



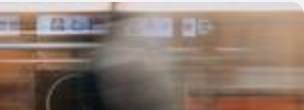
Nature-Based Solutions



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Learning goals

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01

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Global temperatures have increased by over 1.2°C

1850

2022

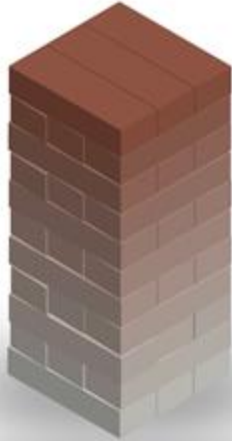
Climate change definitions

CLIMATE CHANGE BASICS

- Long-term shifts in weather patterns and average temperatures on Earth
- Caused by human activities, particularly the emission of GHG from the burning of fossil fuels, deforestation, industrial processes, and agricultural practices.
- Currently at 1.2°C above pre-industrial global temperatures



Climate **tipping points** are a bit
like a game of Jenga



Tipping Points

CLIMATE CHANGE BASICS

“Tipping points” are thresholds where a tiny change could push a system into a completely new state.

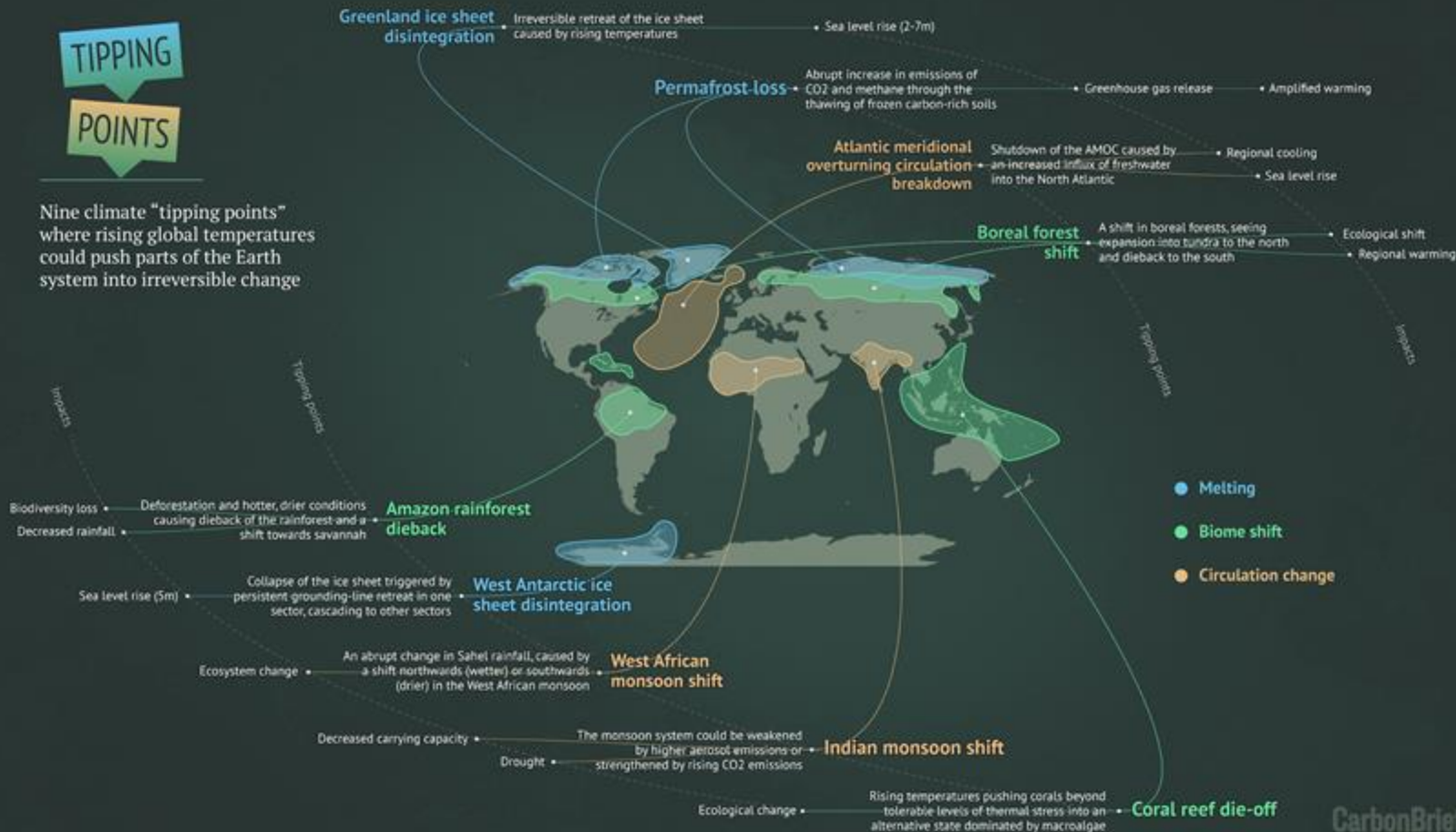
So, rather than a bit more warming causing slightly hotter heatwaves or more melting of glaciers, it causes a dramatic shift to an entire system.

It’s like a game of Jenga.



TIPPING POINTS

Nine climate "tipping points" where rising global temperatures could push parts of the Earth system into irreversible change



Solutions to climate change

CLIMATE CHANGE BASICS

Mitigation

Avoiding and reducing emissions of heat trapping greenhouse gases into the atmosphere and enhancing sinks to sequester and store them.

Addresses the root of the cause with proactive actions to reduce greenhouse gas emissions.

Adaptation

Adjustment to expected and actual effects of climate change to reduce vulnerability. It implies altering our behaviour, systems, and ways of life.

