A Day in the Life of an Ecosystem

Learn to **See with the Sea!**

What is an ecosystem?

Ecosystems in the natural world: A community of diverse and interdependent living organisms in conjunction with the physical environment. Despite fluctuations in populations and disturbances in their environment, ecosystems tend towards ecological stability, or equilibrium.

Ecosystems through a human lens: Also known as “socio-ecological systems”, where diverse and interconnected actors are intricately tied by cultural practices, identities, intentions, roles, beliefs, values, and available resources.

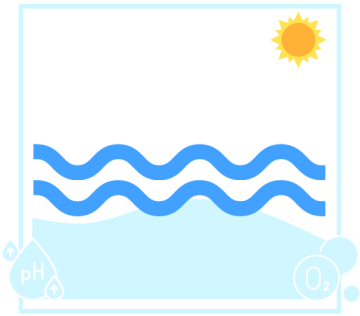
Learn to see the ecosystem you care for through the lens of the Sea.

By exploring marine ecosystems, we can broaden our perspectives, triggering insights that may help us deepen our understanding of the ecosystems we are part of.

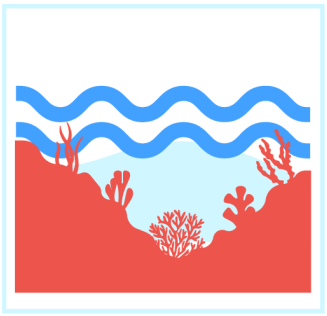
Credits: "A Day in the Life of an Ecosystem: Learn to See with The Sea" is a prototype developed by Farah Makki & Naomi Martin in the framework of the program “Culture in the Civic Space in the MENA region: Learning Journey for Field Supporters” implemented by iac Berlin and supported by the Ford Foundation. Drawing on "Ecosystem Cards" for inspiration, the tool has been developed especially for the Kick-off event in Amman, October 2024.

Learn to See with the Sea!

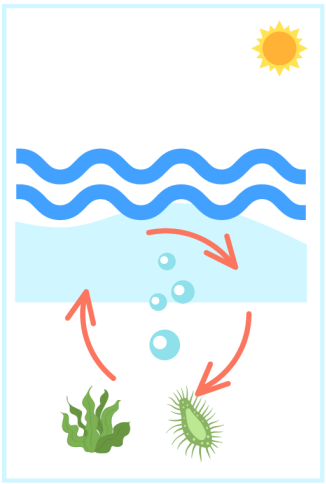
Dive into the water through these visual cards to explore ecosystem dynamics. At the back of every card, you will find questions to explore the ecosystems you are a part of through “marine” eyes.

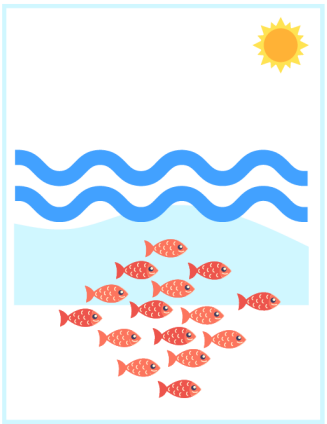


Water Conditions, Habitats

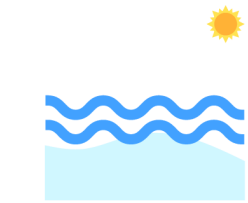


Resources, Bio-diversity





The cards will take through exercises of



Understanding

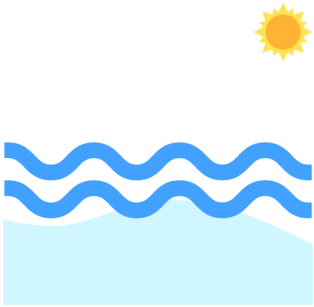
Sensemaking

Inspiring your (learning) journey!

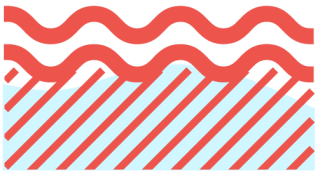
Envisionning

Balance

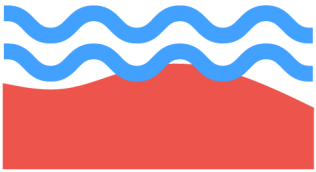
Water is essential for life, and the balance between key elements determines whether life is flourishing, struggling or somewhere in between. Explore the different states of balance in marine environments and how they affect life:



In balance
Optimal conditions for life to flourish



So-so
The balance becomes disturbed with some life forms negatively affected.



