

Module 1.1 - Conservation Literacy

Section 1: Concepts and Terminologies

Biodiversity • Ocean Science • Climate Science

What you'll learn today:

- 📖 **The 3 levels of biodiversity**
- 🛡️ **Protected Areas vs. OECMs**
- 🌿 **Ocean & Climate Literacy**



Learning Objectives — Section 1

Objective 01



Identify Biodiversity Levels

Define and distinguish between genetic, species, and ecosystem/landscape diversity levels.

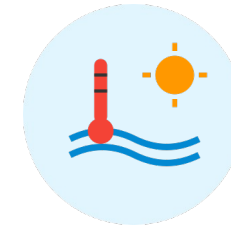
Objective 02



Contrast PAs and OECMs

Compare purpose, governance, and examples of Protected Areas versus Other Effective Conservation Measures.

Objective 03



Articulate Literacy Definitions

Define Ocean and Climate Literacy concepts and apply a Systems Thinking approach to conservation.

Defining Biodiversity — The Three Levels



Genetic Diversity

Variation of genes within a species; the "internal toolkit" that underpins adaptation and resilience.

Example: Heat-tolerant traits in coral populations allowing survival during warming events.



Species Diversity

Variety and relative abundance of different species within a specific area or region.

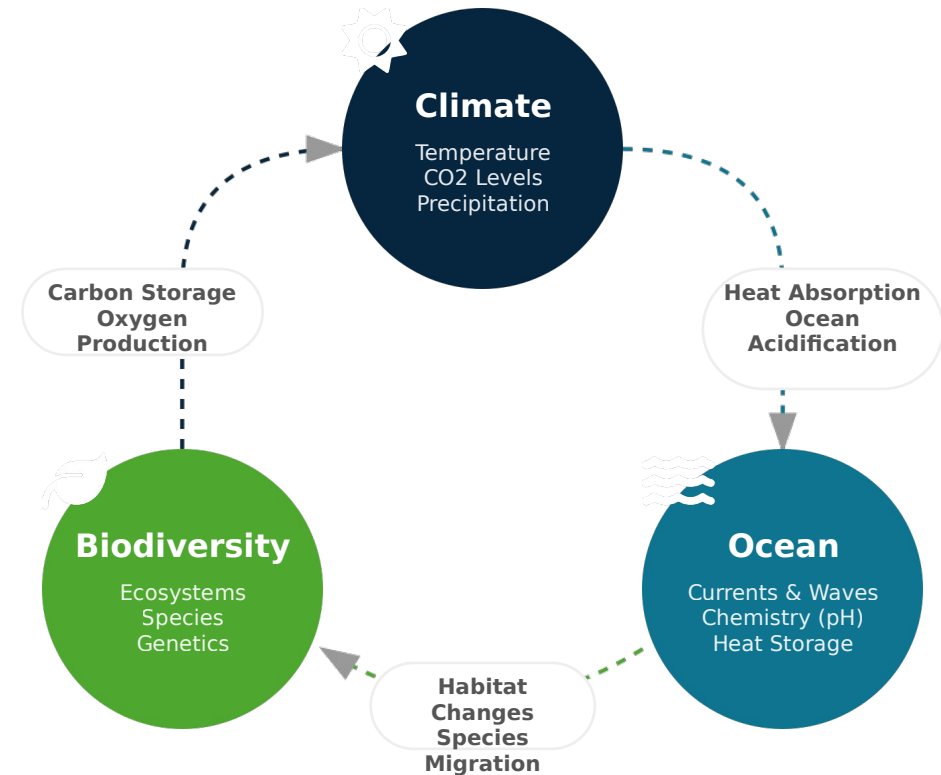
Example: The richness of bird, fish, and crab species found in a mangrove forest.



Ecosystem Diversity

Variety of habitats, biological communities, and ecological processes and their interactions.

Example: Interconnected reefs, seagrass beds, and wetlands forming a coastal seascape.



The Interconnected System: Changes in climate affect the ocean, which drives biodiversity shifts, while ecosystems regulate the climate.

