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MARE

# Lecture 9.2. MARINE PROTECTED AREAS

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1 minute video

<http://oceantoday.noaa.gov/marineprotectedareas/>



# Definition

“A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” – By IUCN





# Classification of MPAs



# Ecological objectives

- To ensure the long-term viability and maintaining the genetic diversity;
- To protect depleted, threatened, rare or endangered species;
- To preserve habitats considered critical for the survival and/or lifecycles of species;
- To prevent outside activities;

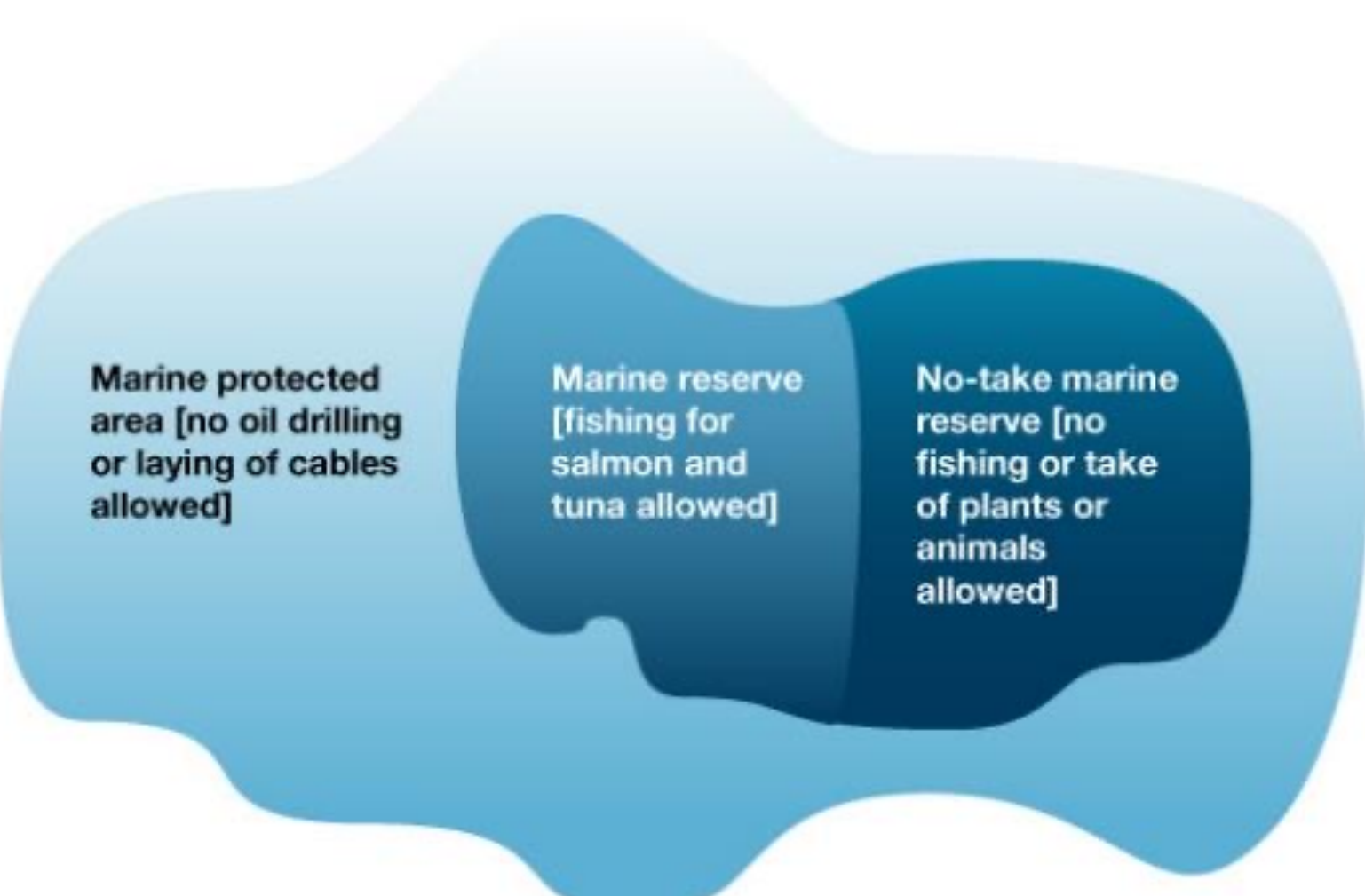


# Human objectives

- To provide for the continued welfare;
- To preserve, protect, and manage historical and cultural sites and natural aesthetic values;
- To facilitate the interpretation of marine and estuarine systems;
- To accommodate with appropriate management systems; and
- To provide for research and training, and for monitoring the environmental effect of human activities.







**Marine protected  
area [no oil drilling  
or laying of cables  
allowed]**

**Marine reserve  
[fishing for  
salmon and  
tuna allowed]**

**No-take marine  
reserve [no  
fishing or take  
of plants or  
animals  
allowed]**



## Marine reserves

- Marine reserves are ocean areas that are fully protected from activities that remove animals or plants or alter habitats, except as needed for scientific monitoring;
- Marine reserves are also often described as "no-take" marine protected areas. Some of marine reserves are open for fishing salmon and tuna.