Out of balance
Harsh conditions making it a struggle to survive.

Balance

You might be wondering: What supports balance in water? We'll explore this question and uncover answers in the next cards.

For now, return to the ecosystem you are a part of:

- How would you describe its current state?
- Does it feel like things are flourishing, struggling, or somewhere in between?

In balance **So-so** **Out of balance**

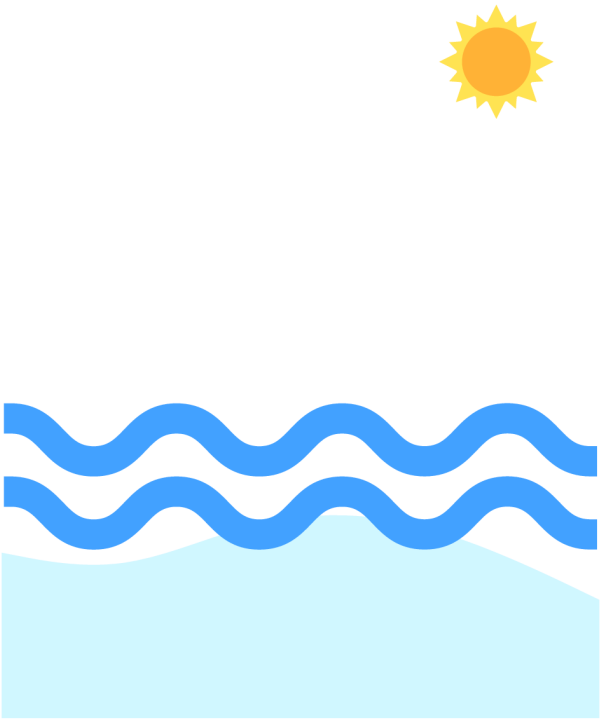
Positionality & Boundaries

Water ecosystems have different characteristics depending on whether we are looking at seas, rivers, or oceans. In all cases, their geographic location and natural boundaries can greatly affect the balance of factors that determine which life forms can flourish. For example, the Dead Sea's unique location and boundaries lead to high salinity levels, limiting its ability to support marine life.

Positionality & Boundaries

- Name the ecosystem you are a part of (and care for).
- What is at the core of the ecosystem?
- Where are the boundaries?

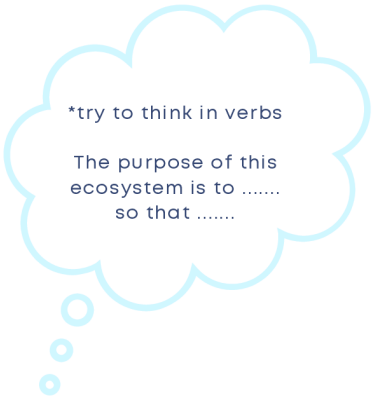
Purpose



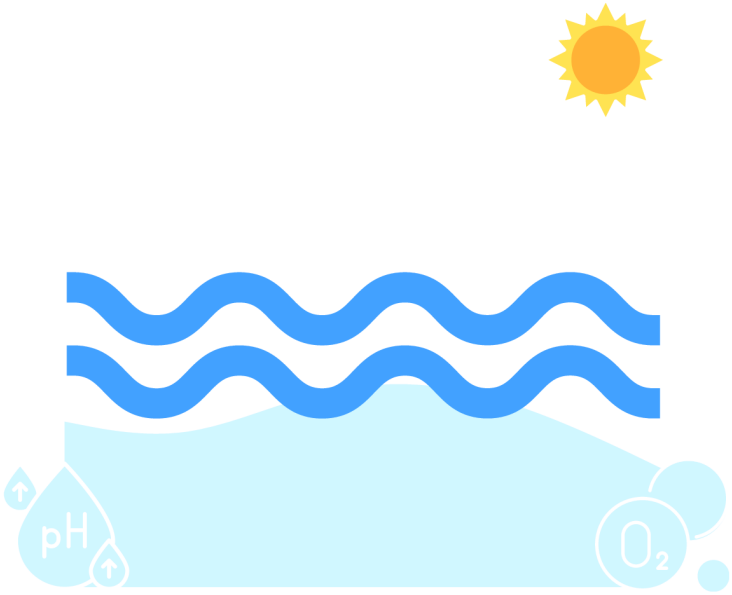
The purpose of the marine ecosystem is to sustain life (both in the water and beyond) by maintaining the health and resilience of the water environment. This includes supporting diverse marine life, regulating climate, and providing resources such as food and oxygen. A healthy marine ecosystem helps ensure that the many different species that rely on it can thrive and live in ecological balance.