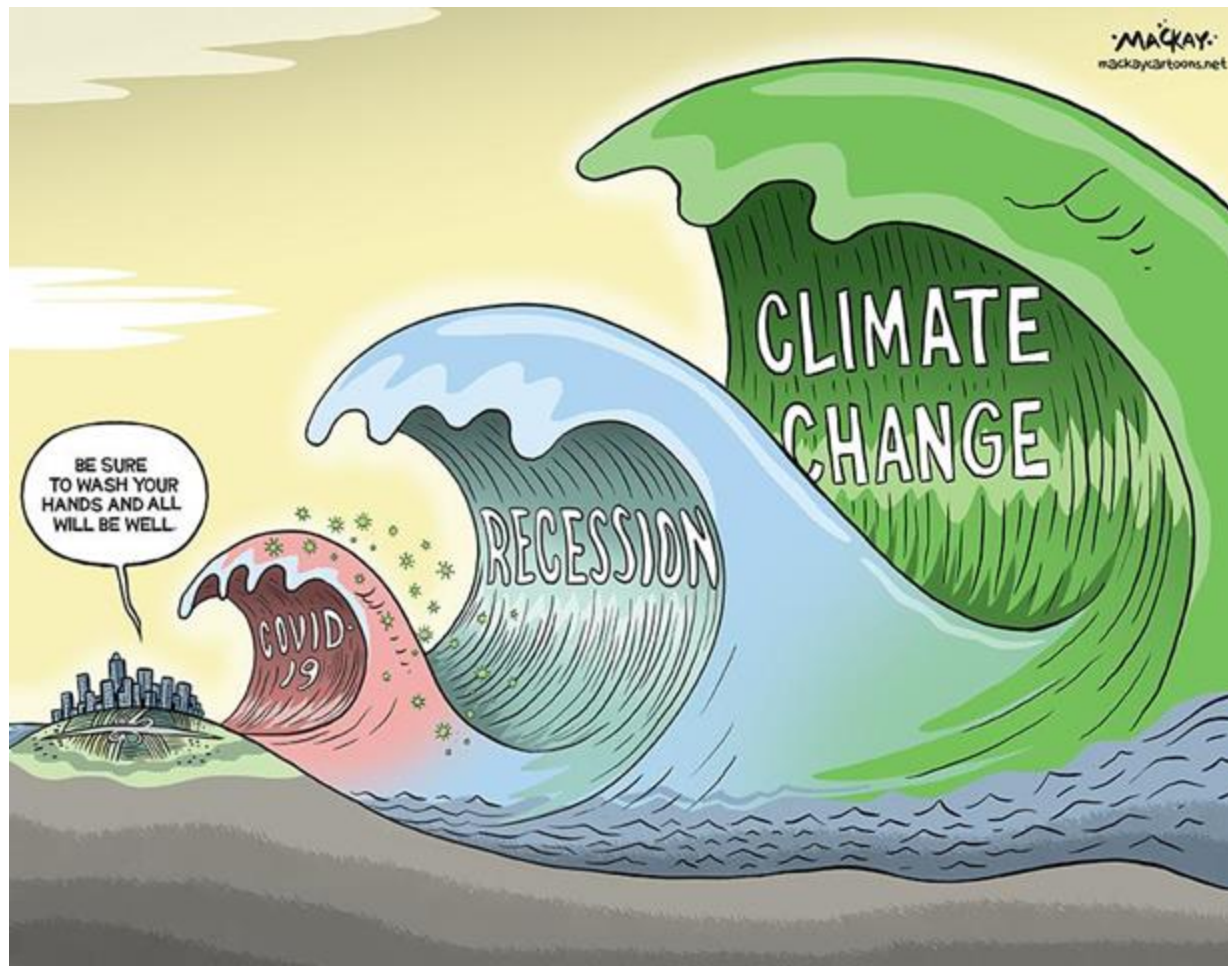
Addresses the effect. Embraces the concept of feedback looping to help fine-tune responses based on ongoing experience.

Resilience

Ability of a social, economic, and ecological system or community to withstand (absorb shocks and stresses), recover from, and adapt to the impacts of climate change while maintaining essential functions and structures.

Forward looking perspective to ensure preparedness for a wide array of potential future scenarios.





Why do we need to tackle climate change?

SOLUTIONS TO CLIMATE CHANGE

Climate change impacts our social systems – our livelihoods, cities, communities, countries, industries, cultures and traditions, etc.

But most importantly, our **social systems** are intricately linked to the health and stability of **natural ecosystems**.



Crop Failures
due to flooding



Changing cities due to sea
level rise



Food insecurity due to
biodiversity loss



HABITAT LOSS AND
DEFORESTATION

12

million hectares

of land become
degraded per year
Half of forest lost

Climate
Change

Human impact on the natural system

We are deteriorating the natural systems on which we depend, beyond a *point of no return*.

Humans are changing the atmosphere, oceans, terrestrial habitats and driving species to extinction.