# Features of Marine Protected Areas Worldwide

## No-Use Zone

No activities permitted.

## No-Take Zone

Measures are taken to protect species whose populations may be affected in other zones/areas. Examples include spawning and nursery grounds.

Non-extractive activities are permitted, such as diving and mooring.

## Buffer Zone

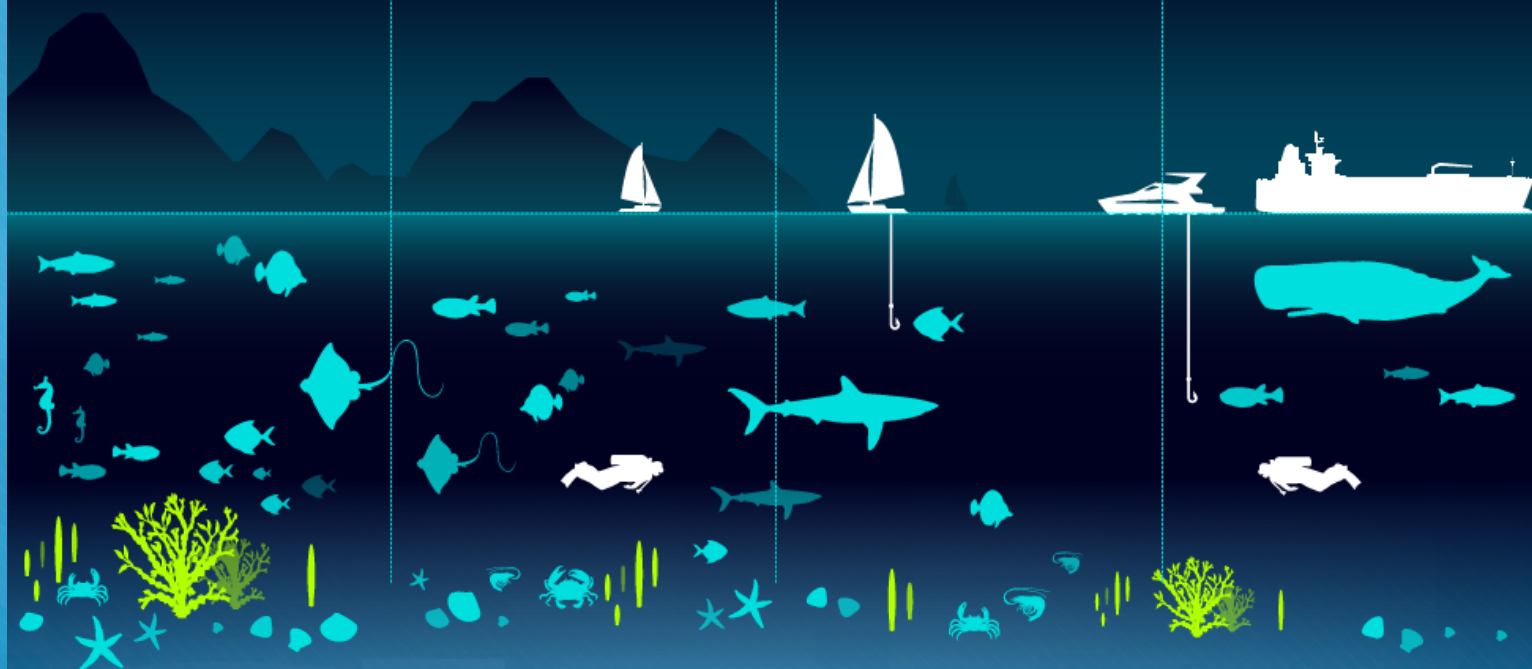
Transitional zones from no-take zones to multiple-use zones.

Moderate activities, such as hook-and-line fishing, limited aquaculture, and limited tourism are permitted.

## Multi-Use Zone

All tourism, fishing and aquaculture activities permitted.

Permitted activities include diving and snorkeling, artisanal fishing, large-scale commercial fishing, and aquaculture.



SOURCE:

Marine Mammal News, What, Why, and Where, Science in Action



# Zoned Multiple-Use

- MPAs that allow some extractive activities throughout the entire site
- These areas use marine zoning to allocate specific uses to compatible places in order to reduce user conflicts and adverse impacts
- Some of these also contain no-take areas
- For example: national parks, and national wildlife refuges





# No Impact

- Human access is allowed
- Prohibition of any activities that could harm them
- no disturbance of submerged cultural resources



# No-Take

- These areas allow human access and even some potentially harmful uses
- However, they prohibit the extraction or significant destruction of natural and cultural resources





# No Access

- These zones restrict all human access to the area in order to prevent potential ecological disturbance
- humans are allowed under specific circumstances for research, monitoring or restoration.



# How much is protected?

- ✧ Total MPAs: 11,333
- ✧ No Take Areas: 0.94%
- ✧ The World Commission on Protected Areas (WCPA) reported that marine protected areas (MPAs) now cover approximately 3.4% of the marine area of the world and 15.4% of the terrestrial and inland waters worldwide as of 2014.