Purpose

- What is the purpose* of the ecosystem you are a part of?
- Whom does it serve?
- Whom does it not serve?



Conditions for life



Conditions for life depend on several key aspects of water chemistry:

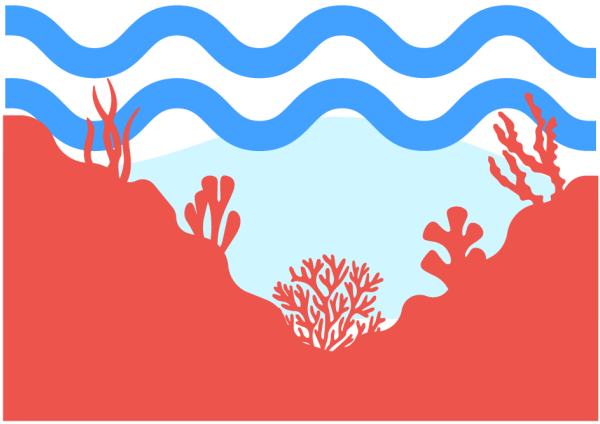
- **Salinity:** The salt content of the water determines which organisms can survive. Some species are adapted to freshwater, while others thrive in salty environments.
- **Dissolved Oxygen:** Aquatic animals and plants need enough dissolved oxygen in the water to breathe.
- **pH Levels:** The acidity of the water affects chemical reactions and biological processes. Most aquatic organisms need a stable pH to stay healthy.

Sensing the water(s) you are swimming in

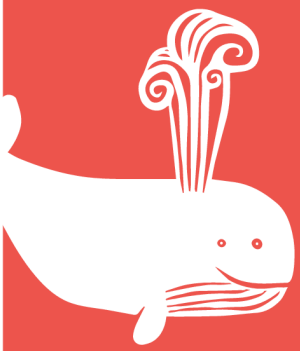
- How does the “water” around you feel? Is it dense or light, salty or fresh, stable or unstable? Is it easy or difficult to breathe?
- What is the pace of life? Does the water feel calm, turbulent, or somewhere in between?
- How do you sense others in this ecosystem? How do they move through the water?

Conditions for life

Habitat(s)



Marine ecosystems are also shaped by physical factors like temperature, light, tides, currents, and the type of sea floor (substrate). Temperature affects how species grow and where they live. Light helps plants make food through photosynthesis. Tides and currents move nutrients and species around. The sea floor´s substrate (whether it is sandy, rocky, or muddy) provides different habitats for marine species, giving them places to live, eat, and reproduce.



Let's see what provides habitat(s), swim with me!

Habitats & Infrastructure

You will find marine life in a variety of habitats, each tailored to the species it supports. Natural infrastructure —like coral reefs and mangroves—provide shelter and places for reproduction, helping certain species flourish.

Seaweed

Clusters of seaweed not only provide shelter for certain species they also produce nutrients essential to the marine food web.

Coral reefs

Biodiverse underwater structures formed by coral polyps that provide habitat for a myriad of marine species.

Mangroves

Coastal forests that stabilize shorelines, provide habitat, and act as nurseries.

