

CLIMATE CHANGE IN TWELVE PICTURES

A short guide
through the
consequences
of climate change
and possible solutions
for climate change
adaptation





Humans and climate – the impacts



Human-induced climate change has been ongoing since the Industrial Revolution. Humans play an active role in this process and affect the climate at all levels of their activity - from the household, to traffic, to the working environment.

The consequence of humankind's negative impact on the Earth's climate is embodied in global warming – today the average global air temperature is 1.10°C higher than at the beginning of the 20th century. There are numerous effects of global warming and climate change on our world, as outlined in the following pictures.

We should always keep in mind that such drastic climate change in a short time period endangers the survival of the living world, including humans and our quality of life.

One of the most effective potential ways to reduce the negative effects of climate change is through the application of Nature-based Solutions.

What are Nature-based Solutions?

The International Union for Conservation of Nature (IUCN) has defined Nature-based Solutions (NbS) as “actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits”. NbS lead to the creation of healthy and functional ecosystems in order to preserve nature and thereby ensure the welfare of society.

Benefits of Nature-based Solutions

- Embrace nature conservation norms (and principles);
- Maintain biological and cultural diversity and the ability of ecosystems to evolve over time;
- Can be implemented alone or in an integrated manner with other solutions to societal challenges (e.g., technological and engineering solutions);
- Applicable at a landscape scale;
- Determined by site-specific natural and cultural contexts that include traditional, local and scientific knowledge;
- Recognise and address the trade-offs between the production of a few immediate economic benefits for development and future options to enable the full range of ecosystem services;
- Produce societal benefits in a fair and equitable way, promoting transparency and broad participation;
- An integral part of the overall design of policies and measures or actions to address a specific challenge.

Increased temperature



Expect the average annual temperature to increase every year: by 2040 the average temperature will be 1.5°C higher.

This may seem insignificant, but this increase will change the living conditions for everyone.

Nature-based Solutions: form green and blue spaces in urban and rural settings. Building new green areas with different plant species and enriching existing ones will provide better living conditions for people and enable the development of urban biodiversity. Building green rooves and planting trees in cities can mitigate the impacts of heat waves by lowering the average daily temperature.

NbS contribute to community resilience, disaster risk reduction, social and economic development, creation of green jobs, regulation of air temperature, and enhance human health.

Keywords: temperature increase, rural environment, urban environment, green areas

Greenhouse effect



The greenhouse effect is a consequence of an energy (heat) imbalance between the amount of heat the Earth receives from the Sun and the amount it releases back into space.

Global warming occurs as a result of excessive emissions of greenhouse gases (GHG), such as carbon dioxide, methane, chlorofluorocarbons, nitrogen oxides and others that absorb solar radiation and retain heat.

In short, the greenhouse effect is the uncontrolled warming of the Earth's atmosphere.

The burning of fossil fuels (coal, oil and natural gas) is the largest source of greenhouse gas emissions.

Nature-based Solutions: involve restoring natural ecosystems (forests, grasslands, wetlands and aquatic habitats), increasing the green infrastructure in cities, and planting new areas enriched with plant species that provide more optimal conditions for photosynthesis. Research has shown that the application of NbS can reduce greenhouse gas emissions by 30%, which is necessary to stabilise global warming at less than 2°C by 2030.

Keywords:

carbon dioxide, methane, chlorofluorocarbon, nitrogen oxides, greenhouse

Altered flora

Climate change, such as droughts and increased average temperatures or extreme temperature changes (sudden temperature drops and rises over a short period of time) can cause some plant species to become extinct in certain areas.

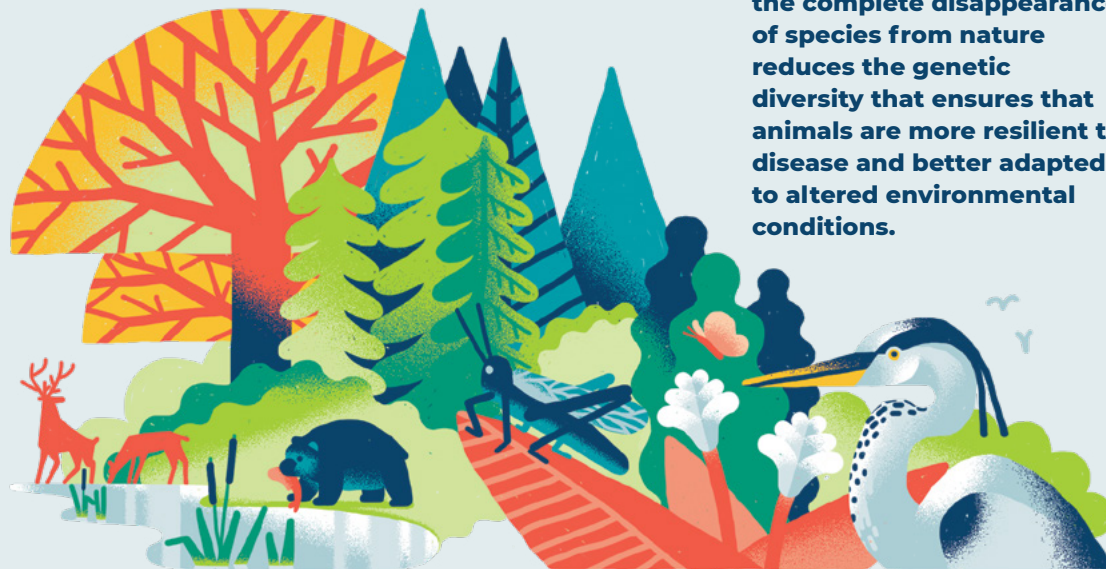
Climate change, in combination with other factors, will lead to the appearance and proliferation of plant species not characteristic for certain areas (e.g., invasive species such as ragweed).