# Typical restrictions



- Fishing
- Oil drilling
- Gas mining
- Tourism
- Ultrasonic devices
- Different wherever you go



# Why do we need MPAs?

- MPAs protect entire ecosystems including habitat and ecosystem function;
- MPAs protect biodiversity at three levels: ecosystem, species and genetic;
- MPAs protect habitats and ecosystems from destructive fishing practices and other harmful human activities, and allow already damaged areas and ecosystems to recover;
- MPAs provide resilience to protect against potentially damaging external impacts, such as global warming and ocean acidification;
- MPAs established at relatively undisturbed areas can serve as benchmarks to compare with altered ecosystems to assess human impact and improve management.



## WELL MANAGED MARINE PROTECTED AREAS SUPPORT FISHERIES

MPAs IMPROVE THE HEALTH OF OCEANS BY:



## MPA

### KEY PRINCIPLES FOR MPAs TO WORK:



## MPAs SUPPORT LIVELIHOODS

in Apo Islands, Philippines, fishers have doubled their catch rate 18 years after the MPA was created. As a result, they go out to sea less, saving oil fuel and time.

A global review shows that well-managed MPAs can substantially increase fish size, density, biomass and species richness.



## MPAs CAN PUMP FISH INTO ADJACENT AREAS

As fish populations recover within MPAs, juveniles and adults can spill over across the boundaries and replenish fishing grounds.

EXAMPLE: APO ISLAND PROTECTED AREA, PHILIPPINES

Surgeonfish and jackfish represent 40–75% of local fishery yields.

Since the MPA was established their population has tripled...

6

+50%

### MPAs CAN EXPORT LARVAE INTO ADJACENT AREAS

Larger fish inside MPAs produce disproportionately more eggs and larvae. Some larvae then drift to fished areas.

EXAMPLE: GREAT BARRIER REEF PROTECTED AREA, AUSTRALIA

The coral trout and the stripey snapper are exploited locally

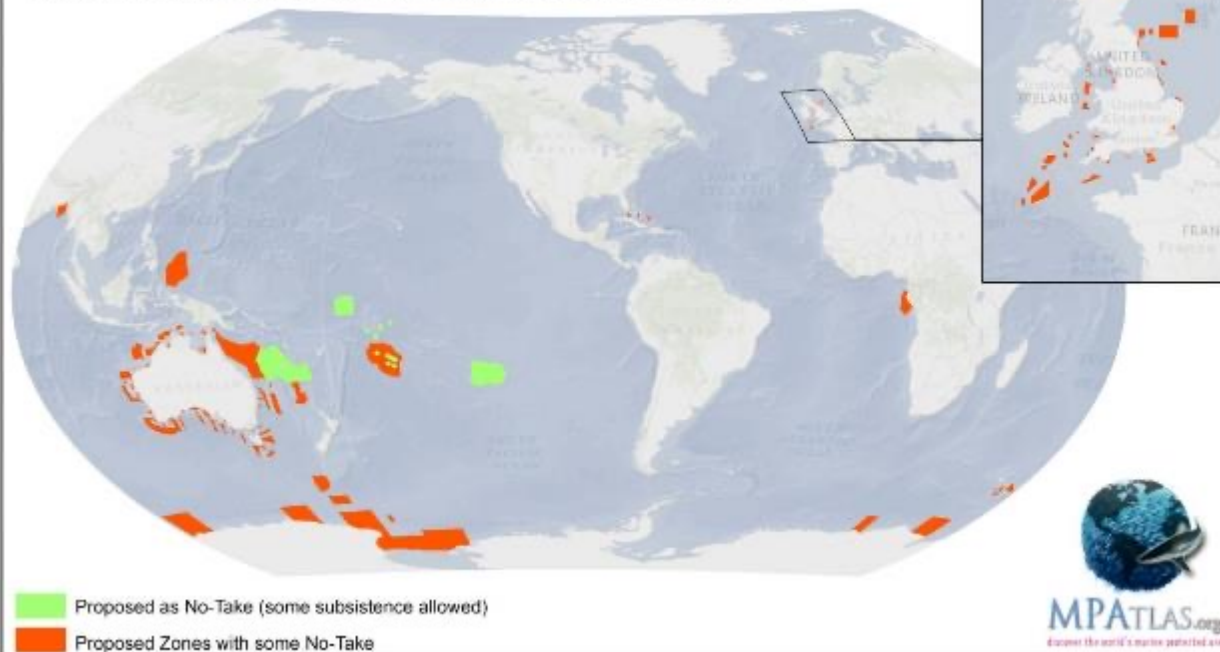
± 50%

Globally, WWF works to support Marine Protected Areas and ensure they contribute to securing food and livelihoods for people while conserving critical habitat and species.



# Map of proposed MPAs

Currently proposed marine protected areas (MPAs) would add 2.7% to the global MPA total and the proposed no-take marine reserves would increase global no-take by 0.9%







# Case Study

Nha Trang Bay



# Nha Trang Bay – Vietnam

## Natural features

- One of the 48 most beautiful Bays in the World Club.
- Bay of 105 km<sup>2</sup> with a reported marine area of 75 km<sup>2</sup>.
- Housing over 230 fish species and 350 species of hard coral, occupying over 45% of all the hard corals on Earth.

## Zonal features

- Core zone: no-fishing but only education and research activities or nature based tourism zone (10%).
- Buffer zone: allowing traditional fishing except trawling.
- Transition zone: sustainable aquaculture is accepted.





