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Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region

Land and Oceans: Integrated components of the Water Cycle and Ecosystem Based Management in a Climate Change Context

Diane Klaimi
Regional Coordinator, Ecosystem Management
UN Environment
Manama, Bahrain

High Level Conference on Climate Change Assessment and Adaptation in the Arab Region – Beirut, Lebanon – 26-28 September 2017

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Increased jellyfish blooming events suggest regime shift from fish-dominated to jellyfish-dominated oceans

- Several regions around the planet appear to show increasing jellyfish populations as a result of more persistent hypoxic conditions.
- the effects of eutrophication may be exacerbated by warmer conditions.
- Increased jellyfish blooming events have lead to health hazards and threats leading to significant economic losses to maritime tourism and water and energy utilities disruption.
- Jellyfish blooms have been occurring long into the past, as episodic population explosions.

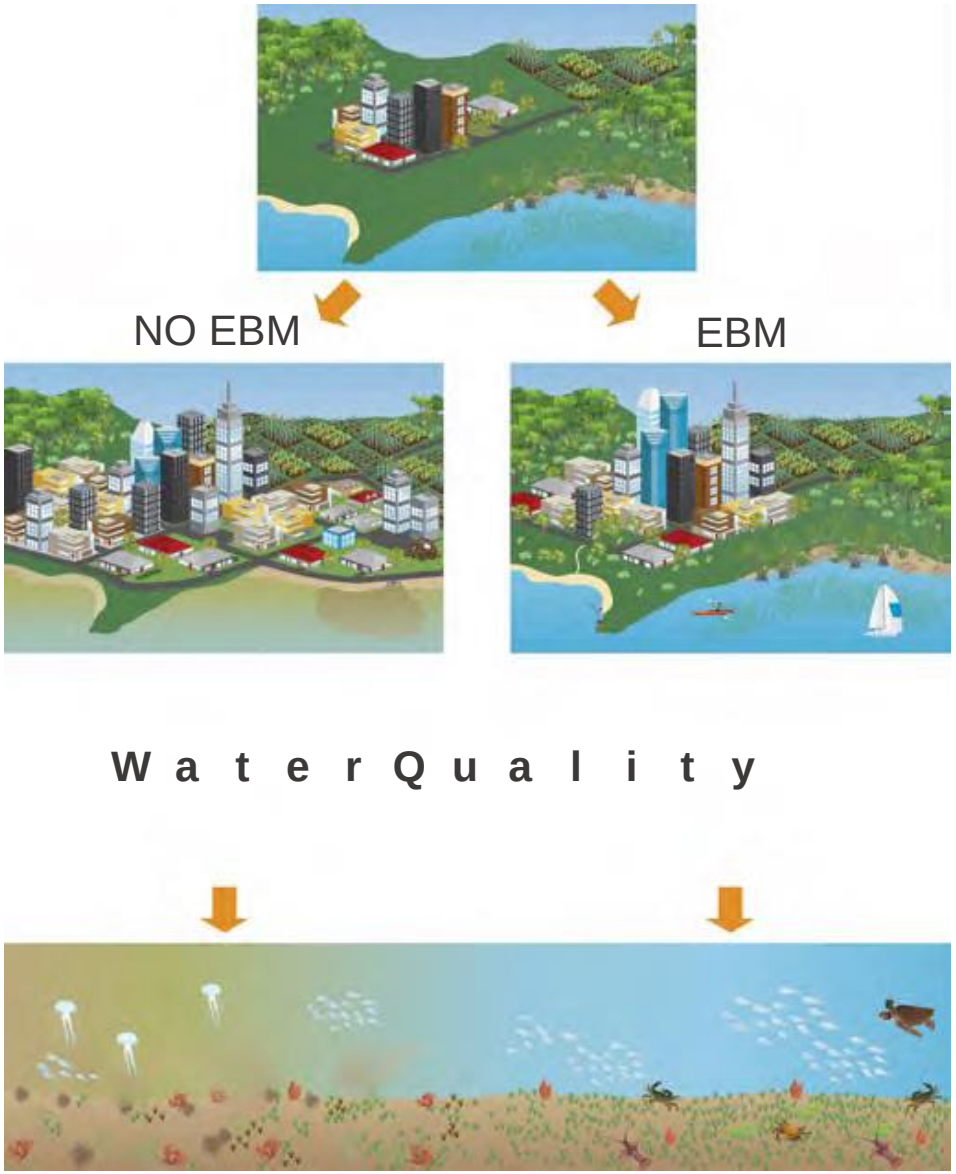
Jellyfish Education

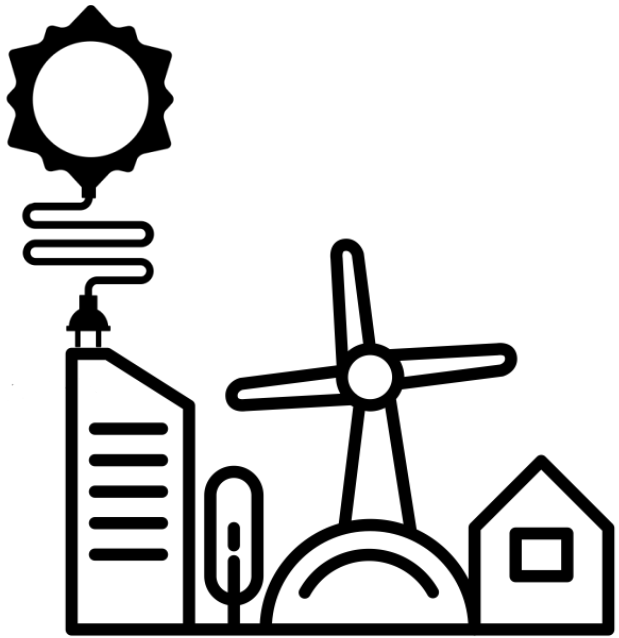
- While it is very true that some jellyfish blooms are economically detrimental to the livelihoods of local fishermen, tourist industries and power and water operations, much of people's perception of jellyfish is rather negative, which is partly driven by poor understanding of their diversity, biology and ecology.

- Understanding how the public engage with jellyfish in combination with education campaigns is a vitally important mechanism to rectify this.

The Development.

Human activities that take place within an ecosystem often overlap with each other, and their impacts can be intensified as a result.





