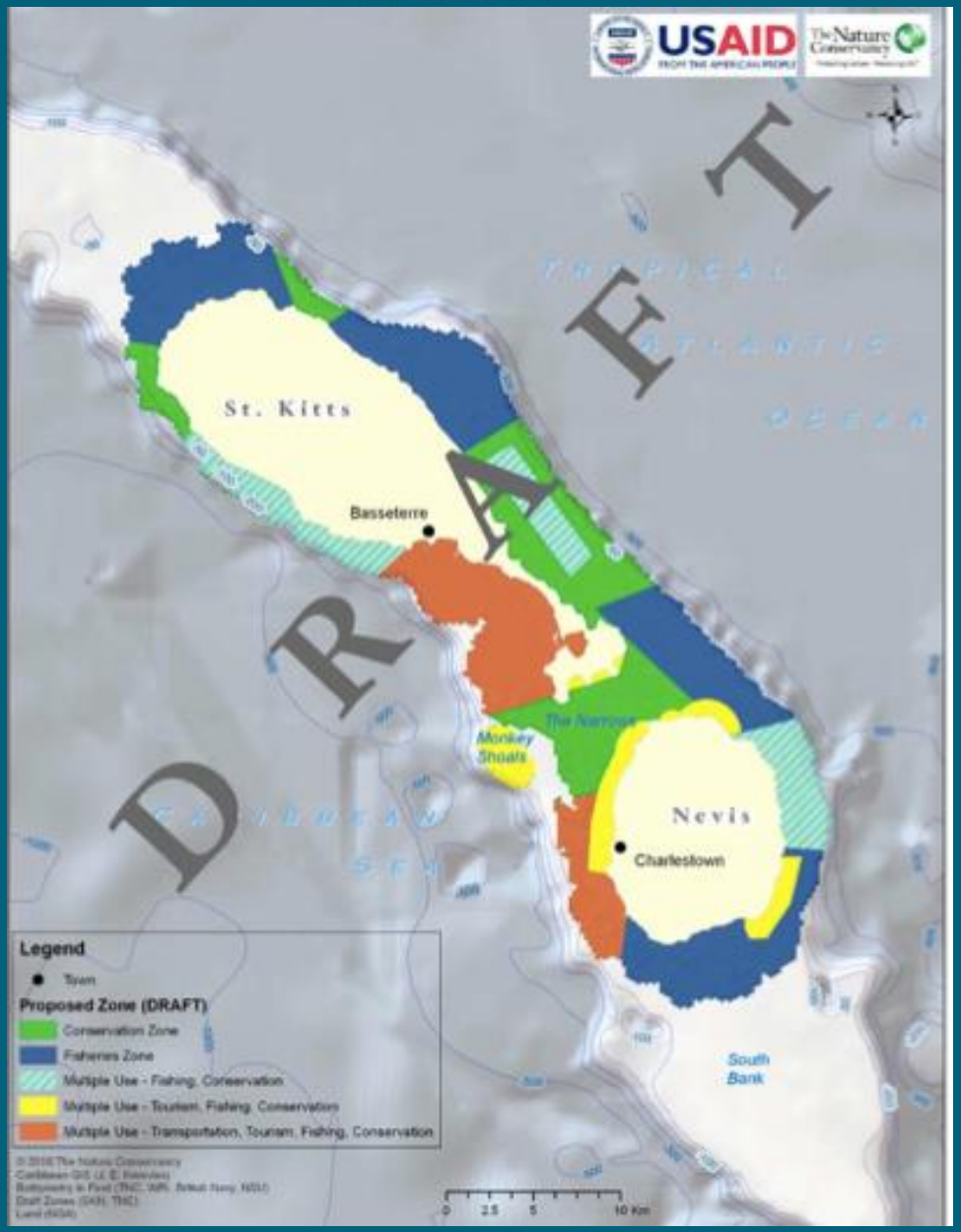

USAID
The Nature Conservancy
DRAFT
St. Kitts
Basseterre
Nevis
Charlestown
Monkey Shoals
The Narrows
South Bank
Legend
Town
Proposed Zone (DRAFT)
Conservation Zone
Fisheries Zone
Multiple Use - Fishing, Conservation
Multiple Use - Tourism, Fishing, Conservation
Multiple Use - Transportation, Tourism, Fishing, Conservation
0 2.5 5 10 Km

TABLE 4. Marine zoning compatibility.

Implications for using ES in zoning:

New or expanding uses can lead to incompatibilities, and external factors such as climate change can affect productivity, vulnerability, and suitability of particular uses.

MSP should thus be a dynamic process, leading to zoning and regulations that are amended over time as conditions and human needs change.

Elements of success:

Consideration of all benefits that flow from ecosystems, including non-monetary values

Fully addressing issues of equity and access allows for true sustainability – the retention, over time, of the widest array values for the widest array of people

Using science to pinpoint the areas of greatest ecological and social importance, the protection of which can serve as the foundation for blue growth

Thank you!