The disappearance of plant species from nature endangers the supply of raw materials for medicines, nutrition and other human needs, which directly threatens human survival.

The International Union for Conservation of Nature (IUCN) created the Red List of Threatened Species™, a list including all plant species threatened with extinction globally.

Nature-based Solutions: allow for the recovery of all types of natural ecosystems, such as forests and shrubs, grasslands, wetlands, and other areas. These measures lead to an increase in biological diversity and an improvement in ecosystem integrity.

Keywords: plant species, red list, habitat restoration



Altered fauna

Changes in the climate, such as droughts and increased average temperatures or extreme temperature changes (sudden temperature drops and rises over a short period of time), lead to the reduction of populations and/or the disappearance of certain animal species.

The disappearance of some animals in nature interrupts the food chain, causing disturbances in the ecosystem. Additionally, diminishing populations or the complete disappearance of species from nature reduces the genetic diversity that ensures that animals are more resilient to disease and better adapted to altered environmental conditions.

Domesticated animal production, and with that safe nutrition for humans, requires healthy natural ecosystems and food chains, including the wild fauna within.

The International Union for Conservation of Nature (IUCN) created the Red List of Threatened Species™, which includes an overview of animal species threatened with extinction.

Nature-based Solutions: restoration of grasslands, recovery of wetlands, natural rehabilitation of forests, direct measures for the recovery of endangered species such as the creation of artificial nests and shelters, etc. These measures raise both biological diversity and ecosystem integrity.

Keywords: animal species, red list, food chain

Altered terrain



Areas exposed to prolonged or intense alterations in climate conditions and their consequences (extremely low or high temperatures, etc.) can become partially or completely degraded.

Changes to the terrain are often the result of erosion processes, on a smaller or larger scale.

Soil degradation leads to changes in the terrain, often making these areas untraversable due to the disappearance of gentle slopes, creation of gullies, disappearance of floor material that allowed for safe movement, accumulation of fine or coarse alluvial material, and the replacement of fertile soil with infertile material. Altered relief also changes the living conditions for plant and animal species.

Nature-based Solutions: protection, restoration and sustainable use of forest areas, recovery of forest and grassland vegetation, rehabilitation through afforestation, biotechnical measures to reduce the impacts of erosion. These measures ensure erosion control, water supply and disaster risk reduction.

Keywords: erosion processes, soil degradation, altered climate conditions

Drought



Drought is one of the most significant consequences of climate change, causing the disappearance of numerous plant and animal species, and the migration of people.

Drinking water springs and independently created wells are drying up more frequently in summer.

Disturbances in water quality are common, as both low or extremely high levels of underground or surface water can contaminate drinking water, making it unsuitable for drinking.

Disturbances in the water regime of the soil cause the soil to dry out, one of the first steps in desertification. As a result, the soil becomes unsuitable for crop cultivation and the survival of vegetation in general.

Nature-based Solutions: protection, restoration and management of wetland habitats, provision of space for the natural flow of rivers, regulation of riverbeds. NbS ensure the accumulation and supply of water in sufficient quantities, flood protection, food production, and more.

Keywords: drought, underground water, surface water, drinking water

Frequent disasters



More frequent disasters caused by changed climate conditions can be expected.

Some of the disasters caused by climate change are:

Floods – a large amount of precipitation in a short time interval is expected to be an increasingly common occurrence in this region. Such climate conditions lead to destructive torrential floods that can damage housing, economic and road infrastructure, and agricultural land in the immediate vicinity of watercourses. Floods on larger rivers are the result of the synergistic action of natural processes (such as snow melt during spring), flash floods on smaller watercourses and large amounts of precipitation. Such floods damage residential buildings, agriculture, industry and infrastructure located near larger rivers. Floods in urban areas (urban floods on inland waters) are caused by climate change, the absence of natural floodplains, and a lack of appropriate infrastructure for the reception and removal of water (stormwater drainage, rainwater reception tanks, drainage or stormwater channels, etc.). Urban floods cause damage to furnishings and the interiors of households, but also disrupt

public services (education, health, hygiene, etc.).