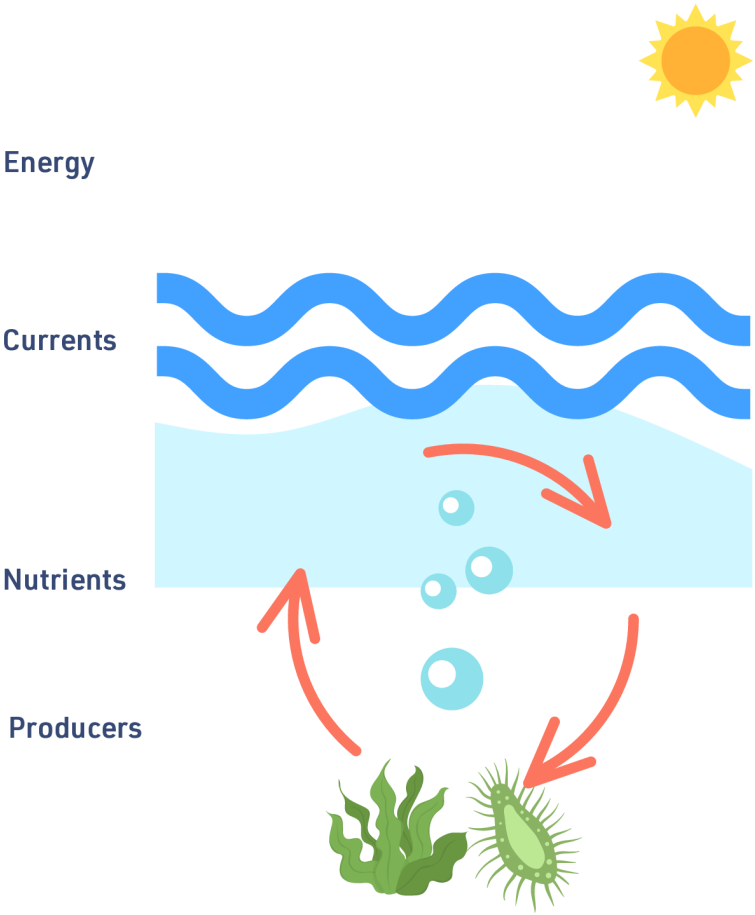
Deep Sea

The abyssal and hadal zones are home to specialized organisms adapted to high pressure, low light, and cold temperatures.

Habitats & Infrastructure

- What habitats and infrastructure exist in the ecosystem you are a part of?
- How well do these support the actors and communities needing them?
- Where are habitats and infrastructure lacking?

