

UNDERSTANDING BIODIVERSITY

TATA SUSTAINABILITY MONTH, JUNE 2020



WHAT IS BIODIVERSITY?

BIODIVERSITY - UNDERSTANDING THE TERM

The word 'Biodiversity' has evolved from a commingling of the descendants of the Greek noun *bios*, which means "mode of life," and the Latin verb *divertere*, which means "to turn aside" or "to go different ways."

BIODIVERSITY THE WEB OF LIFE

Symbiotic connections exist between humans, animals, plants, insects, and even microbes. In fact, deep connections exist between all life forms on Earth. Together, they make up 'The Web of Life'.

Sustaining this web of life requires the performance of a million functions. To do them efficiently, there exist a million diverse lifeforms, each performing a different but vital function. Thus, it is vital to preserve Biodiversity if we want to preserve life on earth.

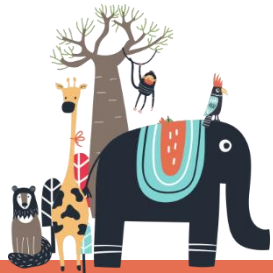


Biodiversity is a short way of saying biological diversity. It describes the variety and variability of Life on Earth.

WHAT IS BIODIVERSITY?

TYPES OF DIVERSITY

Biodiversity is often understood in terms of the wide variety and interdependence of plants, animals and microorganisms that inhabit the planet. Although biodiversity is very complex, this 'web of life' includes:



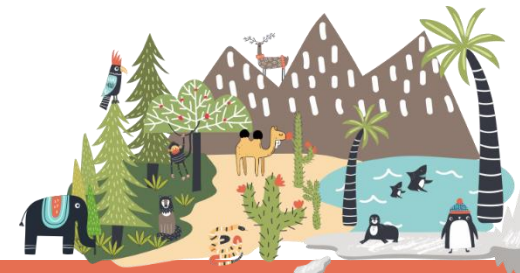
SPECIES DIVERSITY

A species is a group of organisms that can reproduce. Species diversity is the most obvious type of biodiversity. Our planet, Earth, supports an estimated 8 million species and many more which are yet to be identified! Within a species, there is genetic diversity.



GENETIC DIVERSITY

Biodiversity includes genetic differences within each species, for example, between varieties of crops and breeds of livestock. Chromosomes, genes and DNA – the building blocks of life – determine the uniqueness of each individual and each species.



