

THE ROLE OF NATURE

IN MEDIATING VULNERABILITY

From on the ground work in more than 30 countries, The Nature Conservancy has learned that nature is powerful and can help keep us secure from increasing climate disruptions provided we manage it adequately. One of the main tenets of the At the Water's Edge (AWE) project is that nature can provide solutions that can attenuate the impacts of coastal hazards and help communities become more resilient. Nature plays an important role in the overall vulnerability of a place, with a range of nature's services acting to mediate that vulnerability.

NATURE'S SERVICES

Nature can provide solutions that can buffer the impacts of coastal hazards and help people become more resilient



Photo credit: Marjo Aho

Regulate: The regulation obtained from nature's processes, in the context of coastal hazards from flooding i.e. protection and soil retention (to support shoreline stability).

Provide: The products obtained from nature including food and freshwater.

Recreate: The non-material benefits people obtain from nature through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience.

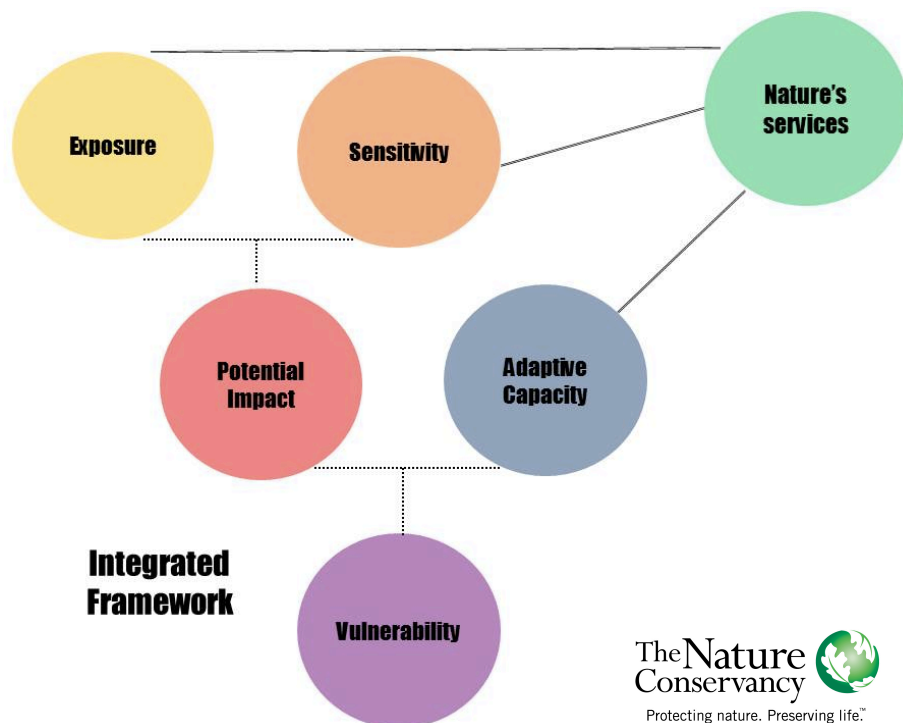
Support: All of the above services are supported by important processes; for example, soil and sand formation are central to coastal protection services

INTEGRATED VULNERABILITY

The integrated vulnerability of a place is a function of its socio-economic vulnerability and the potential of existing nature to provide services related to coastal hazards.

Understanding integrated vulnerability will:

- a) Help us communicate the important role that nature can play in mediating socio-economic vulnerability (and risk);
- b) Help us assess, the need and potential for natural solutions;
- c) Help make decisions about allocation of resources and strategies towards specific actions (which could include gray/green) aimed at supporting natural solutions



THE ROAD TO MEASURING, MAPPING AND SCORING A HABITAT'S POTENTIAL TO PROVIDE NATURE'S SERVICES

Nature's services (e.g. coastal protection), are the product of an ecosystem process or function (e.g. protection from wind and waves). The ecological characteristics and management status of an ecosystem ('controlling components', e.g. vegetation type and density) drive the ability of that ecosystem to provide a specific service. Defining these relationships and then measuring and mapping the 'controlling components' will enable us to score each habitat's 'Potential to Provide Ecosystem Services' (PPES).

The tables on pages 3 and 4 are examples of how we have begun to outline some of these relationships.



Photo credit:Paul Chesley-National Geographic

Protection Service: Wave braking over reef crest



HOW TROPICAL COASTAL ECOSYSTEMS REDUCE VULNERABILITY

| Ecosystem service | Ecosystem process and Function | Role in mediating vulnerability |
|---|--|---|
| Coastal Protection | Wave dissipation and formation | Reduces <u>exposure</u> to wave force |
| | Sediment formation and retention | Supports other habitats (e.g. seagrass) which in turn reduce <u>exposure</u> |
| Maintenance of Fisheries | Provision of suitable reproductive habitat and nursery grounds | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| | Provision of sheltered living space | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| Tourism, ed., maintenance & res. | Provision of unique and aesthetic reefscape | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing <u>adaptive capacity</u> (diversification of livelihood and ability to re-organize) |
| | Provision of suitable habitat for diverse fauna and flora | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |

Based on Barbier et al, 2011

CORAL REEFS



Photo credit: Nacor Bolaños

| Ecosystem service | Ecosystem process and Function | Role in mediating vulnerability |
|---|--|--|
| Coastal protection | Attenuation and/or dissipation of wave and wind energy | Reduce <u>exposure</u> to wind and wave force |
| Erosion Control | Sediment stabilization and soil retention in root structure | Reduce exposure by providing soil control (stabilization and retention) |
| Maintenance of Fisheries | Provision of suitable reproductive habitat and nursery grounds | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| | Provision of sheltered living space | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| Tourism, ed., maintenance & res. | Provision of unique and aesthetic reefscape | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |
| | Provision of suitable habitat for diverse fauna and flora | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |

Based on Barbier et al, 2011

MANGROVES



Photo credit: Marjo Aho

SEAGRASSES

| Ecosystem service | Ecosystem process and Function | Role in mediating vulnerability |
|---|--|--|
| Coastal protection | Attenuation and/or dissipation of wave and wind energy | Reduce exposure to wind and wave force |
| Erosion Control | Sediment stabilization and soil retention in root structure | By providing soil control (stabilization and retention), mangroves reduce exposure |
| Maintenance of Fisheries | Provision of suitable reproductive habitat and nursery grounds | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| | Provision of sheltered living space | Leads to multiple sources of food and livelihood which reduce <u>sensitivity</u> and increase <u>adaptive capacity</u> |
| Tourism, ed., maintenance & res. | Provision of unique and aesthetic reefscape | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |
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Photo credit: Nacor Bolaños

Based on Barbier et al, 2011

| Ecosystem service | Ecosystem process and Function | Role in mediating vulnerability |
|---|---|--|
| Coastal protection | Attenuation and/or dissipation waves and reduction in flooding and spray from sea | Reduce <u>exposure</u> to wave force |
| Erosion Control | Sediment stabilization and soil retention in root structure of beach vegetation | Beaches are the last buffer zone between the ocean and communities; a healthy beach reduces <u>exposure</u> |
| Tourism, ed., maintenance & res. | Provision of unique and aesthetic reefscape | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |
| | Provision of suitable habitat for diverse fauna and flora | Leads to multiple sources of livelihood and overall feeling of well-being (e.g. spiritual connectedness) increasing adaptive capacity (diversification of livelihood and ability to re-organize) |

BEACHES AND DUNES



Photo credit: Marjo Aho

Based on Barbier et al, 2011