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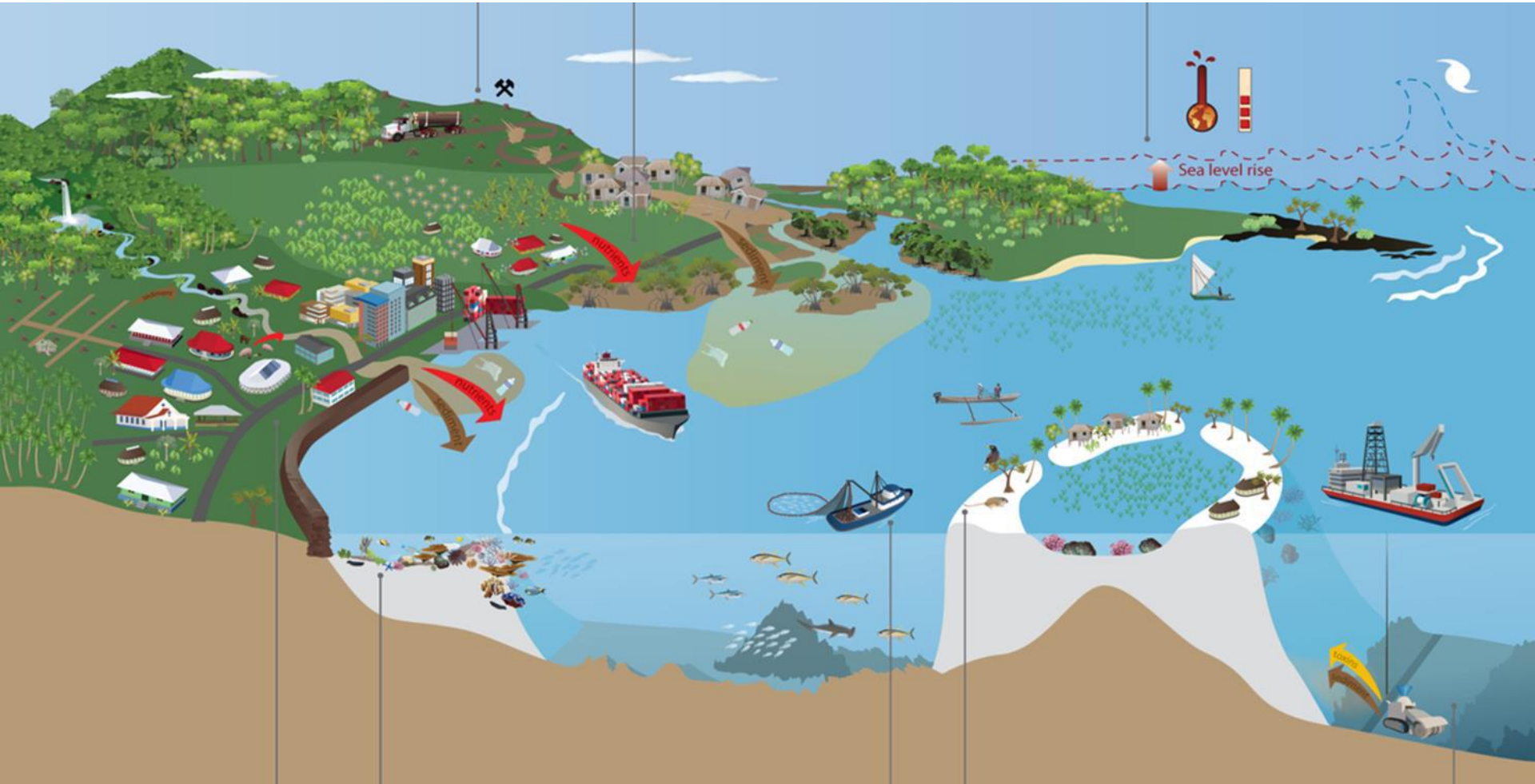
Coastal pollution and ocean warming

Global drivers such as overfishing and climate warming, often act synergistically with more local drivers, such as the increasing availability of hard substrates suitable for jellyfish polyp settlement along coastlines, or the occurrence of coastal upwelling systems



Climate change scenarios

- Increased variability of environmental conditions enable opportunistic species such as gelatinous ones (jellyfish) adapt by developing large populations through early asexual reproduction

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Human induced impacts on Natural oceanic processes

- In most of the cases listed, hypoxia is suspected to be a result of *cultural eutrophication (when man speeds up the aging process by allowing excessive amounts of nutrients in such forms as sewage, detergents, and fertilizers to enter the ecosystem.)* rather than oceanic warming;

- Jellyfish have a more competitive advantage over other organisms for adaptation to these environmental changes due to tolerance for low DO.

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Linking human well-being and jellyfish: ecosystem services, impacts, and societal responses.

- Negative perceptions of jellyfish have led to a lack of understanding about their value (positive, neutral, or negative) in terms of ecosystem services
- Positive services include transporting carbon to greater depths, serving as a source of food for humans, enhancing biodiversity, and contributing to medical advances
- Jellyfish can cost fishing and tourism industries millions of dollars and interrupt power and freshwater production
- Societies will cope with, adapt to, and transform in response to the various impacts associated with increasing jellyfish encounters
- Research exploring the consequences of alternative policy options and the development of information systems critical for understanding the costs to human well-being if jellyfish populations increase

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Climate change scenarios

- Warmer waters may facilitate the expansion of jellyfish species that are usually restricted to a particular range of temperature. This may explain, in part, the increased blooms of the jellyfish or gelatinous species in coastal ecosystems in the Arab region.
- As water warms, the saturation value of dissolved oxygen (DO) decreases. Thus, the oxygen demands of water- breathing organisms such as fishes and invertebrates will be increasingly difficult to meet under global warming scenarios
- Jellyfish also require oxygen, and are generally less abundant in hypoxic (inadequate oxygenation) waters; however, they appear to be more tolerant of hypoxia than many other marine fauna. This is in part due to their low metabolism, extremely efficient swimming, and the ability of some species to store oxygen in their tissues