Ecosystem Services — The Four Types



Provisioning Services

Food: Crops, wild game, seafood, spices

Fresh Water: Storage and retention

Raw Materials: Timber, fibers, fuel wood

Medicinal Resources: Plants, marine compounds



Regulating Services

Climate Regulation: Carbon sequestration (Blue Carbon)

Coastal Protection: Flood control via reefs/mangroves

Water Purification: Wetland filtration of pollutants

Pollination: Crop fertilization by insects/birds



Supporting Services

Primary Production: Photosynthesis, oxygen generation

Nutrient Cycling: Nitrogen, phosphorus circulation

Soil Formation: Creation of fertile land

Nursery Habitats: Critical for fisheries replenishment



Cultural Services

Recreation & Ecotourism: Nature-based leisure

Cultural Heritage: Traditional knowledge, sacred sites

Spiritual Values: Religious or spiritual attachment

Education & Science: Research, cognitive development



Note: Marine-coastal systems (e.g., coral reefs, mangroves) are unique because they deliver services across all four categories simultaneously. Protecting one service (e.g., nursery habitat) often safeguards others (e.g., fisheries, tourism).

Endemism & Endemic Species — Why Islands Matter

📍 What is Endemism?

The state of a species being native to a single defined geographic location, such as an island, state, or other defined zone. High endemism indicates high irreplaceability.

⚠️ Why It Matters

Represents unique evolutionary lineages found nowhere else. These species often have small ranges, making them extremely vulnerable to habitat loss, climate change, and invasive species (higher extinction risk).

Conservation Actions

- 📍 Prioritize sites with high endemism (KBAs/Hotspots)
- 🛡️ Strengthen biosecurity against invasive species
- 🌱 Integrate ICCAs (Indigenous & Community Conserved Areas)



Caribbean Islands

11,000+ endemic plants, unique birds like the Jamaican Tody, and diverse reptiles.



Tropical Andes

World's highest plant & amphibian endemism. Critical global biodiversity reservoir.



Mesoamerica

Cloud forest endemics including specialized orchids, salamanders, and insects.

Key Biodiversity Areas (KBAs) — Global Standard



Key Biodiversity Areas (KBAs) are sites that contribute significantly to the global persistence of biodiversity across terrestrial, freshwater, and marine ecosystems.

A1



Threatened Biodiversity

Site holds significant populations of globally threatened species (IUCN Red List).

B1



Geographically Restricted

Site holds a high proportion of the global population of range-restricted species.

C



Ecological Integrity

Largely intact ecosystems with exceptional ecological integrity and naturalness.

D



Biological Processes

Sites maintaining key life-cycle events (spawning, migration, aggregation).

E



Irreplaceability

Sites identified through quantitative analysis as essential and irreplaceable.



Use in Practice for 30x30



Guides PA/OECM Expansion



Informs Spatial Planning



Directs Conservation Investment

Months/
Weeks

Area-Based Conservation — PAs vs OECMs

Protected Areas (PAs)

Formal Conservation Estate

"A clearly defined geographical space, recognized and managed through legal means to achieve long-term conservation."

🎯Primary Objective

Conservation is the main objective. Management is specifically designed for nature protection.

☰Examples

National Parks
Wildlife Sanctuaries
Marine Reserves

OECMs

Other Effective Area-based Conservation Measures

"Areas achieving effective in-situ conservation of biodiversity regardless of their primary management objectives."

🎯Primary Objective

Often managed for **cultural, spiritual, or economic** reasons; conservation is a beneficial "by-product."