SPECIES DECLINE

On our way to a loss of

1 million

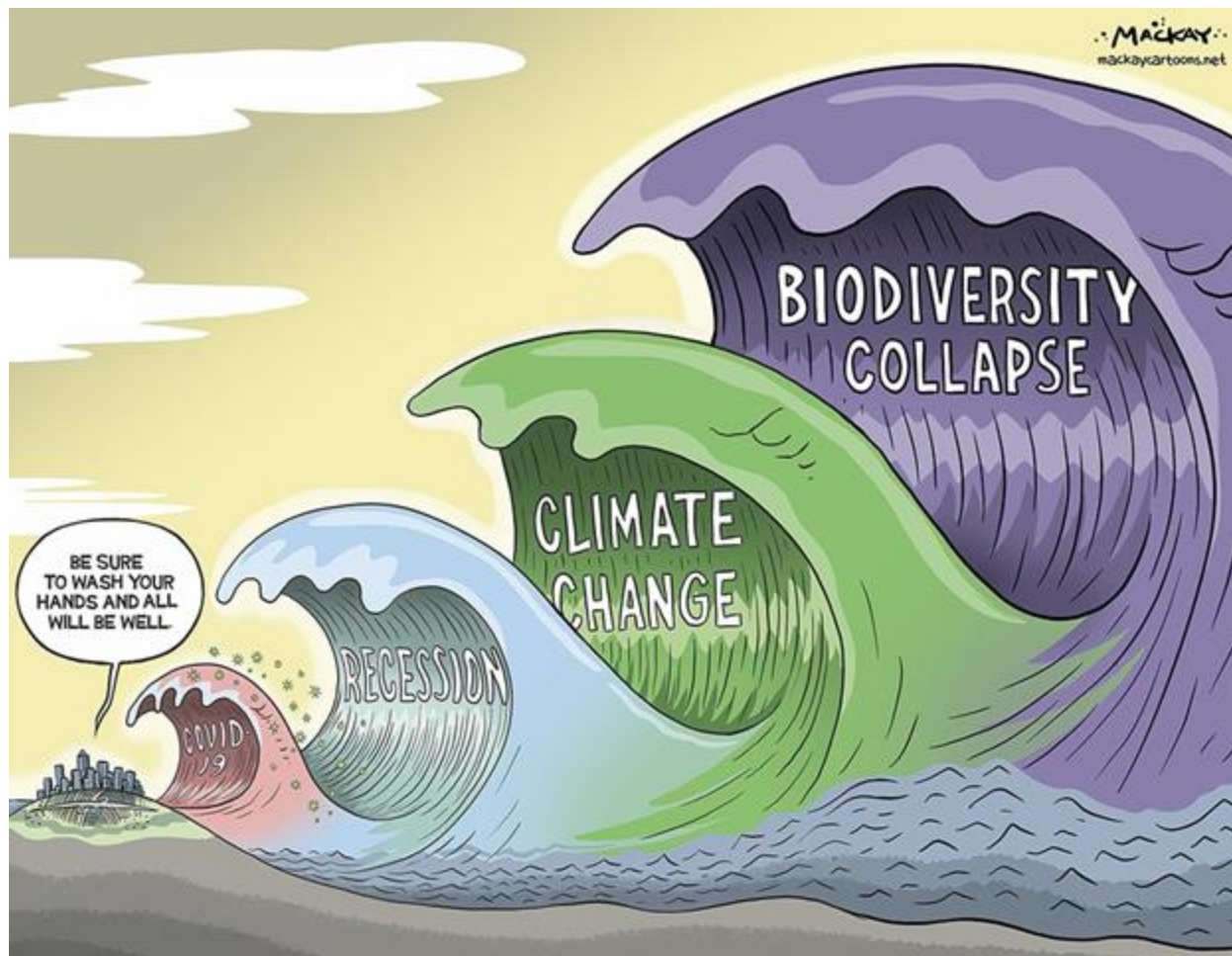
species

Invasive
Species and
Diseases

Resource
depletion

Pollution



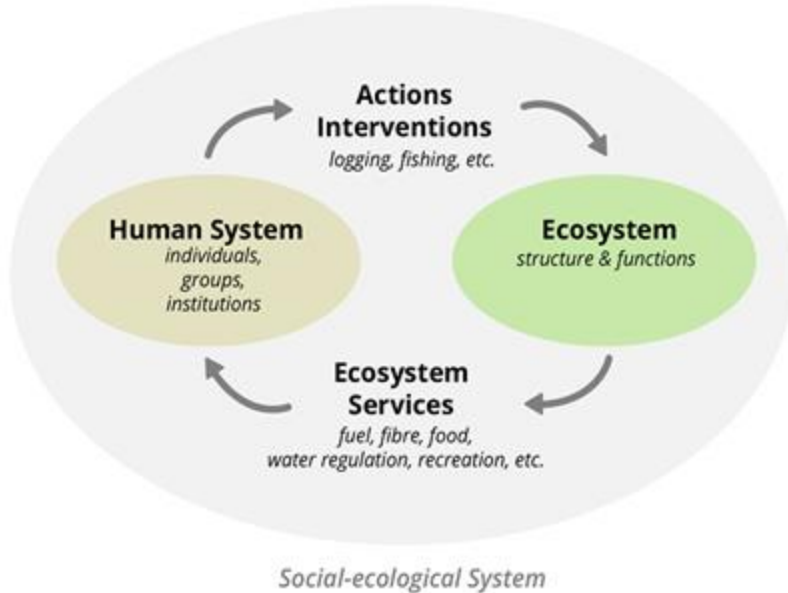


Interconnectedness of social and natural systems

Biodiversity is the foundation on which robust economies and human well-being depend.

It encompasses the variety of life on Earth, including the diversity of species, ecosystems, and genetic variations within species.

This rich diversity is crucial for the resilience and productivity of ecosystems, which in turn provide essential ecosystem services.



Adapted from Resilience Alliance (2007) "Assessing and Managing Resilience in Social-Ecological Systems: Supplementary Notes to the Practitioners Workbook, Vol. 2"



Ecosystem services provided by nature

SOLUTIONS TO CLIMATE CHANGE

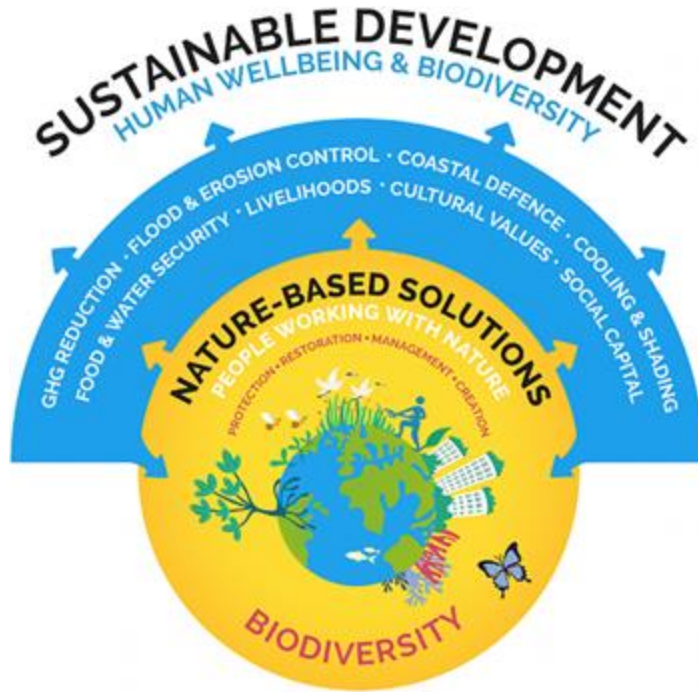


Source: [Green Earth, Ecosystem Services](#)



What are Nature-Based Solutions?





What are Nature-Based Solutions?

Nature-based Solutions (NbS) involve working with and enhancing nature, as part of nature, to address societal goals, providing local benefits for people and biodiversity.

- The concept is grounded in the knowledge that healthy biodiverse ecosystems support humans in multiple ways (and vice versa).
- Recognises that biodiversity loss and climate change share some of the same drivers and hence the same solutions.