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Land based activities cause Eutrophication and hypoxia in river basins and oceans compounded by global warming

SDG 14

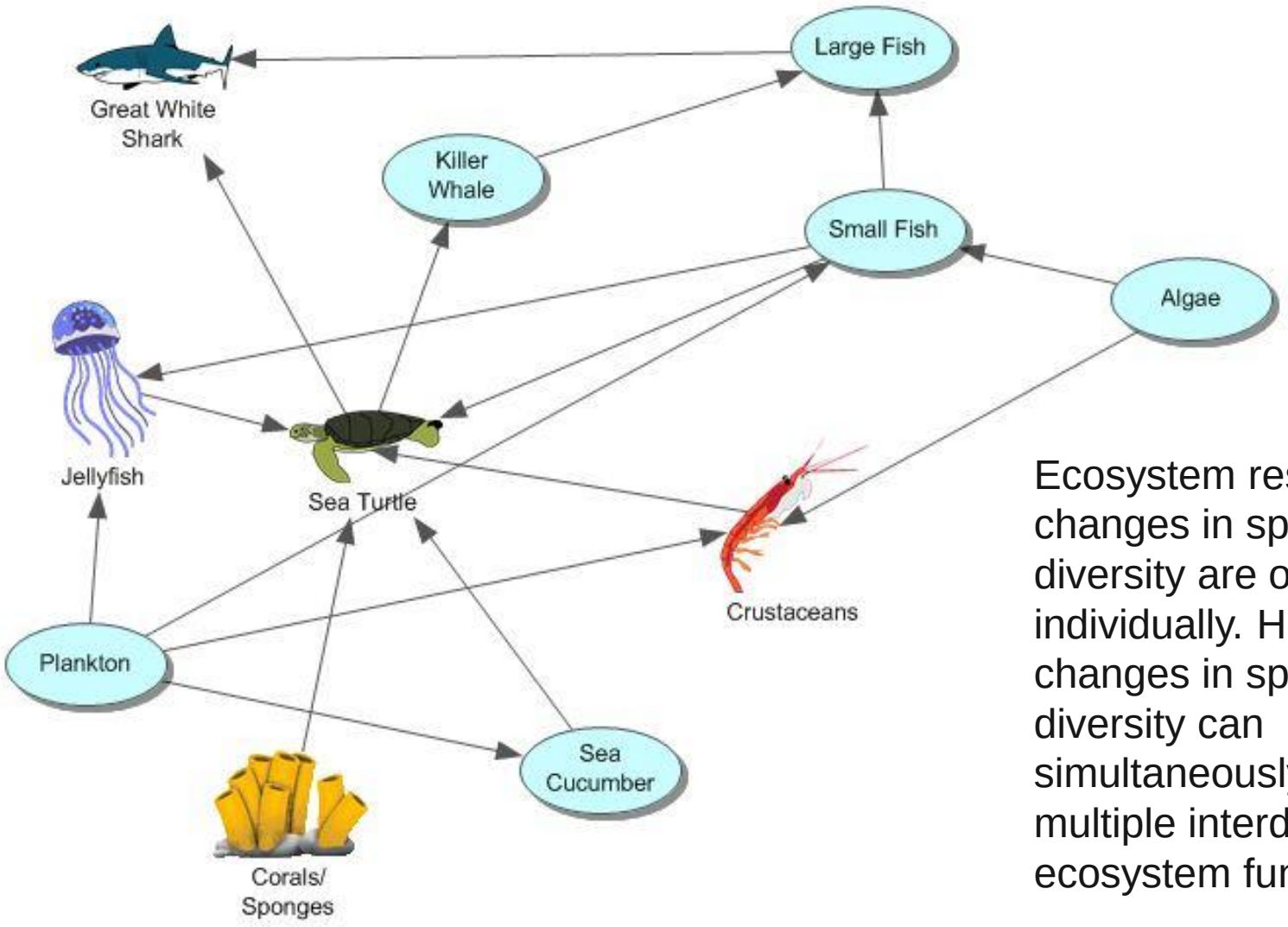
FROM LAND TO SEA

Protecting our oceans and coasts is not just the responsibility of coastal cities. Any urban activity within river basins can affect the oceans, such as the discharge of sewage or industrial wastes into rivers. Urban sanitation and solid waste management are essential to reducing coastal zone pollution