ECOSYSTEM DIVERSITY

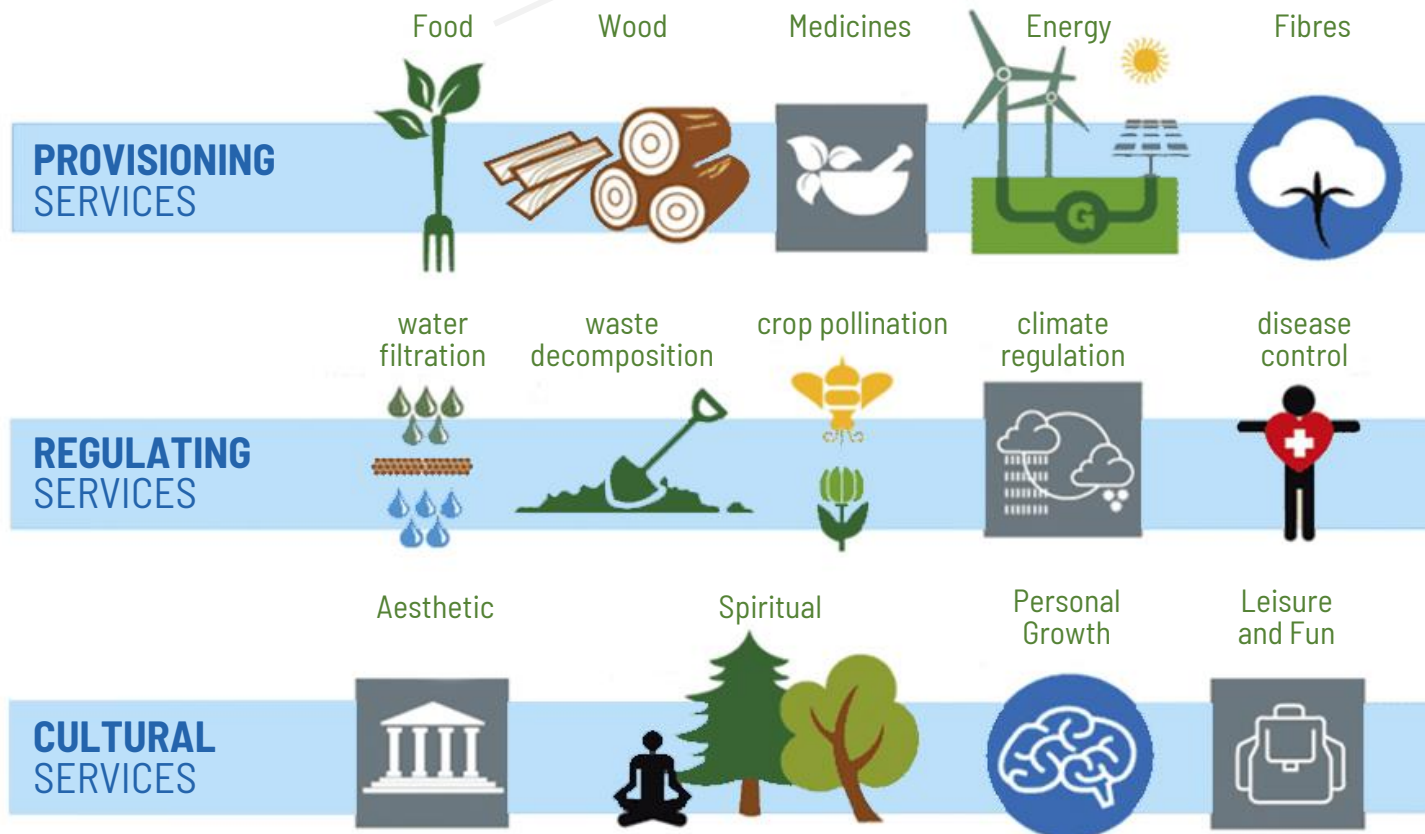
Another aspect of biodiversity is the variety of ecosystems such as those that occur in deserts, forests, wetlands, mountains, lakes, rivers and agricultural landscapes. In each ecosystem, living creatures, including humans, form a community, interacting with one another and with the air, water and soil around them. A single tree in the Amazon rain forest, can provide a home for up to 2,000 species of birds, insects, fungi, epiphytes and microorganisms.

WHY IS IT IMPORTANT?

ECOSYSTEM SERVICES

Biodiversity also provides a variety of ecosystem services, which are critical to human survival.

Between 50-90 percent of the human diet, by both volume and calories, depending on the country, comes directly from flowering plants.



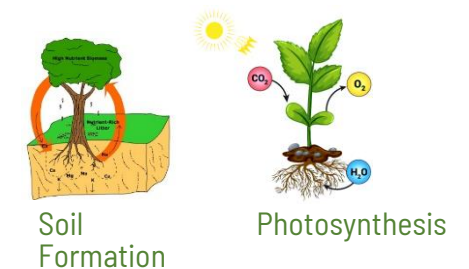
Services that describe the material or energy outputs from ecosystems. They include food, water and other resources.

Services that act as regulators. E.g. regulating the quality of air and soil or by providing flood and disease control.

Non-material benefits that people obtain from contact with ecosystems. They include aesthetic, spiritual and psychological benefits.