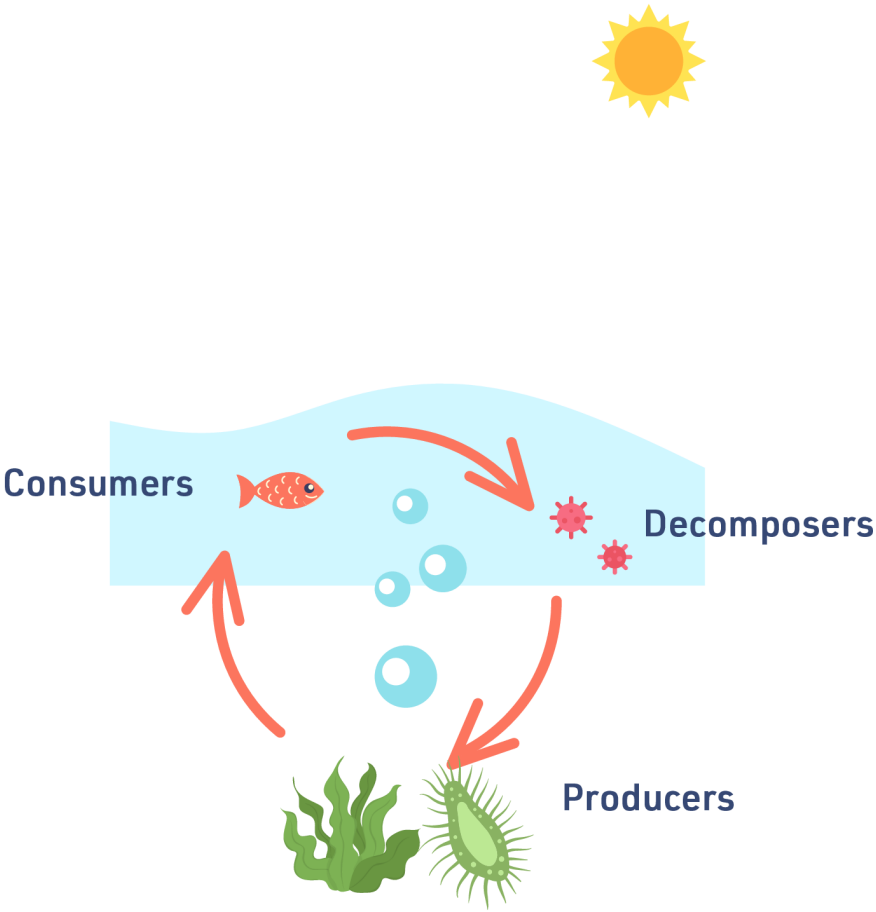
Resources for life



Marine ecosystems rely on essential resources like sunlight for energy, currents to distribute nutrients, and primary producers to sustain life. Key nutrients - such as nitrogen, phosphorus, and silicon - support the growth of these producers, forming the foundation of the food chain and ensuring the ecosystem's vitality.

Let's learn about the relation between resources and cycles

Cycles for life



Ecosystems are sustained by continuous cycles of energy, nutrients, and resources. Producers (such as plants and algae) create energy from sunlight, consumers (such as marine species) rely on these producers for food, and decomposers (microorganisms) break down waste and dead matter, returning nutrients to the system. When in balance, this closed loop keeps resources flowing and supports life.

Resources & Cycles

Coming back to the ecosystem you care for:

- What tangible and intangible resources are currently in use in the ecosystem?
- Where do these resources come from? Are they generated internally or sourced externally?
- How well do resources flow and regenerate within your ecosystem? Are they accessible to everyone who needs them?
- What resources or flows are missing that could help your ecosystem thrive?

Actors & Roles
bio-diversity

Actors in the marine ecosystem influence resources & cycles. They play different roles such as:

Phytoplankton

Seaweed

Producers

Producers are able to make their own food. Just like producers on land, producers in the marine environment convert energy from the sun into food through photosynthesis.

Decomposers

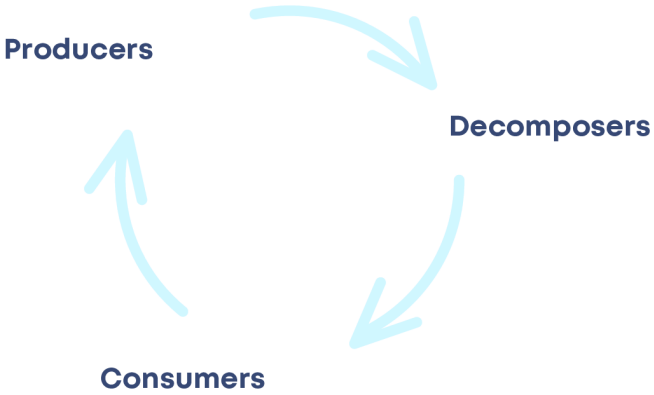
Bacteria are microscopic organisms that break down dead organic matter and in doing so release nutrients back into the ecosystem. They help support all levels of the food web, including consumers, by decomposing their waste and dead tissue.

Consumers

Consumers are unable to make their own food, relying on either consuming other organisms or absorbing dissolved organic material. These include a wide range of marine species, from fish and mammals to starfish and cockles.

Bio-diversity of Actors

Do these actors trigger any associations with the actors in the ecosystem you are trying to understand?



Bio-diversity of Roles

Light in the dark

Nutrients recycling

Oxygen balance

Species health

Habitat restoration

Shelter & source of nutrients and energy

Many species – besides being decomposers, producers, or consumers – have additional roles that play a unique part in sustaining life. Some provide light in dark environments, while others provide shelter, restore habitats or balance oxygen levels in the water. There are even some species that support the health of others, ensuring the entire ecosystem thrives.

This biodiversity of supportive roles is key to a thriving ecosystem.

Bio-diversity of Roles

Do these actors trigger any associations with the ecosystem you are trying to understand?

Nutrients recycling

Bacteria support all levels of the food web by decomposing waste and dead tissue, thereby releasing nutrients back into the ecosystem.

Bring light in the deep dark sea

In the deep sea, where sunlight doesn't penetrate, some species use bioluminescence for communication, mating, and camouflage.