Ecosystem services provided by nature

SOLUTIONS TO CLIMATE CHANGE

NATURE BASED SOLUTIONS



Reforestation



Mangroves
Reforestation



Sustainable
Agriculture



Seaweed
Farming

TECHNOLOGICAL SOLUTIONS



Solar Panels



Geothermal
Power Plant



Electric Vehicles



Wind Turbines



Definitions

SOLUTIONS TO CLIMATE CHANGE

EUROPEAN COMMISSION (2015)

NbS are solutions inspired and **supported by nature**, which are cost-effective, **simultaneously provide environmental, social and economic benefits and help build resilience**.

Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.

IUCN (2016)

NbS are **actions to protect, sustainably manage, and restore natural or modified ecosystems**, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.

UNITED NATIONS ENVIRONMENT PROGRAMME (2022)

Actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human wellbeing, ecosystem services, and resilience and biodiversity benefits.



Pathways to reduce vulnerability

SOLUTIONS TO CLIMATE CHANGE

Nature-based Solutions have 3 pathways for reducing climate vulnerability

1 REDUCING EXPOSURE

- Protection from erosion, from inland flooding and from coastal hazards and sea level rise.
- Moderating urban heat waves, heat island effect
- Managing storm-water and flooding
- Sustaining natural resources in variable climates

2 REDUCING SENSITIVITY

- Buffering communities from climate shocks by enhancing and diversifying ecosystem services

3 ENHANCING ADAPTIVE CAPACITY

- Governance reform, empowerment and improving access to resources

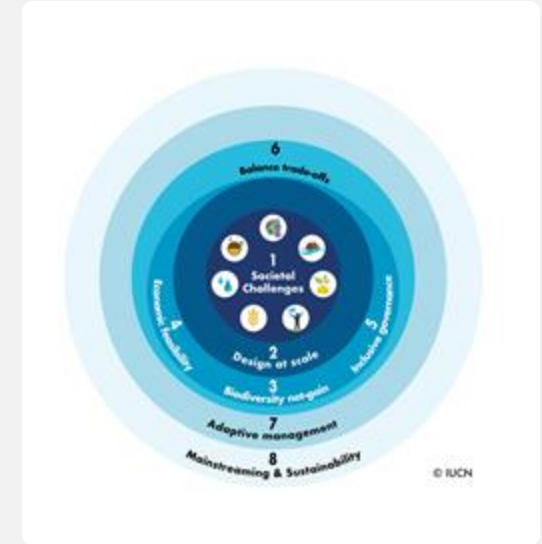


Implementing Nature-Based Solutions

IUCN created the **Global Standard for Nature-based Solutions** for verification, design and scaling up of NbS, consisting of:

- 8 Criteria
- 28 Indicators

Allows for **common understanding** of its interpretation and a **shared vision**.



Sources: Global Standard for NbS, IUCN (2020)



Nature-Based Solutions Guidelines



1

NbS are not a substitute for the rapid phase-out of fossil fuels and must not delay urgent action to decarbonize our economies



2

NbS involve the protection, restoration or management of a wide range of natural and semi-natural ecosystems; the sustainable management of aquatic systems and working lands; or creation of novel ecosystems in and around cities or across the wider landscape



3

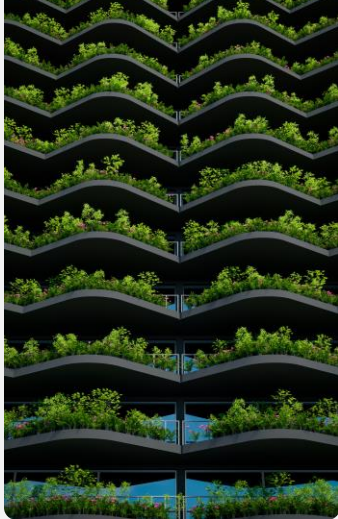
NbS are designed, implemented, managed and monitored by or in partnership with Indigenous peoples and local communities through a process that fully respects and champions local rights and knowledge, and generates local benefits



4

NbS support or enhance biodiversity, that is, the diversity of life from the level of the gene to the level of the ecosystem





Nature-Based Enterprises

Nature-based enterprises (NBEs) use nature as a core element of their product/service offering.

Nature may be used directly by growing, harnessing, harvesting or restoring natural resources in a sustainable way and/or indirectly by contributing to the planning, delivery or stewardship of sustainable nature-based solutions.



Categories

NATURE-BASED SOLUTIONS

There is an interactive map linking nature-based solutions to climate change adaptation outcomes based on a systematic review of the peer-reviewed literature - <https://www.naturebasedsolutionsevidence.info/>