الهدف 14: الحياة تحت الماء
الحفاظ والاستخدام المستدام للمحيطات والبحار والموارد البحرية للتنمية المستدامة

بحلول عام 2025، منع التلوث البحري بجميع أنواعه، ولا سيما من الأنشطة البرية، بما في ذلك المخلفات البحرية والتلوث من المغذيات

Marine food change alterations disrupt biodiversity, food webs and ecosystem functioning



Ecosystem responses to changes in species diversity are often studied individually. However, changes in species diversity can simultaneously influence multiple interdependent ecosystem functions.

Tug war over wetlands and coastal ecosystems: competing for ecosystem resources

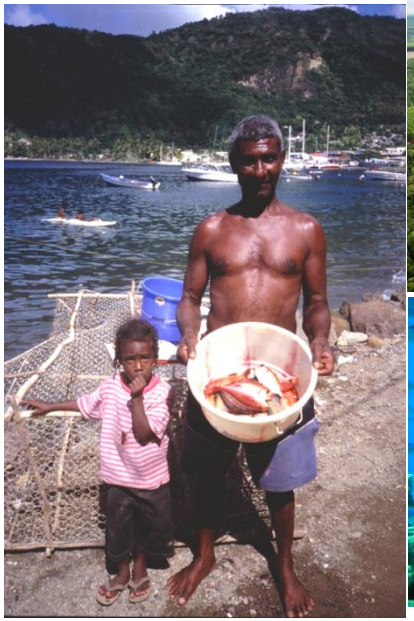
- **Ecosystems have in common:**
  - multiple stakeholders
  - multiple purposes / goals
- **The ecosystem approach is about:**
  - negotiating values, priorites and trade-offs
    - comparing apples and oranges!
  - taking action
  - evaluating progress
  - with a general view to "maximize outcomes"

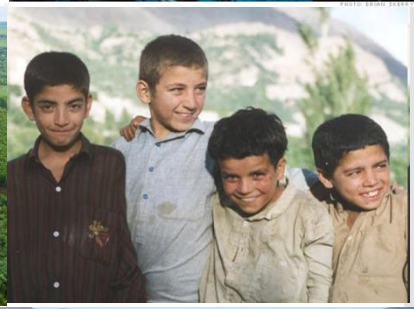
UN Environment Ecosystem-based Management (EBM)

Healthy Ecosystems for multiple needs and address climate change challenge

Ecosystem-Based Management is a process that uses ecosystem science – our knowledge of the connections among living organisms, natural phenomena, and human activities – as well as economic science and social science. Deriving this knowledge in a participatory way, and using it to determine priorities and drive integration of management across all sectors, is the essence of EBM. By doing so, we can ensure that those uses are sustainable for society and the environment over the long term.