SUPPORTING SERVICES

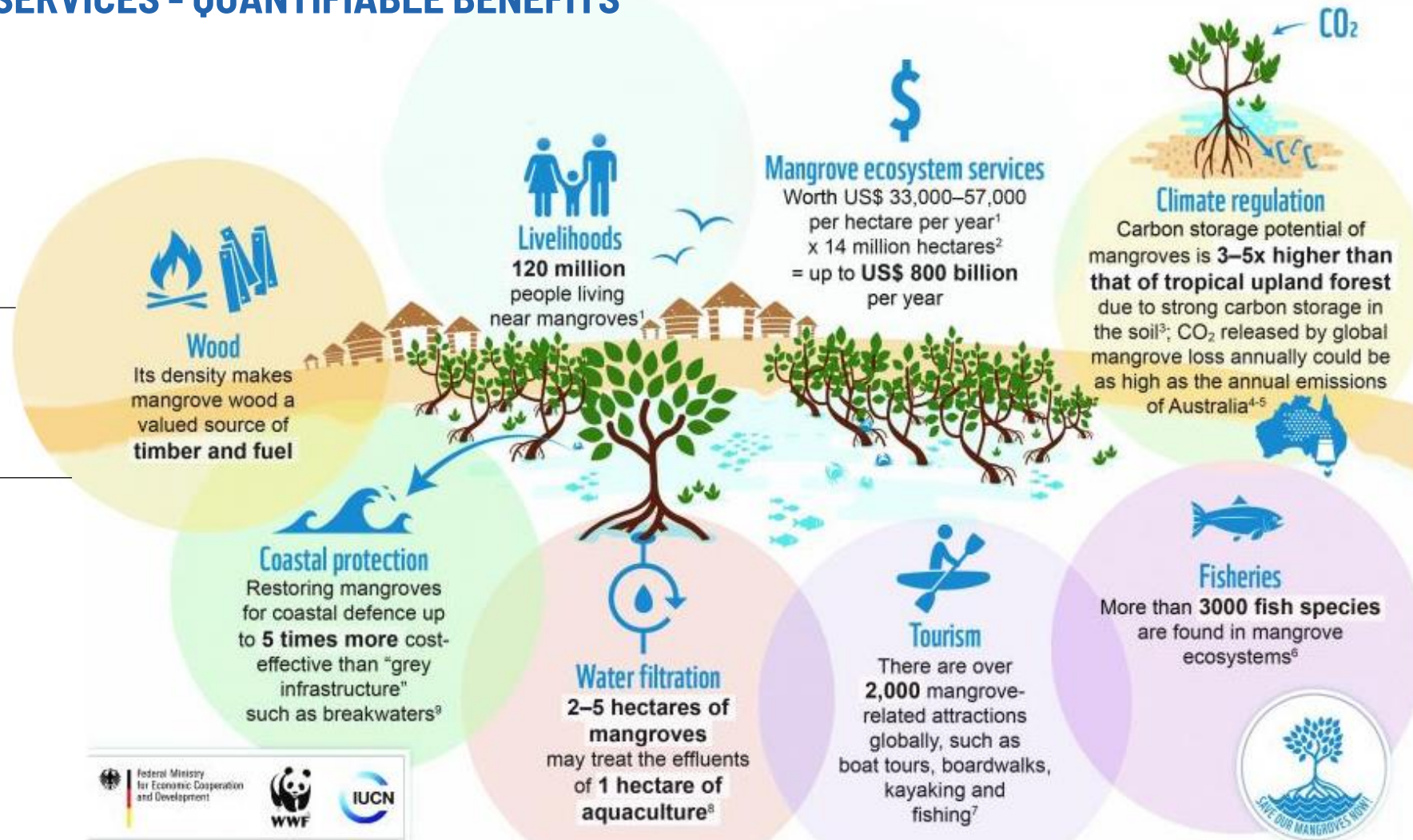
Services necessary for production of all other ecosystem services – from the very basic provision of living spaces for plants or animals to maintaining a diversity of different breeds of plants and animals. Plus, services such as



WHY IS IT IMPORTANT?