☰Examples

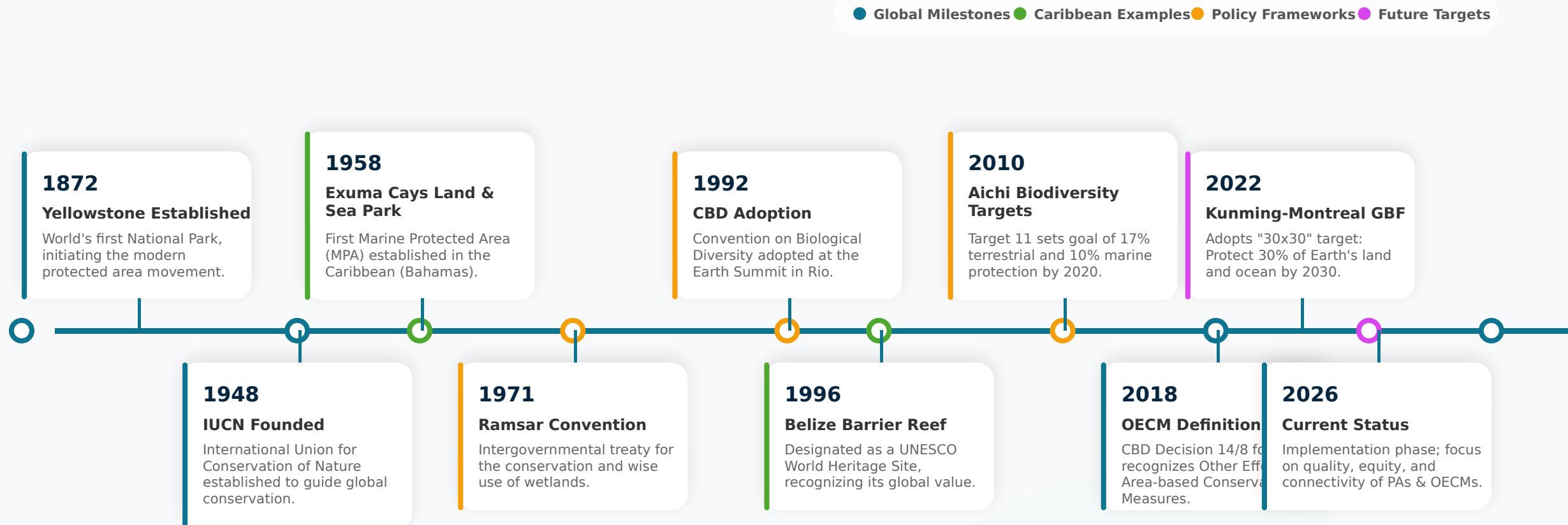
Sacred Natural Sites
Military Exclusion Zones
Traditional Fishing Grounds

Why both matter for the 30x30 Global Target?



Recognizing OECMs alongside formal PAs expands the conservation estate, acknowledging diverse governance and locally effective stewardship beyond traditional government-run parks.

Evolution of Protected Area Designations



Protected Areas in Action — Caribbean Examples

Caribbean Protected Areas Showcase



Belize Barrier Reef

Belize

A UNESCO World Heritage Site comprising 7 marine reserves. It covers 96,300 hectares and demonstrates high management effectiveness through a mix of government oversight and NGO partnerships.

96,300
ha

UNESCO
Site

Govt.
Managed

Exuma Cays Land & Sea Park

Bahamas

Established in 1958 as the first MPA in the Caribbean. This 456 km² no-take zone serves as a critical replenishment reservoir for queen conch, lobster, and grouper populations.

No-Take
Zone

NGO
Managed

Key
Nursery

Morne Trois Pitons NP

Dominica

A prime example of terrestrial protection, centered on volcanic features and tropical forest. It protects vital watersheds and provides the sole habitat for the endemic Imperial Parrot.

6,857
ha

Watershed
Prot.

Endemic
Species

Regional Context: PAs vs. OECMs

Metric	Protected Areas (PA)	OECMs (Context)
Legal Formalization	100% Formal	60% Formal
Mgmt. Effectiveness	75% Good/High	70% Effective
30x30 Contribution	18% of Region	12% of Region



Applying Systems Thinking in Conservation



Why Systems Thinking? Climate, ocean, and biodiversity are interconnected. Interventions in one area can create ripple effects throughout the system, requiring a holistic approach to conservation.