Restore habitat

Sea otters help protect kelp forests and the species living there by eating and, thereby, controlling the number of sea urchins which would otherwise eat too much kelp.

Shelter, source of nutrients & energy

Clusters of seaweed not only provide shelter for certain species they also produce nutrients essential to the marine food web.

Balance oxygen in the water

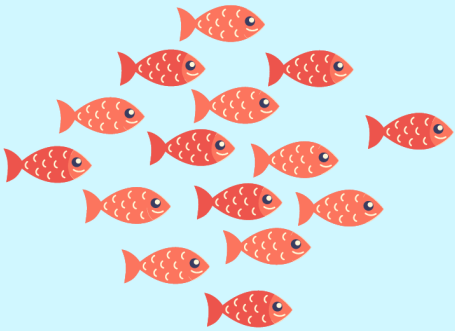
Cockles clean the water which helps to prevent an overgrowth of some producers like phytoplankton which can deplete oxygen and harm fish.

Contribute to other species health

Certain fish species, like cleaner wrasses, set up "cleaning stations" where larger fish (clients) come to have parasites and dead skin removed.

Actor(s) & Roles for life

Inspired by the marine species?
Ready to think about actors and roles in the ecosystem you´re swimming in?



Let's explore...

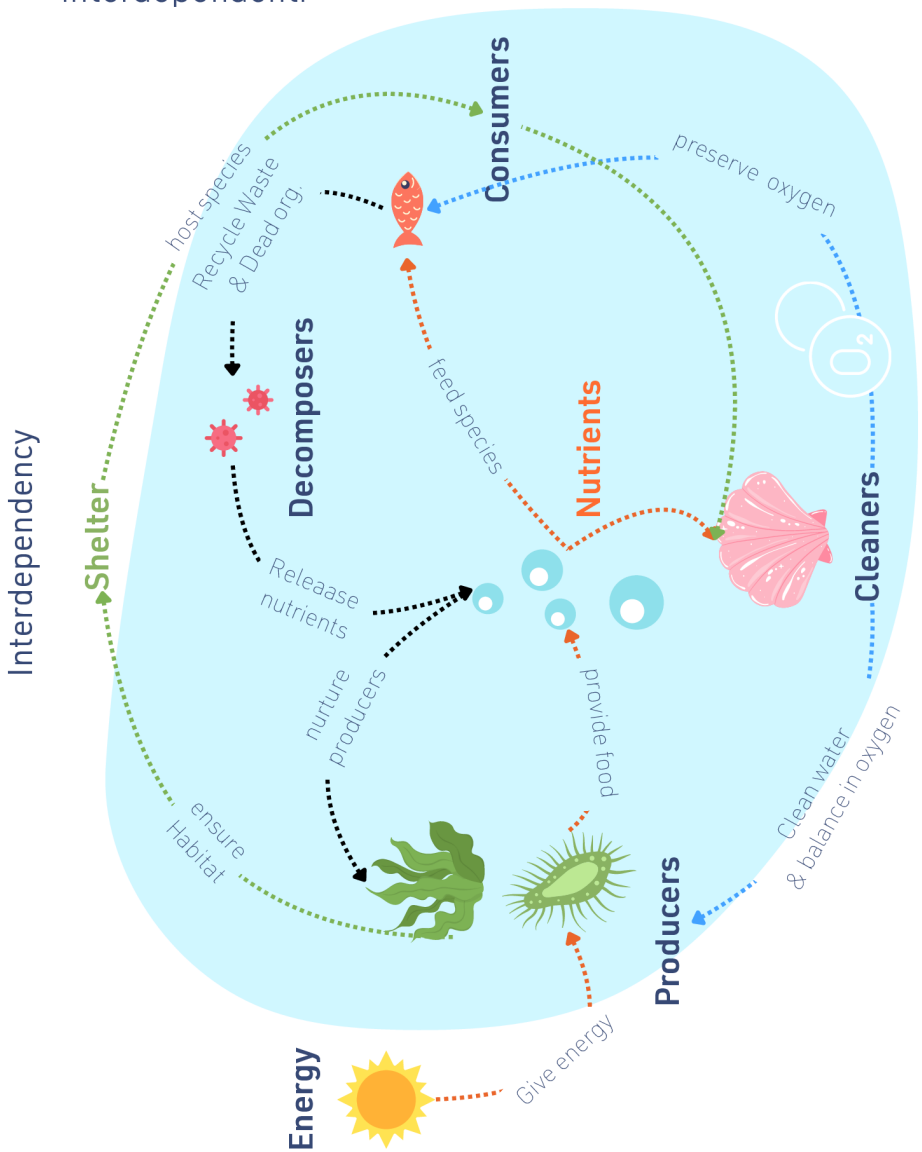
Actor(s) & Roles

Following your insights from the marine ecosystem:

- Who are the key actors and what roles do they play in the ecosystem you are a part of?
- How effectively are these roles being fulfilled?
- Are there any actors or roles missing in the ecosystem?
- How would you define your role(s)?

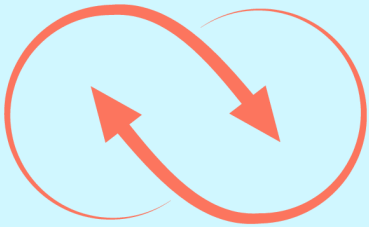
Connections & Relations

In the marine ecosystem, species interact in complex ways to fulfill their own needs and maintain balance. Actors, roles, and ecosystem functions are interdependent.



Where interactions can affect balance?

Connections & Relationships



How species interact affects the ecosystem´s balance in different ways:

- **Food Webs:** Species have specific roles, from producers to consumers, that together form a network of interactions that sustain life.
- **Symbiosis:** Mutualistic relationships show how cooperation benefits all involved. For example, cleaner fish remove parasites from larger fish, providing the cleaner fish with food and improving the health of the larger fish.
- **Nutrient Recycling:** Essential nutrients are recycled through various processes, helping maintain ecosystem health and productivity.
- **Adaptation:** Species adapt to environmental changes, reflecting the evolving nature of ecosystems. For example, some coral species are adapting to rising sea temperatures by forming symbiotic relationships with heat-tolerant algae. This helps them to survive in warmer waters and continue to provide shelter.

Connections & Relationships

- What connections currently exist between actors in the ecosystem?
- How would you describe the relationships between actors? What types of relationships exist for what purposes? What qualities do they have?
- How does power show up?
- What connections and relationships are missing?

Rules & Norms

Formal regulations and informal practices by humans also shape the marine ecosystem. Rules include legal protections such as fishing quotas, marine protected areas, and pollution controls. Informal norms include practices, community stewardship, and cultural traditions that promote responsible behavior.

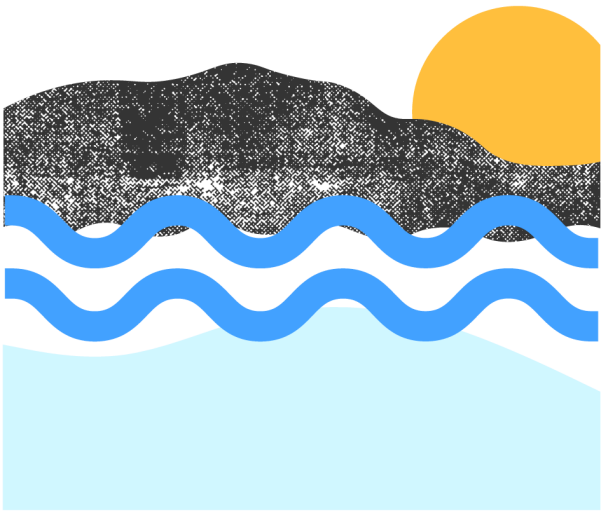
Rules & Norms

Just like in a marine ecosystem, the ecosystems we are a part of also have their own rules and norms (both explicit and implicit) that influence how the ecosystem develops over time.

Looking to the ecosystem you are a part of:

- What rules and norms affect how it functions?
- What are the core principles governing interactions and dynamics?
- How much influence do different actors have over the rules, norms, and principles that affect them?

Wider Context



Wider Context

The wider context around an ecosystem can influence its internal dynamics, either supporting or disrupting balance in:

- Water conditions
- Food webs
- Resource cycles
- Symbiotic relationships
- Habitats and infrastructure

Understanding and trying to work with these factors - even if they are not easily influenced - can help maintain the balance and health of marine ecosystems.