ECOSYSTEM SERVICES - QUANTIFIABLE BENEFITS

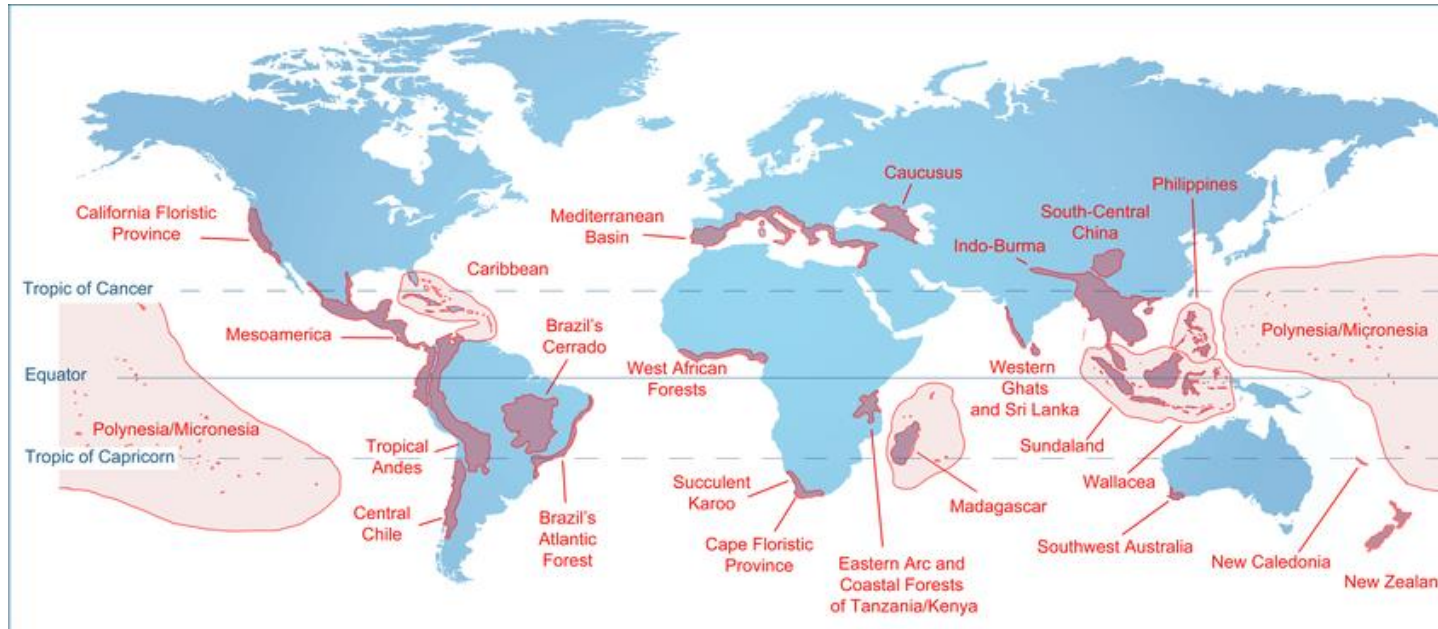
The benefits people derive from mangroves



- Sources:
- ① UNEP, 2014
 - ② Giri et al., 2011
 - ③ In the Indo-Pacific region: Donato et al., 2011
 - ④ Up to 450 million t CO₂: Pendleton et al., 2012
 - ⑤ In 2015: EDGARv4.3.2., 2018
 - ⑥ Sheaves, 2017
 - ⑦ Spalding et al., 2016
 - ⑧ Primavera et al., 2007
 - ⑨ In Vietnam: Narayan et al., 2016

THE CHALLENGE

Around the world, 36 areas qualify as hotspots, of which four are in India



These biodiversity hotspots represent just 2.4% of Earth's land surface, but they support more than half of the world's plant species as endemics and nearly 43% of bird, mammal, reptile and amphibian species as endemics.



Key Findings from IPBES Global Assessment on Biodiversity and Ecosystem Services Report 2019

- 75% terrestrial environment is "severely altered" to date by human actions.
- 1 million animal and plant species are now threatened with extinction, more than ever before in human history.
- The average abundance of native species in most major land-based habitats has fallen by at least 20%, mostly since 1900.

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*IPBES - Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services <https://ipbes.net/about>

THE CHALLENGE

KEY CAUSES OF ACCELERATED LOSS OF BIODIVERSITY

PRIMARY DRIVERS

HABITAT LOSS

Thinning, fragmenting, or outright destruction of an ecosystem's plant, soil, hydrologic, and nutrient resources

INVASIVE SPECIES

Any non-native species that significantly modifies or disrupts the ecosystems it colonizes

OVEREXPLOITATION

Process of harvesting too many aquatic or terrestrial animals, which depletes the stocks of some species while driving others to extinction

POLLUTION

Addition of any substance or any form of energy to the environment at a rate faster than it can be rendered harmless