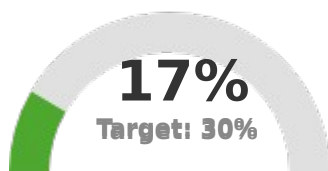


Outcome: Solutions that are effective, equitable, and resilient across the climate-ocean-biodiversity nexus.

The 30x30 Target Explained

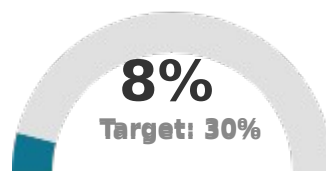
 The **Kunming-Montreal Global Biodiversity Framework (GBF)** establishes a target to effectively conserve and manage at least **30% of the world's land and ocean by 2030**.

Terrestrial



↑ Progressing

Marine (MPAs)



↑ Accelerating

Quality & Effectiveness Indicators



Ecological Representativeness



Connectivity & Corridors



Indigenous & Local Rights



Management Effectiveness

Pathway to 2030



Next Steps Priorities

- ✓ Close gaps in key biomes
- ✓ Secure sustainable finance
- ✓ Expand OECM recognition

Literacy Foundations — Ocean & Climate Literacy

Ocean Literacy

Understanding the ocean's influence on you—and your influence on the ocean.

- One big interconnected ocean with many features
- Ocean makes Earth habitable & influences weather
- Support a great diversity of life and ecosystems

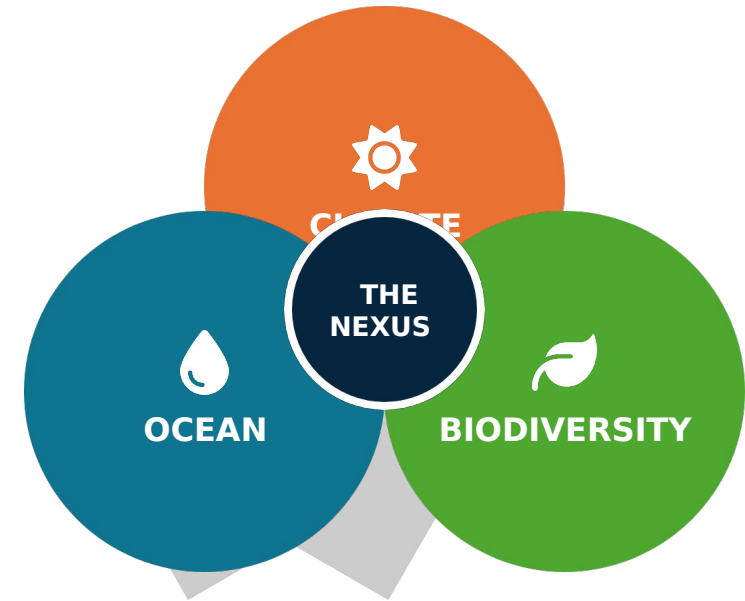
Climate Literacy

Understanding the climate system, human impacts, and making informed decisions.

- Sun is the primary source of energy
- Complex interactions regulate Earth's system
- Human activities impact the climate system

2026 Perspective

Moving beyond facts to understanding agency, systemic impact, and the "Blue Economy" role.



Systems Thinking Approach

A change in one system immediately dictates a change in others. The atmosphere (Climate), hydrosphere (Ocean), and biosphere (Biodiversity) are inseparable.

High-Biodiversity Areas: Caribbean & Latin America



Mesoamerica

~17,000 Plant Species (20% Endemic)

Caribbean Islands

11,000+ Endemic Plant Species



Amazon Basin

10% of World's Known Species

Biodiversity Hotspots

- Tropical Andes (Critical)
- Caribbean Islands (High)
- Mesoamerica (High)
- Amazon Basin (High)
- Atlantic Forest (Critical)
- Cerrado (Medium-High)
- Chocó-Darién (High)
- Marine Zones (Reefs)



Tropical Andes

30,000+ Vascular Plants (Highest Globally)

Source: GEO-6 LAC Regional Assessment & Conservation International Biodiversity Hotspots (2026)

Nature-based Solutions — Caribbean Case Studies

 **Nature-based Solutions (NbS)** are actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively.



Belize

Mangrove Blue Carbon

Belize's mangroves store 3-5x more carbon than forests. Protecting 60,000+ hectares through Marine Managed Areas against 30-50% regional loss.