**PROTECTING
ECOSYSTEMS**



**RESTORING
ECOSYSTEMS**



**IMPROVING
MANAGEMENT**

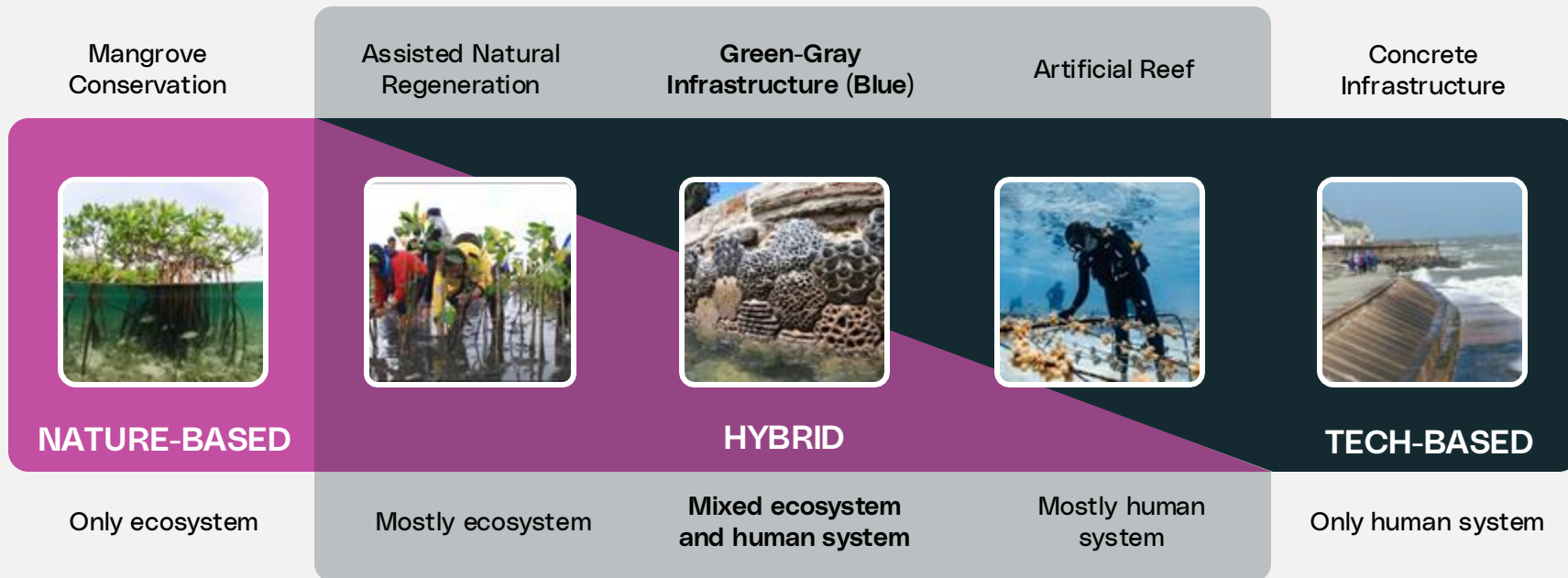


**CREATING
ECOSYSTEMS**



Green vs Gray Solutions

NATURE-BASED SOLUTIONS



LANDSLIDE RISK



Nature-Based Solution

Approaches that utilize natural processes and landscape features to reduce the risk and impact of landslides.

Examples: re-vegetation, soil bioengineering, restoration of natural drainage patterns.



Tech-Based Solution

Engineering structures that physically hold the soil and prevent it from sliding. They require significant civil engineering work and high investment costs.

Examples: retaining walls, anchors, and soil nails.

Example

Terra Erosion Control

NbS: Biotechnical slope stabilization using vegetation to provide bank protection and solutions to erosions and sediment control.

Customers: private corporations, government agencies, municipalities and community groups.



CARBON SEQUESTRATION



Nature-Based Solution

Practices and systems that enhance the ability of natural ecosystems to absorb and store carbon dioxide from the atmosphere.

Examples: reforestation, regenerative agricultural, wetlands and peatlands restoration, natural habitats conservation



Tech-Based Solution

Technological carbon sequestration like:

- Capture and permanent storage of CO₂ from processes where biomass is burned to generate energy
- Direct air capture (involves the capture of CO₂ directly from the atmosphere)

Examples: power plants using biomass, refineries, engineered molecules.

Example

The Future Forest Company

NbS: peatland restoration from design to completion to improve biodiversity and lock up carbon.

Customers: public and private landowners.



WATER RESOURCES MANAGEMENT



Nature-Based Solution

Solutions for the protection and restoration of ecosystems such as forests and wetlands which naturally regulate water flows and improve water quality.

Examples: rain gardens to absorb runoff water, constructed wetlands and riparian buffers.



Tech-Based Solution

Engineered infrastructures and technological systems designed to collect, store, treat, and distribute water for various uses.

Examples: dams and reservoirs, desalination and water treatment plants.

Example

Bio2Clean

NbS: plants and their associated microorganisms to remove pollutants from soil, water or sediment through degradation, extraction or transformation.

Customers: government and municipalities.



GREEN ROOFS



Nature-Based Solution

Solutions that utilize natural processes and vegetation to provide environmental benefits in urban areas.

Examples: Green Roofs - Rooftops covered with vegetation to absorb rainwater, reduce heat, and sequester carbon. Urban Green Spaces - Incorporating parks and green corridors in cities to enhance biodiversity, improve air quality, and provide cooling.



Tech-Based Solution

Conventional Rooftop Cooling. Engineered infrastructures and technological systems designed to address urban environmental challenges through mechanical and material-based approaches.

Examples: Air Conditioning: regulate indoor temperatures, increase energy consumption and GHG. Stormwater Management: designed to manage rainwater runoff and prevent flooding.

Example

RoofScapes

NbS: Roofscapes specializes in transforming unused urban rooftops into green spaces, utilizing vegetation to create green roofs.

Customers: urban developers, city planners, property owners, and municipalities.



NbS with and for the people

NATURE-BASED SOLUTIONS

How to deliver effective, resilient, legitimate and equitable NbS outcomes?

1

Rich Indigenous
Peoples and
Local
Communities
knowledge

2

Co-Creation
and Adaptive
Management

3

Equitable
Benefit
Distribution

4

Empowerment
and Positive
Outcomes

5

Cultural
Integration and
Long-term
Support

Sources: Getting the message right on nature-based solutions to climate change, Seddon et al; 2020.



Extra Resources

IPCC – Intergovernmental Panel on Climate Change

- **Focus:** Climate change
- **Established:** 1988
- **Role:** Assesses global scientific knowledge on climate change, its impacts, and solutions. Produces major reports to inform policy and international negotiations.

IPBES – Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

- **Focus:** Biodiversity and nature's contributions to people
- **Established:** 2012
- **Role:** Evaluates the state of biodiversity, ecosystem services, and their importance to human well-being. Provides science for conservation and sustainable development policies.

Books

- **Losing Earth** - Nathaniel Rich
- **Pricing the priceless** - Paula Diperna



Tips from Accelerators and VCS

ENTREPRENEURSHIP

1

Show a clear connection to biodiversity impact

2

Have a clear commercial vision in mind and investment readiness

3

Diversified revenue streams

4

Demonstrate a methodology for measuring your impact

5

Ensure that you are engaging the community





Questions for you

ENTREPRENEURSHIP

ABOUT YOUR PROJECT...

1. What problem are you trying to solve?
2. Will your project increase your revenue or reduce your costs?
3. How much investment is needed?
4. Is it part of an on-going (mature) business or is it a stand-alone (new) initiative?
5. Are other players also seeking to address the same problem? Will it outperform other solutions?
6. Is your solution replicating a proven model or introducing new innovative features?
7. Could the proposed solution be replicated by others and scaled?
8. Is it generally hard to obtain private financing for this type of project?