CLIMATE CHANGE ASSOCIATED WITH GLOBAL WARMING

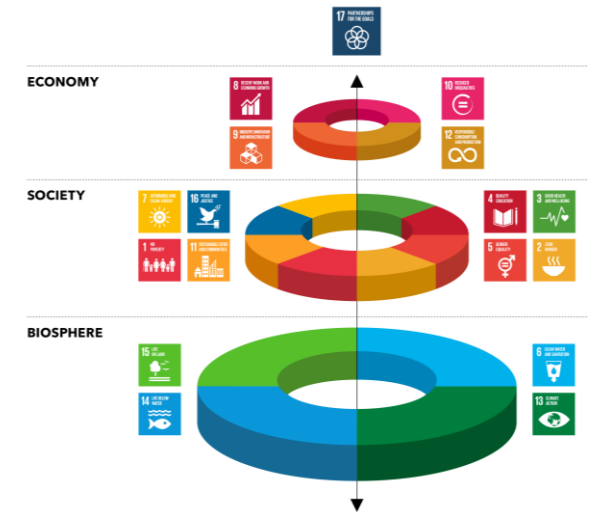
Modification of Earth's climate associated with rising levels of greenhouse gases in the atmosphere over the past one to two centuries

INFLUENCERS

- Human population growth
- Increasing consumption
- Reduced resource efficiency

BIODIVERSITY LOSS

Reduction in the number of genes, individual organisms, species and ecosystems, in a given area



Current negative trends in biodiversity and ecosystems will undermine progress towards 80% of the assessed targets of the SDGs, related to poverty, hunger, health, water, cities, climate, oceans and land.

Loss of biodiversity is therefore not only an environmental issue, but also a developmental, economic, security, social and moral issue as well.

A RAY OF HOPE



- Active Global Cooperation on Biodiversity - Convention on Biological Diversity (CBD), CITES, etc.
- During the lifetime of CITES, 84 species - including 34 mammal populations, 20 plants and 19 reptiles - were moved from Appendix I to Appendix II. This shows that the strict regulation of trade, as required for Appendix I-species, has help endangered species to recover, and transfer to Appendix II
- Formulation of the Aichi Biodiversity Targets, which provides an innovative and visionary approach that integrates biodiversity with social and economic drivers at the heart of the problem, and thus the key to the solution.
- Several success stories in environment, species protection, reviving water bodies, etc.
- Technology is aiding several initiatives in India to crowdsource information for conservation of animals.
- Increasing joint effort initiatives from villages to high tech labs, tribal communities to scientists and businesses in conserving biodiversity.
- Commitments towards reducing emissions, reducing single-use plastic, enhancing renewable energy and even cross-country cooperation is heartening.

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The age of extinction

Ten wildlife success stories to sing about in 2019

Aichi Target Achievement Dashboard

Progress towards the Aichi Biodiversity Targets (GBO-4 Assessment)

The dashboard of Aichi Targets achievement shows that even though we are missing most of the targets, significant progress has been made in most

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BUSINESS AND BIODIVERSITY

IMPACT OF BUSINESS ON BIODIVERSITY



DIRECT IMPACTS

- Stem primarily from land use and waste generation
- Include habitat loss and degradation, erosion, species loss, air and water pollution, soil and water contamination
- Introduction of non-native species can disrupt surrounding ecosystems
- Can affect local communities by reducing access to natural resources or disrupting ecosystem services, such as erosion control



INDIRECT IMPACTS

- Caused by third party suppliers in the sourcing and production of goods and services used by a company
- Can result from the use or disposal of a company's products by consumers or other business users
- Changes in behaviour by others, including local people, employees and in-migration, that are prompted by a company's operations may lead to induced negative impacts to biodiversity



CUMULATIVE IMPACTS

- Arise when the operations of several companies in close proximity begin to collectively affect biodiversity
- Although individual business decisions or activities may have insignificant direct impacts on biodiversity, when combined, their impact may be significant

BUSINESS AND BIODIVERSITY

DEPENDENCE OF BUSINESS ON BIODIVERSITY

- While biodiversity is fundamental to preserve 'life as we know it', it is also critical for businesses to function
- Increasing costs in commodity supply chains, as a result of decreasing biodiversity, can have consequences on a company's bottom line. This threatens future cash flows and the stability of business by amplifying unmanaged risks in supply chains