Wider Context
Factors of imbalance

Removing key species can collapse food webs, leading to the decline of other species and disrupting balance in the ecosystem.

Overfishing

Toxic introductions

Contaminants can damage habitats and/or interfere with the flow of nutrients, affecting food webs and the overall health of the ecosystem.

Invasive species

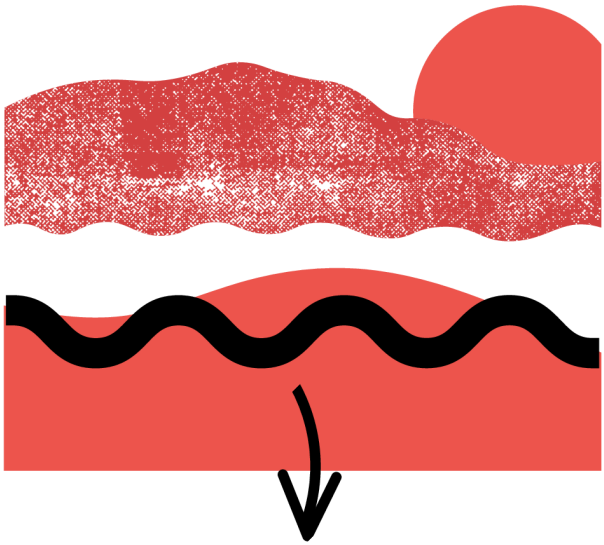
Non-native species can outcompete or prey on native species, altering food web dynamics.

Wider Context
Factors of imbalance

Looking at factors that disrupt balance in the marine ecosystem, does it trigger any associations with the ecosystem you are trying to understand?

Wider Context

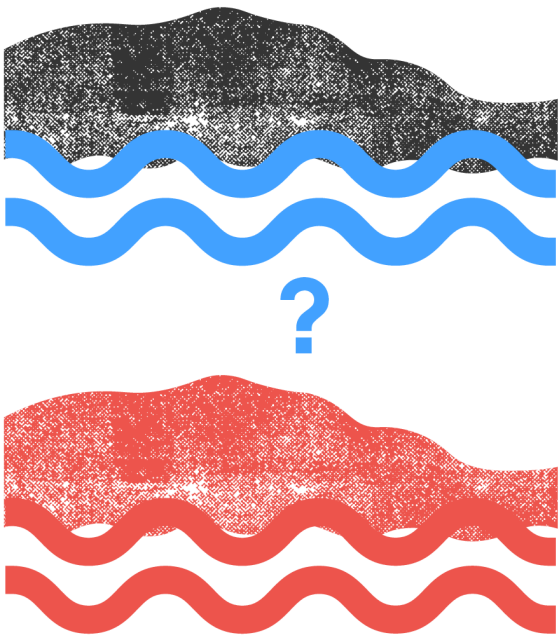
An example from the Dead Sea



Climate Change: Rapid changes in temperature can alter water quality and hinder species' ability to adapt, affecting how the ecosystem functions and which species are able to survive. The Dead Sea, for example, is shrinking by 1 meter each year, increasing its water salinity and density.

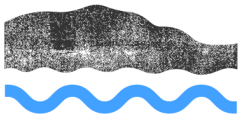
Does it trigger any associations with the ecosystem you are trying to understand?

Wider Context

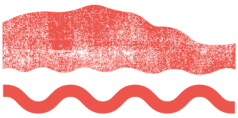


Wider Context

- *What external factors* affect or are likely to affect balance within the ecosystem? And how?*
  (social, political, economic, environmental, technological)



More
Supportive factors



Less
Supportive factors

What bright spots do you see that point to more promising approaches?

Deep Sea

Values & Core Beliefs

Deep Sea
Values & Core Beliefs

The values and core beliefs we hold about ourselves, others, and the world around us are deeply embedded in our ecosystems. Exploring the deep sea can help us uncover these underlying attitudes and behaviors that influence the ecosystem.

- What prevailing narratives exist in the ecosystem?
- What core beliefs and values lie beneath these narratives?
- What deeper truths and needs exist beneath the stories, values, and beliefs that shape the ecosystem?