1,000+ tons
CO2 stored per hectare



Belize

Fragments of Hope

Planted 85,000+ coral fragments (2013-2026) with 80-90% survival. Protects vital tourism revenue from storm damage.

50+ Sites
Reefs Restored



Bahamas

Seagrass Restoration

Seagrass captures carbon 35x faster than rainforests. Restoring degraded beds to enhance fish nurseries.

2,500 ha
Habitat Restored



Dom. Rep.

Community Watersheds

Watersheds protecting endemic birds & livelihoods. 15,000+ hectares under ICCA governance.

45 Species
Endemics Protected

QUANTIFIED REGIONAL BENEFITS



150,000 t
CO2 Storage



97%
Wave Reduction



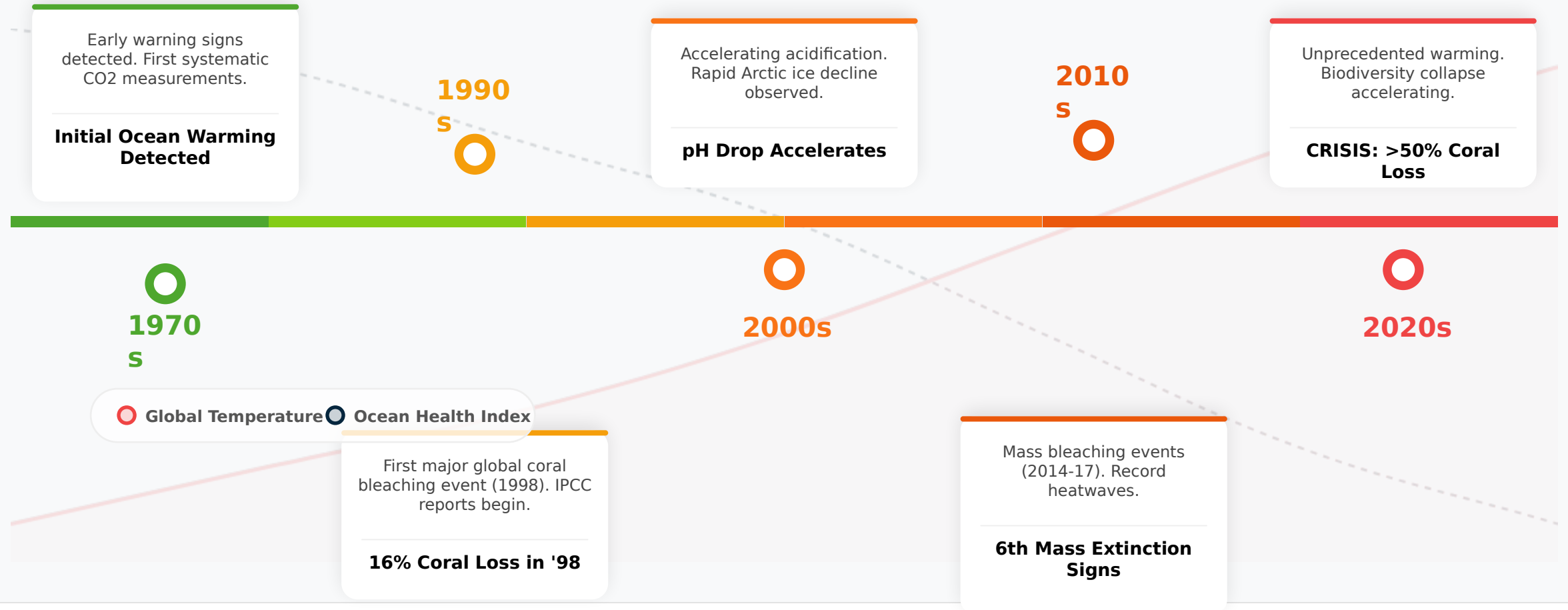
200+
Species Protected



\$50M+
Revenue Protected

Data sources: GEO-6 LAC, Fragments of Hope Foundation, Blue Carbon Initiative, IUCN Caribbean