The value of global ecosystem services is estimated at \$16-\$64 trillion. The loss of biodiversity can have a direct impact upon business operations, where raw materials are no longer available at the quality and in the quantity needed



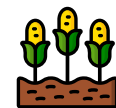
Pharmaceutical Sector

25-50% depend on genetic resources



Biotechnology Sector

Many products (enzymes, microorganisms) are derived from genetic resources



Agricultural Sector

More than 75 per cent of global food crop types, including fruits and vegetables and some of the most important cash crops, such as coffee, cocoa and almonds, rely on animal pollination



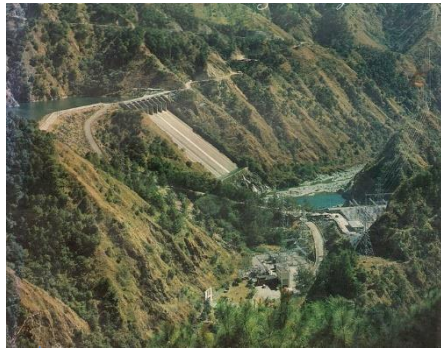
Personal Care, Botanical, Food & Beverage Sector

Some products ('natural' products) from genetic resources

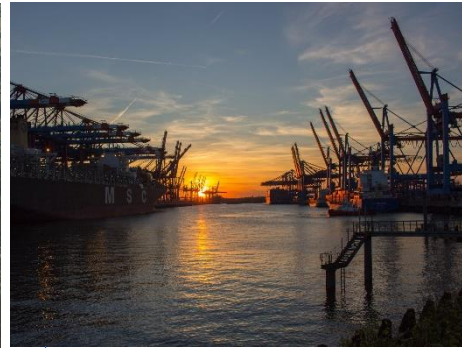
BUSINESS AND BIODIVERSITY

DEPENDENCE OF BUSINESS ON BIODIVERSITY

A FEW ILLUSTRATION THAT DEMONSTRATE HOW BIODIVERSITY IMPACTS BUSINESS



Deforestation in the Agno river basin in the Philippines has led to such extensive river and reservoir siltation that the **100-megawatt Binga hydroelectric facility** can only operate intermittently



The share price of **Associated British Ports** dropped by 12% following the refused planning permission for their port at Dibden Bay, UK, due to its proximity to protected areas. The company was forced to write-off £44.9 million in sunk costs



The Transneft project in Russia incurred severe delays due to its proximity to the pristine Baikal Lake and potential impacts on the critically endangered Amur Leopard, and costed Transneft a reported USD 1 billion to shift the pipeline's route



In 2003, indigenous Ecuadorians filed a suit against **ChevronTexaco** in an Ecuadorian court, charging the company with dumping toxic oil wastewater into 350 open pits as well as into Amazon basin wetlands and rivers that the tribes rely upon for drinking, bathing, and fishing. The company is currently involved in a USD 27 billion court battle relating to alleged toxic contamination of local rainforests and rivers



The forestry company **MacMillan Bloedel** suffered reputational damage when Greenpeace and others protested against the firm for clear-cutting forests. In response, Scott Paper and Kimberly-Clark in the United Kingdom stopped sourcing from MacMillan Bloedel, causing the company to lose five percent of its revenue almost overnight

BUSINESS AND BIODIVERSITY



RISKS

- **Regulatory** Might your business be affected by regulatory responses to biodiversity loss? e.g. extraction quotas, ecosystem pricing regimes, permitting requirements, carbon taxes
- **Physical** Will ecosystem degradation expose your operations to increased disruption? e.g. flooding, desertification
- **Reputational** What negative impacts on biodiversity are 'hidden in the closet' in your operations or supply chains? e.g. unsustainable sourcing, impacts on endangered species, pollutants
- **Supply Chain** Could biodiversity risks threaten the operations of your key suppliers?



OPPORTUNITIES

- **Brand Differentiation** Processors and retailers can take advantage of rapid growth in demand for certified sustainable agricultural products to enhance brand value and differentiate their products with consumers
- **New Revenue Streams** Sales of products/services which help producers to conserve biodiversity whilst increasing production
- **Business Diversification** Servicing the rising demand by businesses for biodiversity conservation within their area of impact

BIODIVERSITY ESSENTIALS

JARGON BUSTER

Natural Capital

is the world's stock of natural resources, which includes geology, soils, air, water, and all living organisms

Biodiversity

is the variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level

Ecosystem

is a community of living organisms in conjunction with the non-living components of their environment, interacting as a system

Biodiversity Hotspot

Large regions containing exceptional concentrations of plant endemism and experiencing high rates of habitat loss.