Sources: Invest in Nature Report, FINANCING CONSERVATION AND NATURE-BASED SOLUTIONS, Natural Capital Financing Facility (NCFF)





Questions for you

ENTREPRENEURSHIP

ABOUT YOUR IMPACT...

1. What social and environmental impact will the project have?
2. Are you trying to solve local, regional or global issues?
3. Do you have clear goals and identifiable outcomes? Are they reasonable and measurable?
4. Is the project fighting biodiversity loss or improving climate adaption using NbS?
5. Are there any potential negative side effects? If yes, how are you taking them into account?

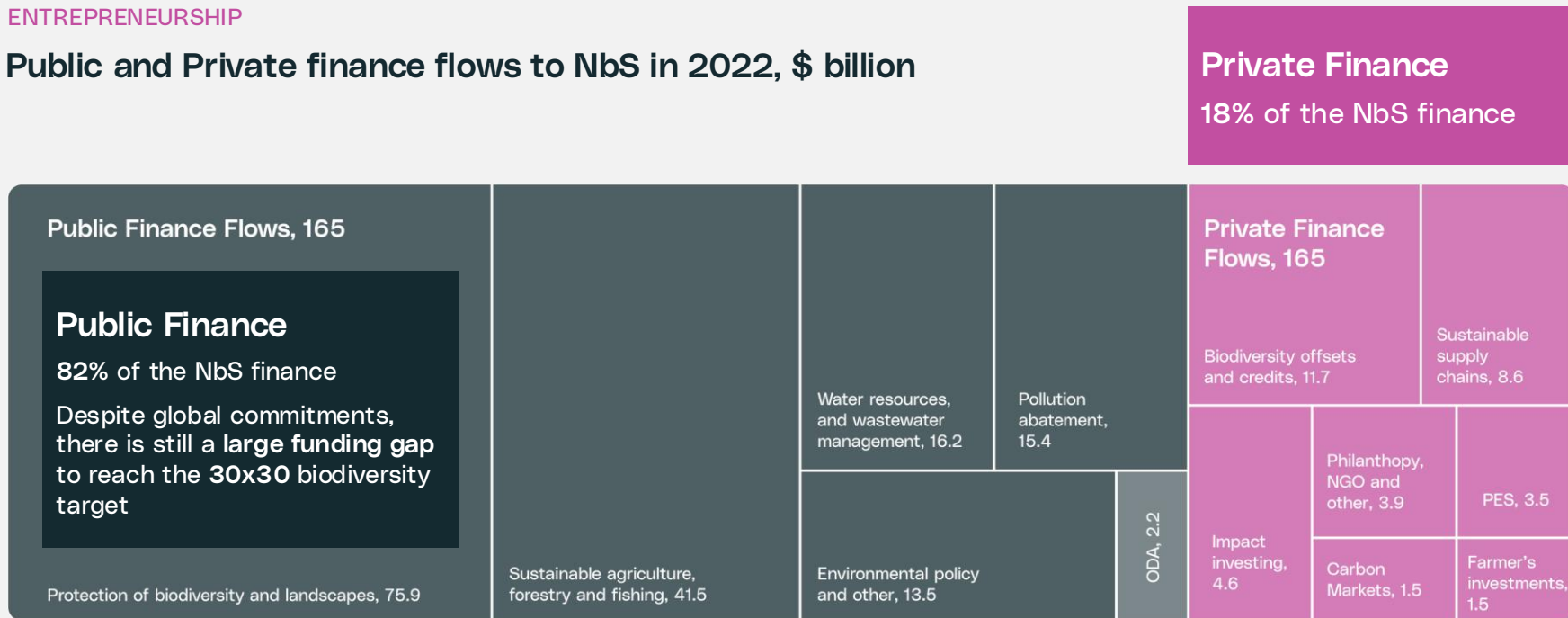
Sources: Invest in Nature Report, FINANCING CONSERVATION AND NATURE-BASED SOLUTIONS, Natural Capital Financing Facility (NCFF)