Accelerating Impacts: Climate, Ocean & Biodiversity Loss



One Health — Linking Nature and Human Health

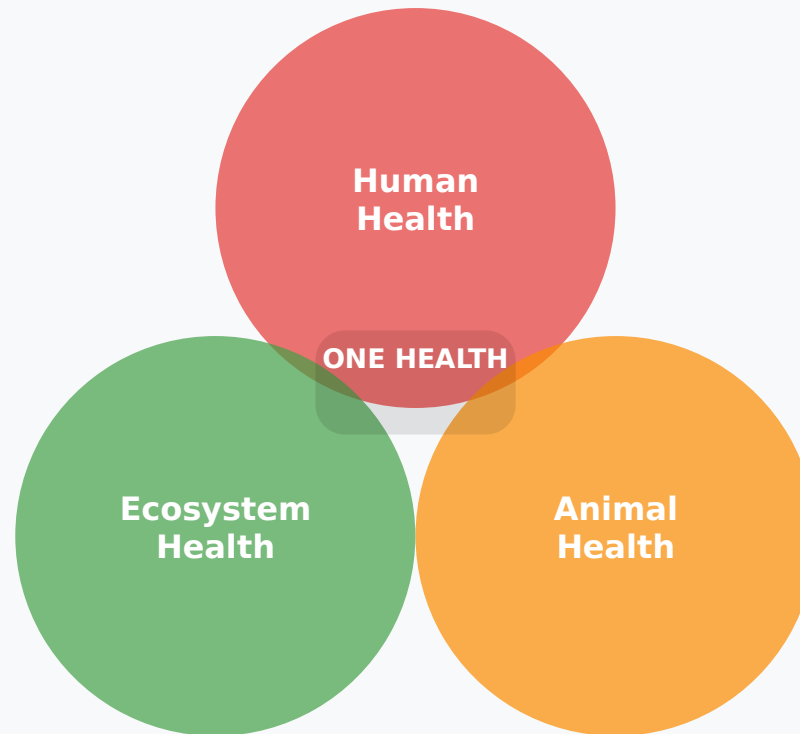


One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems.

⚠ Biodiversity Loss Risks

- **Habitat Fragmentation:** Increases human-wildlife contact zones.
- **Wildlife Trade:** Amplifies pathogen exposure pathways.
- **Loss of Dilution Effect:** Diverse communities reduce transmission; low diversity spikes it.

⚙ **Example:** COVID-19 pandemic highlighted the devastating consequences of zoonotic spillover linked to nature degradation.



Policy Implications

- ✓ Protect & connect habitats to maintain natural barriers.
- ✓ Regulate high-risk wildlife trade and markets.
- ✓ Invest in surveillance at the human-animal interface.
- ✓ Leverage co-benefits for climate resilience.



Key Takeaway: Conserving healthy ecosystems is a form of preventive public health security.

Summary & Further Reading

Key Takeaways

01 Manage Biodiversity Scales

Effective conservation requires addressing genetic, species, and ecosystem/landscape levels simultaneously.

02 Inclusive Conservation (30x30)

Achieving global targets relies on both formal Protected Areas (PAs) and Other Effective Conservation Measures (OECMs).

03 Systems Thinking Literacy

Ocean and Climate Literacy are foundational, emphasizing the interconnected "Nexus" where changes in one system affect all.

Authoritative Resources



Ocean Literacy: Essential Principles v3.2 (2024)

NOAA

repository.library.noaa.gov/view/noaa/67228



Ocean Literacy Portal

UNESCO-IOC

oceanliteracy.unesco.org



Climate Literacy Guide (2024)

USGCRP

globalchange.gov/climate-literacy



Conservation Literacy Guidelines

Society for Conservation Biology (SCB)

conbio.org/professional-development



GEO-6 Regional Assessment (LAC)

UNEP

unep.org/resources/geo-6