UNEP

Climate change

Disasters and conflicts

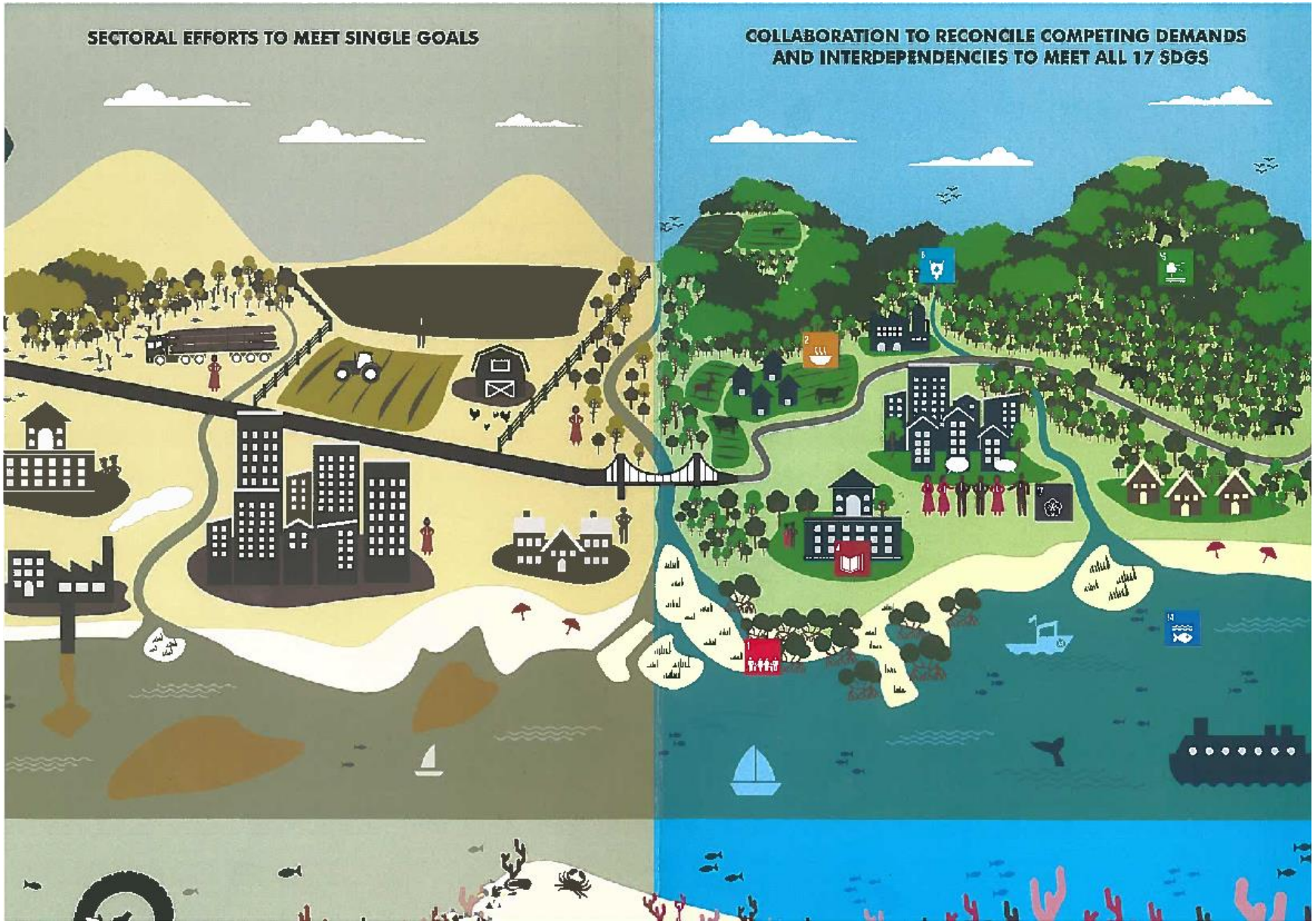
Ecosystem management

Environmental governance

Chemicals and waste

Resource efficiency

Environment under review


SECTORAL EFFORTS TO MEET SINGLE GOALS
COLLABORATION TO RECONCILE COMPETING DEMANDS AND INTERDEPENDENCIES TO MEET ALL 17 SDGS

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Mitigating strategies to overcome/adapt to jelly fish blooms

- Education
- Information-research
- Personal protection
- Removal of jellyfish – large scale
- Regulations
- Uses in Fertilizer
- food industry

General recommendations on global warming and overfishing:

- Responsible fisheries: must reduce their impacts, with a ***shift from industrial to artisanal practices***. Many fish species eat jellyfish, and young fish juveniles and larvae (when abundant due to adult abundance), can probably outcompete jellyfish for zooplankton. The combination of more jellyfish predators and less food for jellyfish would therefore mean less jellyfish.

- A reduction of greenhouse gas emissions is a pre-condition to reduce global change and especially ocean warming.