# Nha Trang Bay – Vietnam

## Critical challenges

- Noticeable decline of the water quality.
- Over-exploitation of marine resources.
- Inadequate awareness of the local residents.
- Funding: reliant on government and international donors .

## Resolutions

- Completing the current provisions.
- Sustain and promote financing for Nha Trang Bay MPA project.
- Enhance the awareness of local residents.
- Establish a comprehensive aquaculture plan.

A decorative header featuring a bright yellow sun with a blue circle in the center, partially obscured by stylized blue and white clouds. The background is a solid blue color.

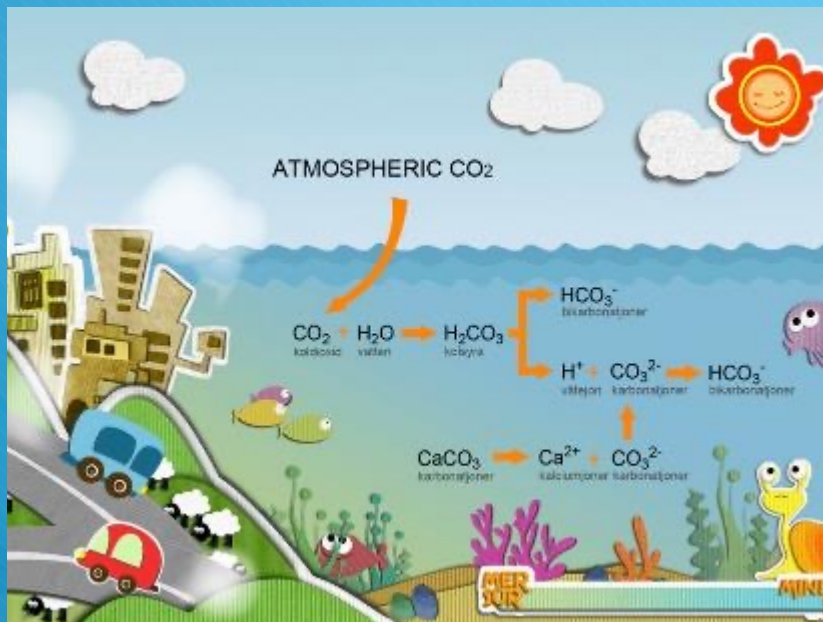
# HOW ARE MPAs AFFECTED?

- Ocean acidification
- Sea level rise
- Increasing temperature of sea surface
- Human-caused pollution