Erosion and landslides.

The increasing frequency of droughts, floods and forest fires lead to soil degradation, resulting in erosion and landslides. In turn, this leads to the disappearance of fertile soils, and the destruction of existing infrastructure in areas affected by these phenomena. These disasters are frequent in hilly and mountainous regions and cause significant damages to agricultural crops and infrastructure, while restoration work is usually too demanding, expensive and often impossible. Unfortunately, landslides can damage residential buildings, leading people to abandon their place of residence and forcing migration of the population.

Drought. Drought occurs due to extreme temperatures without rainy days. This type of disaster has the greatest negative consequences for humans, animals and plants. Though invisible as it occurs, the result of drought manifests in harsh landscapes, with no vegetation or very little vegetation able to function under such conditions. It will become increasingly common for floods and droughts to occur in the same year, further contributing to harsh living conditions.

Nature-based Solutions:

measures for the recovery of habitats in affected areas, bioengineering measures to mitigate the effects of floods (creating living dams, fascines, installing jute nets, etc.). The benefits of these measures include strengthening community resilience, reducing disaster risk, controlling soil erosion and so on.

Cooperation is needed among all interested parties at the local, national and regional levels to:

- Raise awareness and knowledge levels among decision makers, natural resource managers and local communities about Nature-based Solutions for disaster risk reduction;
- Integrate Nature-based Solutions into equitable, climate-responsible planning and policies for adaptation and disaster mitigation;
- Apply Nature-based Solutions to reduce the risk of disasters, and the potential increase of risk over time.

Keywords: flood, erosion, landslides, drought, damage, losses, altered climate conditions



Population migration



Climate change is increasingly creating intolerable living and working conditions, resulting in population migration.

The most common reason for migration is the lack of basic living conditions, such as drinking water and fertile soil, but also negative phenomena such as landslides.

Drought, erosion, floods, large fires and landslides are the most common disasters, which in combination with the excessive and unsustainable exploitation of resources, destroy the natural resources necessary for life.

It is estimated that by 2050, 700 million to 1 billion people will be forced to change their place of residence due to the loss of arable land and disasters ensuing from altered climate conditions.

Nature-based Solutions: measures for the recovery of natural habitats, sustainable management of agro-forestry systems, incentives to the local population for raising wild breeds of animals and cultivating plant varieties that are adapted to the new environmental conditions. The benefits are sufficient sources of food, water regulation and economic and social development.

Keywords: population, desertification, disasters, water, fertile soil

Melting glaciers



The melting of the glaciers on the Earth's polar caps and high mountains is causing a global rise in sea levels.

With the changes in sea level, the levels of surface and underground waters also change, flooding coastal areas.

If all the ice on Greenland were to melt completely, the sea level would rise by 7.6 meters.

According to some estimates, an increase in sea level between 10 and 100 centimetres by 2100 would completely submerge certain islands, such as Maldives.

Nature-based Solutions: interventions that ensure the recovery of forests, grasslands, wetlands and aquatic ecosystems, and measures aimed at mitigating disasters such as flash floods, fires, landslides, etc., would reduce the effects of climate change and the greenhouse effect, thereby contributing to stabilisation of the glaciers on Earth.

Keywords: sea level, glaciers melting, flooding

Urbanisation



Due to the altered climate conditions, primarily the increase in temperature, frequency and intensity of precipitation and dry periods, and with the increasing pressures of human migration, the living environment will also change.

The change in living conditions will increasingly move towards urbanisation.

Be ready to adapt and learn to live in an environment that functions in the altered climate conditions.

Nature-based Solutions: establishing green and blue spaces in urban zones, building green roofs and planting trees in cities can mitigate the impact of heat waves by lowering the average daily temperature.

NbS additionally contribute to the creation of green jobs and the regulation of the annual temperature.

Keywords: urbanisation, change, living conditions

It has already begun...



Climate factors are already significantly altered or are in the process of being altered, especially temperature, precipitation and air humidity.

Without specific measures implemented at all levels (in regulations, planning and implementation of activities) in accordance with the needs of nature, human success in adapting to altered climate conditions is uncertain.

In order for all sectors of society (industry, agriculture, water management, forestry and others) to adapt to climate change and develop towards reducing and adapting to its effects, this topic must be dealt with in regulations and sectoral policies.

Activities that are appropriate and aligned with nature must be planned and implemented. **The application of Nature-based Solutions ensures the recovery of natural ecosystems and**

their functions, providing multiple benefits for humans.

The topic of climate change should be integrated into the education system at all levels - from preschool to higher education - to form generations that understand climate change and act accordingly.

It is necessary to create a special, active safety culture for each individual and for society as a whole.


Keywords: climate change, Nature-based Solutions, regulations, education



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