Funding Nature

ENTREPRENEURSHIP

Public and Private finance flows to NbS in 2022, \$ billion

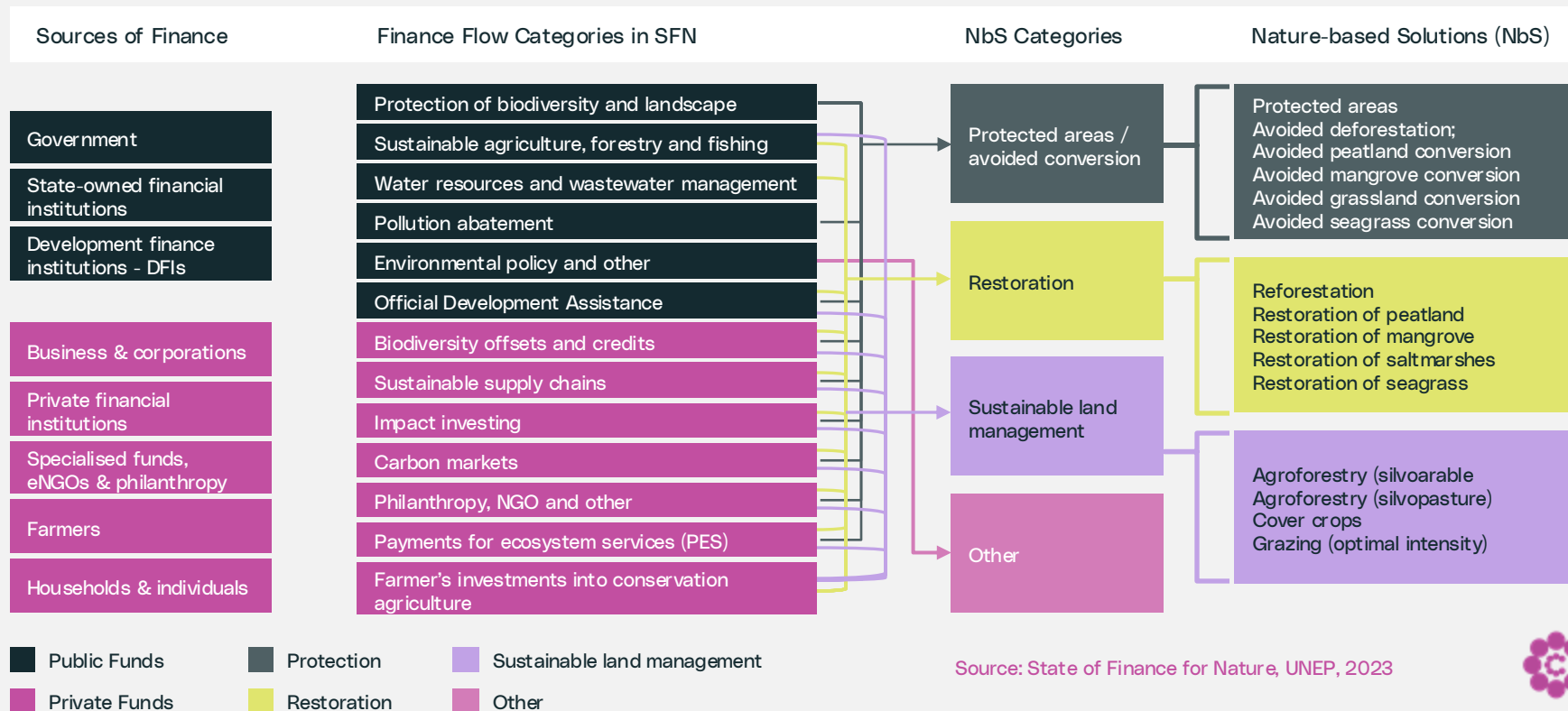


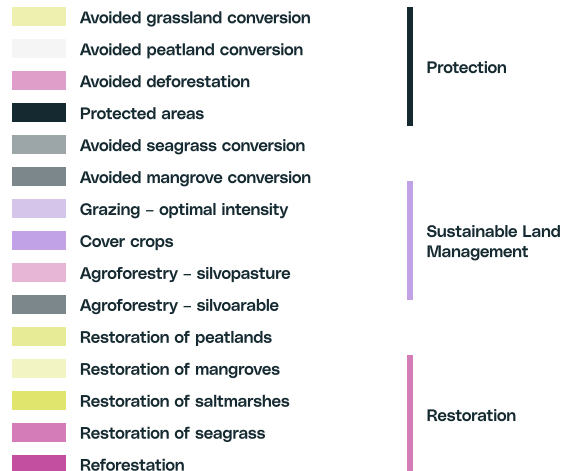
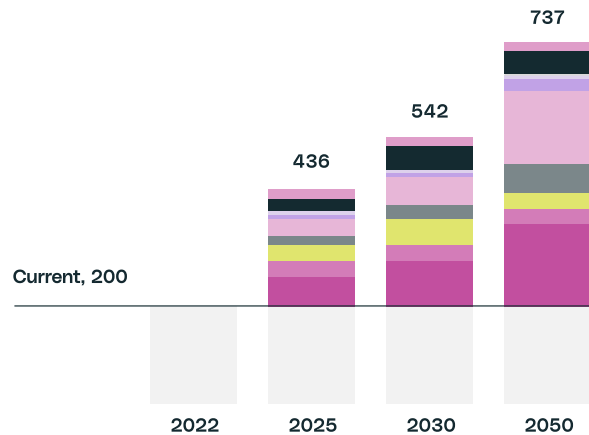
Source: State of Finance for Nature, UNEP, 2023



Mapping the Sources and Categories of Finance

ENTREPRENEURSHIP





Mapping the Sources and Categories of Finance

ENTREPRENEURSHIP

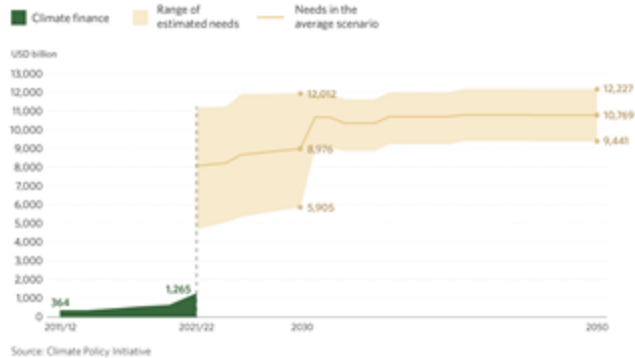
Annual financial flows to NbS need to more than double by 2025 and nearly triple by 2030 to reach climate, biodiversity and land degradation targets.



Trends And Market Opportunities

ENTREPRENEURSHIP

Figure ES3: Global tracked climate finance and average estimated annual needs through 2050



Carbon Offsetting And Climate Mitigation

Carbon sequestration and offsetting by reforestation, afforestation, soil storage, and blue carbon.

Business Models: Startups leveraging carbon markets, voluntary carbon credits, and partnerships with corporations.

Global Landscape of Climate Finance, 2023



Natural Infrastructure For Climate Resilience

Climate resilience through green infrastructure solutions such as urban green spaces, green roofs, and natural flood management.

Business Models: services in green infrastructure design, implementation, and maintenance, often through public-private partnerships.

Integrating Green and Grey, Creating Next Generation Infrastructure, World Bank Group and World Resources Institute



Trends And Market Opportunities

ENTREPRENEURSHIP

Biodiversity Conservation And Habitat Restoration

Projects focusing on biodiversity conservation, habitat restoration (e.g., wetlands, forests), and species recovery.

Business Models: Startups involved in ecosystem restoration services, biodiversity monitoring, and conservation finance, partnering with NGOs, governments, and impact investors.

State of Finance for Nature, UNEP, 2023

Sustainable Agriculture And Agroforestry

NbS promoting sustainable agriculture practices like agroforestry, regenerative farming, and sustainable land management.

Business Models: Companies providing agroecological services, agroforestry systems, and tools for soil health improvement, targeting both smallholders and commercial farms.

Global Standard for Nature-based Solutions, IUCN, 2020





Trends And Market Opportunities

ENTREPRENEURSHIP

Blue Economy and Marine Conservation

NbS addressing marine and coastal conservation, including coral reef restoration, mangrove protection, and sustainable fisheries.

Business Models: Startups involved in marine spatial planning, eco-tourism, fisheries management, and sustainable seafood supply chains, supported by coastal communities and marine conservation organizations.