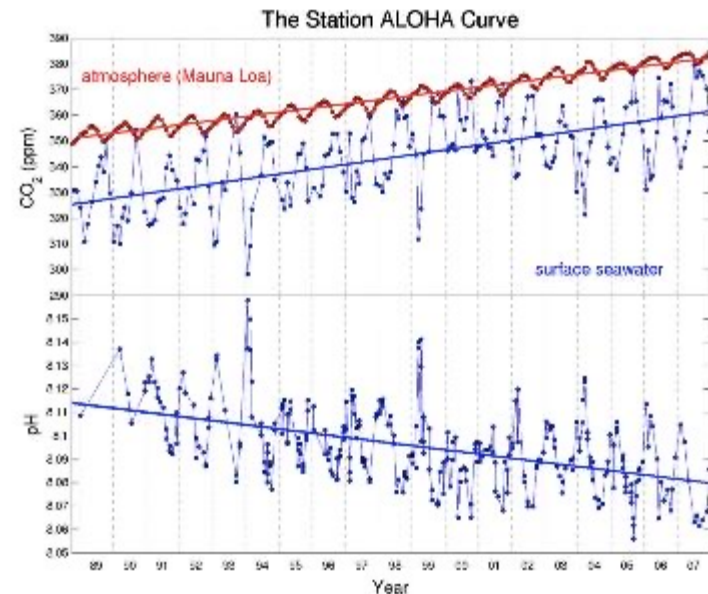


# CO<sub>2</sub> vs. Ocean Acidification

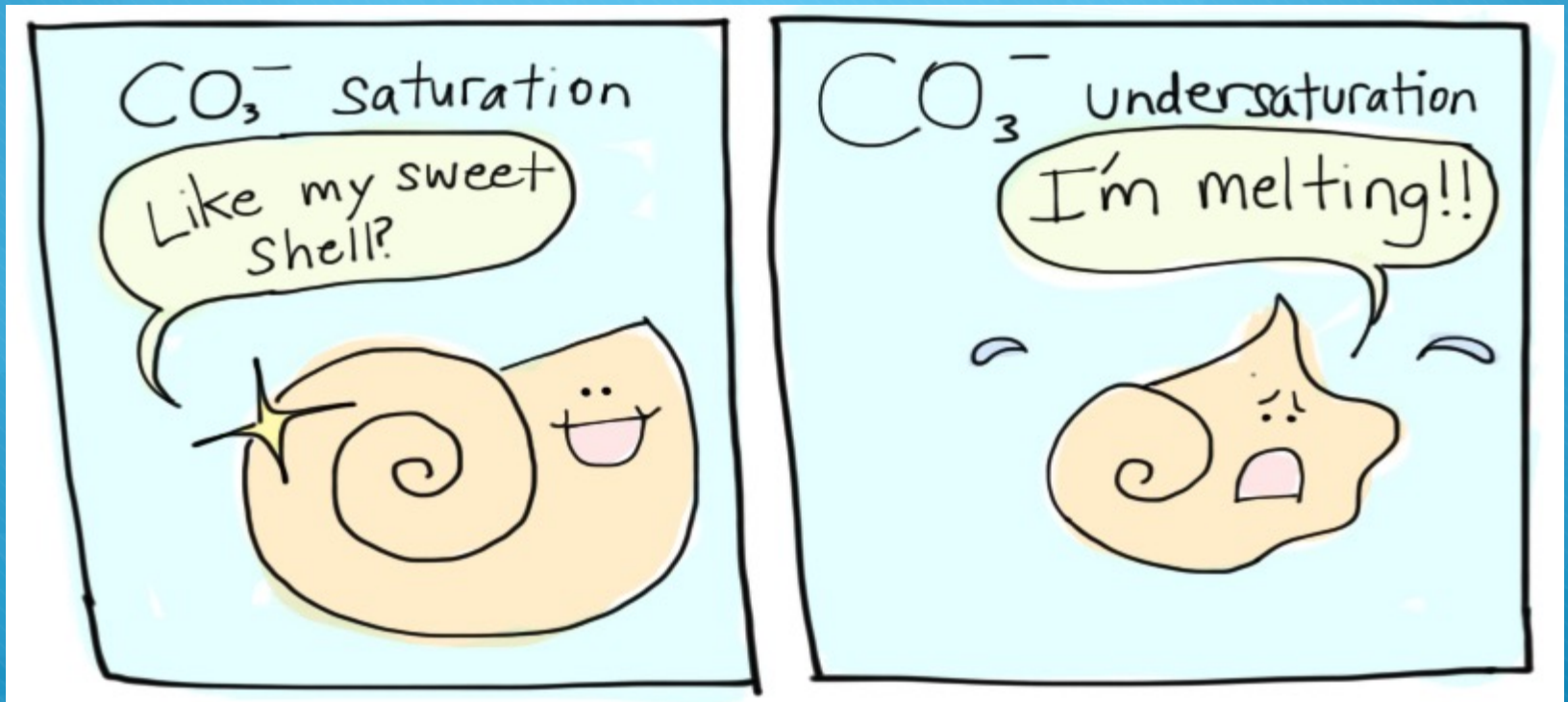
## Ocean acidification



## Dissolved CO<sub>2</sub> and pH

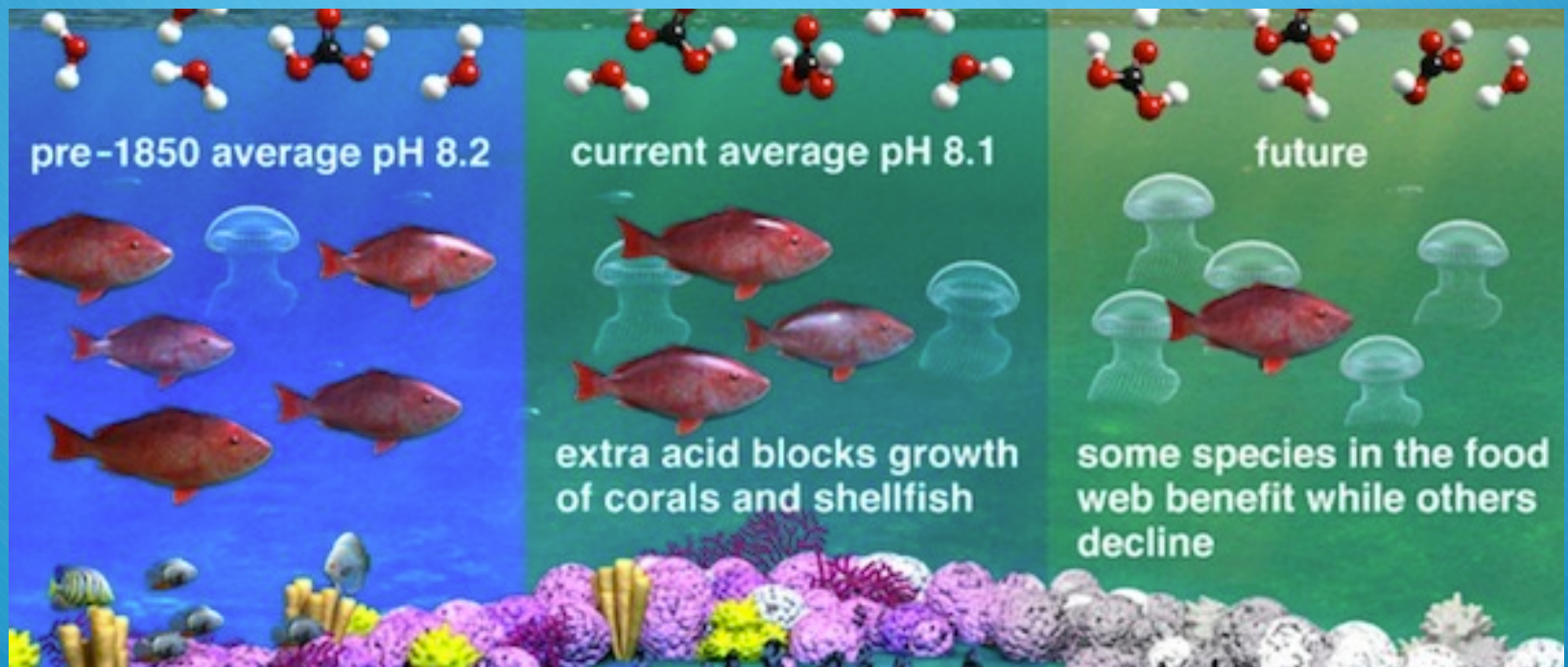


# Impacts



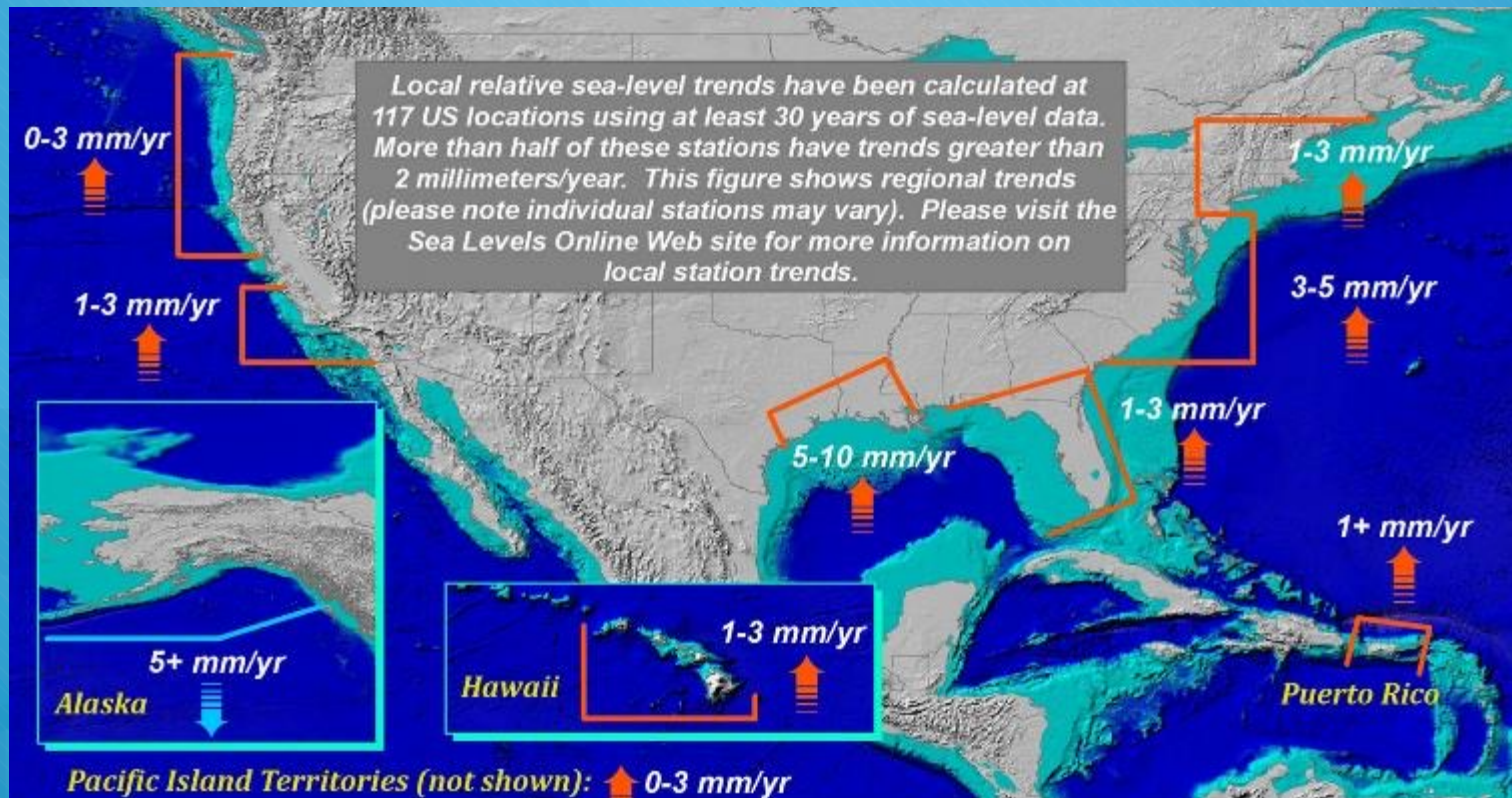


# Impacts

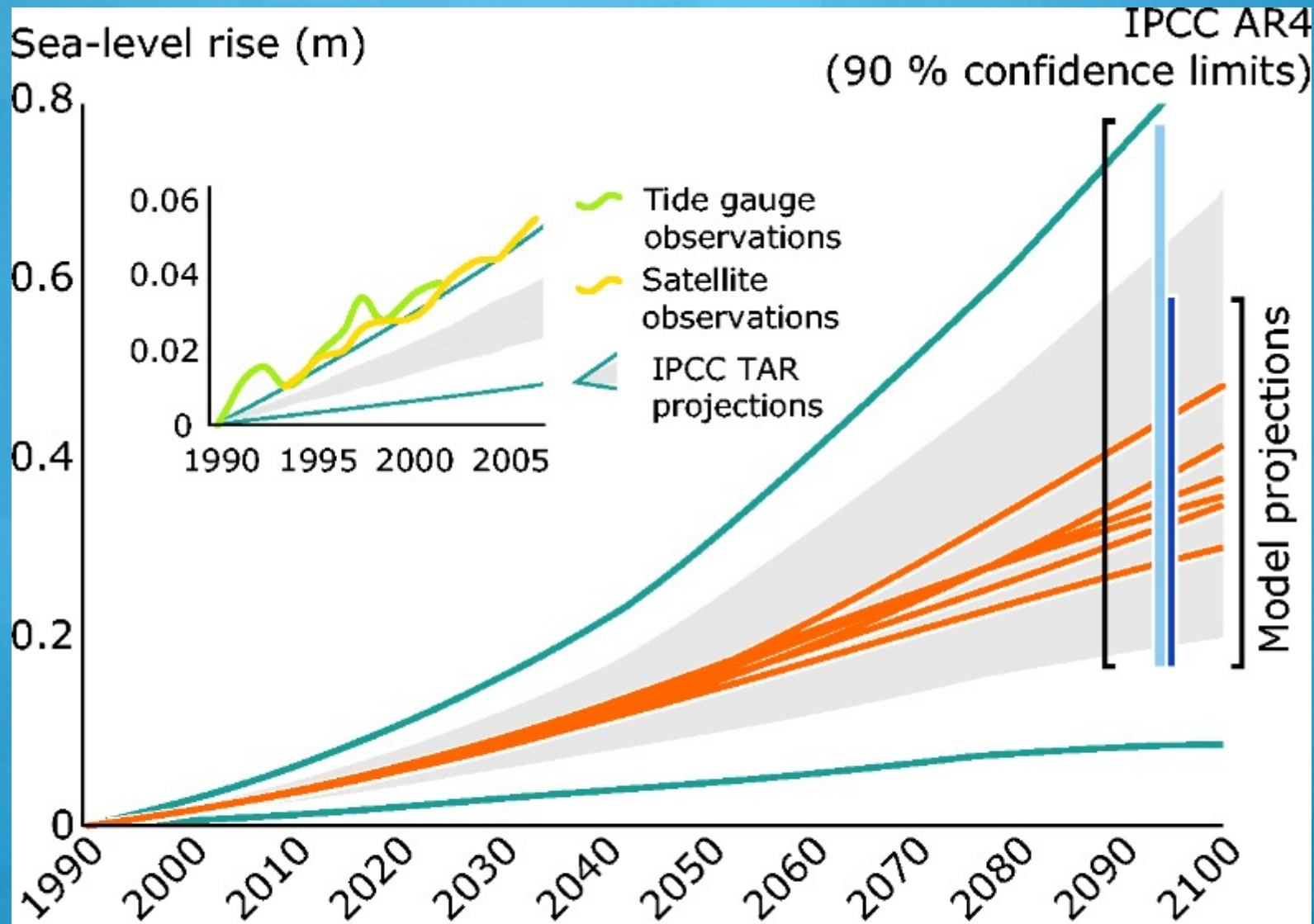




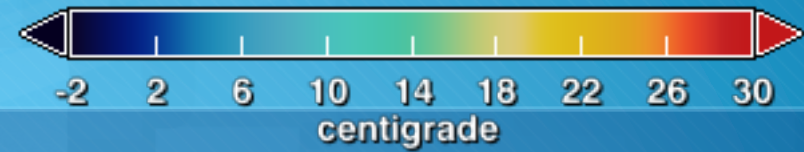
# Sea level rise



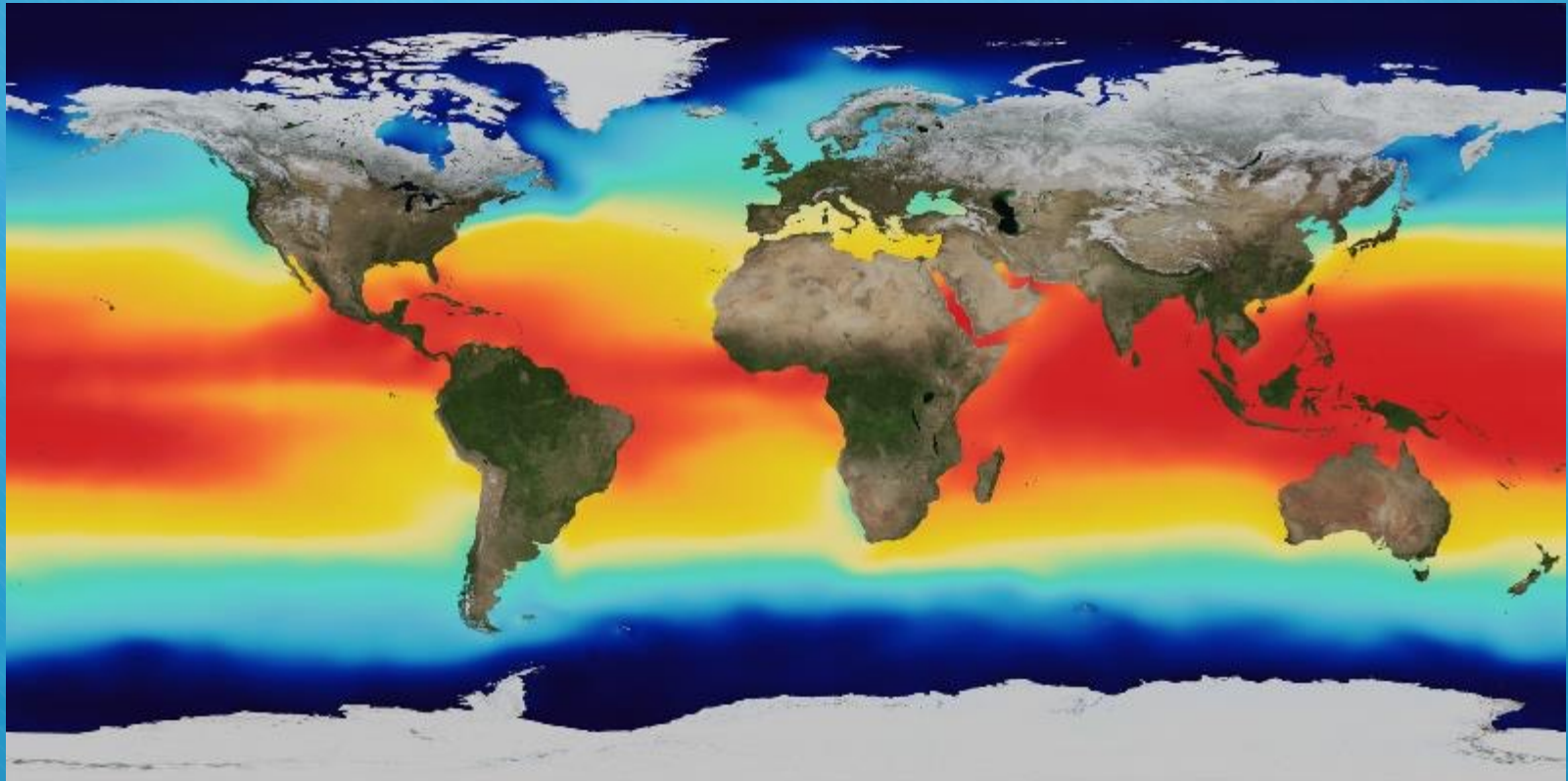




Sea Surface Temperature



# Sea surface temperature





# Human-caused pollution







## Originated from Air pollution

- Vehicles exhaust
- Stack emission





# Originated from Water runoff

- Inland
- Offshore





## Others

- Tourism
- Natural resources exploitation
  - Marine transportation
- Invasive species, overgrazing, etc.





# Case Studies

MPAs affected by different causes