Species

a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding. The species is the principal natural taxonomic unit, ranking below a genus and denoted by a Latin binomial, e.g. Homo sapiens

Keystone Species

is a species which has a disproportionately large effect on its natural environment relative to its abundance, a concept introduced in 1969 by the zoologist Robert T. Paine

Ecosystem Services

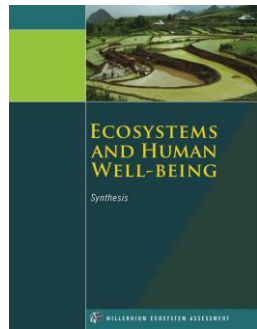
are the many and varied benefits to humans gifted by the natural environment and from healthy ecosystems. Such ecosystems include, for example, agroecosystems, forest ecosystems, grassland ecosystems and aquatic ecosystems

Invasive Species

are animals or plants from another region of the world that don't belong in their new environment. They can be introduced to an area by ship ballast water, accidental release, and most often, by people. Invasive species can lead to the extinction of native plants and animals, destroy biodiversity, and permanently alter habitats.

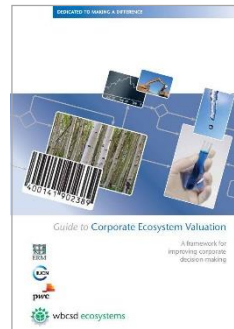
BIODIVERSITY ESSENTIALS

IMPACT ASSESMENT TOOLS AND FRAMEWORKS



Millennium Ecosystem Assessment (MEA)

Its findings provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably

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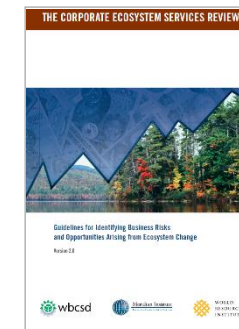
WBCSD's Guide to Corporate Ecosystem Valuation (CEV)

The framework helps improve corporate decision making by taking into account ecosystem services. It also explains what a company needs to do to integrate natural capital valuation into its business strategy

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IBAT - IUCN

It provides a basic risk screening on biodiversity by drawing together information from a number of IUCN's Knowledge Products. IBAT helps businesses incorporate biodiversity considerations into key project planning and management decisions

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The Corporate Ecosystem Services Review

It consists of a structured methodology that helps managers proactively develop strategies to manage business risks and opportunities arising from their company's dependence and impact on ecosystems

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BIODIVERSITY ESSENTIALS

CONVENTIONS AND TREATIES ON BIODIVERSITY CONSERVATION



INTERNATIONAL CONVENTIONS AND TREATIES

- The United Nations Conference on the Human Environment, Stockholm, 1972
- CITES: Convention on International Trade in Endangered Species
- The Earth Summit at Rio de Janeiro, 1992
- The Convention on Biological Diversity (CBD) or Biodiversity Convention, 1992
- Cartagena Protocol or the Biosafety Protocol, 2000
- 2010 - The Global Biodiversity Challenge



NATIONAL LEGISLATION

- Forest Act, 1927
- Forest (Conservation) Act, 1947
- The Indian Wildlife (Protection) Act, 1972
- Environment Protection Act, 1986
- The Wildlife (Protection) Amendment Act, 1991
- Biological Diversity Act, 2002

BIODIVERSITY ESSENTIALS

BIODIVERSITY CERTIFICATIONS

Biodiversity certifications are powerful instruments that enable all actors in an ecosystem to make important improvements to the way they manage and monitor their impact on biodiversity. Certifications ensure that organisations adopt best practices, control risks and performing above specified standards. Certifications help customers buy responsibly and there by ensure that their supply chain is aligned to their biodiversity goals.

ECOSYSTEMS SERVICES

PROVISION



REGULATION



CULTURAL



BIODIVERSITY THE WEB OF LIFE



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