Technology-driven Solutions

Integration of advanced technologies (e.g., GIS, remote sensing, IoT) to monitor, manage, and optimize NbS projects.

Business Models: Tech startups offering data analytics, predictive modeling for ecosystem services, monitoring platforms, and decision support tools for NbS implementation and impact assessment.



A vertical photograph showing the silhouettes of a group of people standing on a hill or cliff, looking out over a sunset or sunrise. The sky is filled with soft, orange and pink clouds. The people are in the foreground, their forms dark against the bright sky.

Trends And Market Opportunities

ENTREPRENEURSHIP

Community-led And Indigenous Knowledge-based Approaches

NbS projects co-designed and implemented with Indigenous Peoples and local communities, integrating traditional ecological knowledge.

Business Models: Companies focusing on community-based natural resource management, Indigenous-led conservation initiatives, and partnerships that empower local communities through equitable benefit-sharing models.



Case studies of enterprises offering Nature-based Solutions (NbS)





START-UP CASE STUDIES

SELF-DEGRADING PLASTICS

Coral Vita grows climate change resilient coral up to 50x faster via a process known as micro-fragmentation, while deploying a commercial model to restore dying reefs at scale.

They partner with leading marine institutes to incorporate cutting edge methods so that their restoration projects are as effective as possible. By offering reef restoration as a service to clients that benefit from healthy reefs, they are developing an industry that can support large-scale restoration.

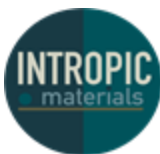
Impact

Cultivated 17,000 corals across 20 species. They have 2x local fish populations and improved the health of reefs. They have created jobs and opportunities for local communities.

NbS approaches used

Innovative restoration model to bring reefs back to life by growing climate change resilient corals and planting them into degraded reef sites.





START-UP CASE STUDIES

CORAL RESTORATION

Intropic Materials is solving plastic waste from the inside out by embedding enzymes directly inside plastics to aid and speed up natural degradation.

These plastics rapidly and completely break-down at the end of use into biodegradable or chemically recyclable small molecules without producing microplastics, in accessible life-friendly conditions like warm water baths or compost.

Impact

Their biodegradable additives help reduce the environmental footprint of plastics by ensuring that products can fully break down after use.

NbS approaches used

Mimicking and accelerating natural biodegradation processes through their innovative additives. These additives are inspired by natural enzymes that break down organic matter.





strong
by
form

START-UP CASE STUDIES

CONSTRUCTION MATERIALS

Strong by Form is specializing in the development of sustainable construction materials using advanced technologies. Their core mission is to create bio-inspired, lightweight, and high-performance structural materials that can replace traditional building materials.

Their solutions leverage biomimicry and advanced manufacturing techniques to produce environmentally friendly alternatives that are strong, durable, and sustainable.

Impact

Their innovative materials are designed to minimize waste and energy consumption, ultimately reducing the environmental impact of construction activities.

NbS approaches used

Mimicking the structural properties of natural organisms to develop materials that are lightweight and strong. This biomimicry ensures that the production process is sustainable and eco-friendly.





START-UP CASE STUDIES

BIO-BASED BUILDING MATERIALS

Biohm is a pioneering bio-based building materials and manufacturing company. It focuses on creating a sustainable built environment by developing bio-based materials and circular construction systems.

Their product line includes materials like **mycelium** insulation, which is derived from fungi, and **bio-based composites** made from agricultural waste. Biohm aims to **replace traditional, carbon-intensive materials with alternatives that are regenerative, low-energy, and non-toxic.**

Impact

Reduce reliance on finite resources and lowers the environmental footprint of building materials. Their innovations help divert waste from landfills, reduce greenhouse gas emissions, and promote biodiversity.

NbS approaches used

Harnessing the natural properties of mycelium and plant-based materials.





START-UP CASE STUDIES

ECOSYSEM RESTORATION

GROW Oyster Reefs revitalizes oyster populations using proprietary concrete mixes and designs that mimic oyster shells, attracting healthy oysters and creating protective reefs.

Their products support long-lasting habitat restoration by working with nature to restore coastal ecosystems.

Impact

Contributing to the restoration of oyster populations, which are essential for healthy marine ecosystems.

Oyster reefs serve as natural breakwaters, reducing coastal erosion and protecting shorelines from storm surges.

NbS approaches used

Leveraging the natural processes and benefits provided by oyster reefs. The company constructs oyster reefs using sustainable materials like their own concrete and granite.





START-UP CASE STUDIES

GREENING BUILDINGS

GrünStattGrau (GreenInsteadofGrey) simplifies the process by bringing people together to promote innovations and implementation. The organization offers comprehensive advice and, in collaboration with network partners from business, science, and administration, supports the implementation of interior, roof, and facade greening projects.

Acting as an interface between public sector, business, and research network partners, the organization facilitates best practice sharing.

Impact

Heavy precipitation with flooding,
torrential rain, heat islands,
biodiversity loss in cities.

NbS approaches used

NbS for green building.





START-UP CASE STUDIES

ECOSYSTEM RESTORATION

The Fieldwork Company specializes in ecological research and technological solutions for ecosystem restoration. They are significantly impacting environmental restoration and sustainability through its innovative nature-based solutions.

They focus on restoring aquatic ecosystems, particularly seagrass beds and shellfish reefs, using biodegradable 3D-printed structures and advanced drone surveillance for ecological monitoring.

Impact

Development of unique aquaculture practices contributing to ecosystem recovery. Biodegradable prototypes that do not harm the environment during or after their use.

NbS approaches used

NbS for green building.





START-UP CASE STUDIES URBAN GREENING

Helix Pflanzen is a pioneer in the development of nature-based solutions. It creates products such as green walls which provide solutions for landscaping, back yards and building facades, reducing the impact of noise and absorbing dust and pollutants.

Compelling examples of nature-based solutions with inherent multi-purpose benefits. Can be installed in the densely built environment and can thus contribute effectively to urban resilience.

Impact

Green walls and green roofs can mitigate heat stress in cities; they contribute positively to urban biodiversity and they can reduce storm water run-off

NbS approaches used

Direct use of nature - NbS for green infrastructure





Thank you!