# Seychelles islands

- Famous for their coral reefs
- The remote Aldabra Atoll is the largest raised atoll in the world





# Seychelles islands

- Severe coral bleaching in the late 1990s
- In March 2003, its 7 research sites in American Samoa were reported to be suffering from coral bleaching.

→ Reasons ?





# San Diego MPAs

- Home to thriving underwater ecosystems
- Roughly 12 square miles of vibrant rocky reef and kelp forest habitat
- South La Jolla and Swamis Reef





## San Diego MPAs under threats

- Residential sources
- Commercial sources
- Agricultural sources
- Industrial sources





## Anguilla MPAs

- Formed from limestone and marls developed on old volcanic rocks
- The main coastal marine habitats in Anguilla are coral reefs and sea grass beds





## Anguilla MPAs under threats

- Development
- Sand mining
- Sea level rise
- Tourism





# What has been done for MPAs?

International and national targets





# International MPA Targets

Agreement	Goal
CBD (2010)	Designate 10% of the world's marine areas under MPA status by the year 2020
Durban Action Plan (2003)	Establish a global system of MPA networks to greatly increase the marine and coastal area covered by 2010. No-take zones to comprise at least 20-30% of each habitat.
The Evian Agreement (2003)	Establish networks of marine protected areas under international law by 2012
WSSD (2002)	Establish representative networks of MPAs by 2012



# National MPA Targets

Country	Plan of Action
Chile	10% of marine areas by 2010. National network for organization by 2015.
Cuba	22% of land habitat
Germany	38% of water managed by the Marine Protected network. (no set date)
Ireland	14% of territorial waters as of 2009.
Jamaica	20% of marine habitats by 2020.
New Zealand	20% of marine environment by 2010.
Philippines	10% Fully Protected by 2020.
United Kingdom	Establish an ecologically coherent network of MPAs by 2012.



A stylized illustration of a bright yellow sun with a blue circle in the center, partially obscured by white and light blue clouds. The background is a solid blue color with a subtle pattern of lighter blue squares.

# A case study from Canada

3 minute video:

<https://www.youtube.com/watch?v=zMG-K5zTbig>



## National and Regional progress towards establishing Marine Protected Areas

- In addition to the specific MPA targets, many nations have established a variety of MPAs in their waters.
- Many of these nations have also entered into regional network agreements.
- Various sites provide additional details to regional initiatives.