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ISSUES BRIEF
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DRYLANDS AND LAND DEGRADATION

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- **Drylands are areas which face great water scarcity.** They cover over 40% of the earth's land surface, and are home to more than two billion people.
- They **are highly adapted to climatic variability and water stress, but also extremely vulnerable to damaging human activities** such as deforestation, overgrazing and unsustainable agricultural practices, which cause land degradation**.**
- **Land degradation** in drylands is known as desertification, and **is the loss of the biological or economic productivity of land**.
- Desertification **reduces agricultural output, contributes to droughts and increases human vulnerability to climate change**.
- **The loss of biodiversity in drylands,** including bacteria, fungi and insects living in the soil, is **one of the major causes and outcomes of land degradation**.
- **Restoring rangelands and sustainable land management practices** can preserve drylands biodiversity, restore ecosystem functions, and halt land degradation.

What is the issue?

Drylands are places of water scarcity, where rainfall may be limited or may only be abundant for a short period. They experience high mean temperatures, leading to high rates of water loss to evaporation and transpiration. Drylands are also characterised by extremely high levels of climatic uncertainty, and many areas can experience varying amounts of annual precipitation for several years.

Drylands are found on all continents, and include grasslands, savannahs, shrublands and woodlands. They are most common in Africa and Asia – for example, in the Sahel region in Africa and almost all of the Middle East. Drylands cover over 40% of the earth's land surface, provide 44% of the world's cultivated systems and 50% of the world's livestock, and are home to more than two billion people.

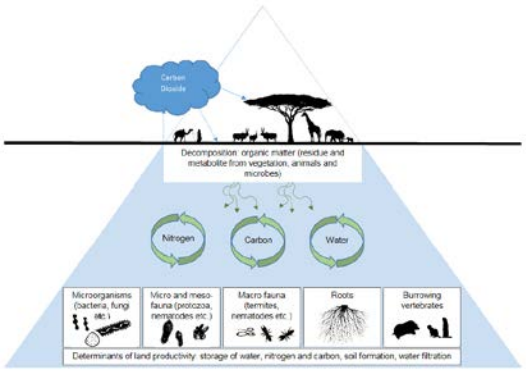
Drylands are extremely vulnerable to climatic variations, and damaging human activities such as deforestation, overgrazing and unsustainable agricultural practices. The consequences of these include soil erosion, the loss of soil nutrients, changes to the amount of salt in the soil, and disruptions to the carbon, nitrogen and water cycles – collectively known as land degradation.

Land degradation leads to the reduction or loss of the biological or economic productivity and complexity of land. In drylands, land degradation is known as desertification. It is estimated that 25-35% of drylands are already degraded, with over 250 million people directly affected and about one billion people in over one hundred countries at risk.

Why is this important?

Biodiversity

Drylands support an impressive array of biodiversity. This includes wild endemic species – such as the Saiga Antelope in the Asian steppe and American bison in the North American grasslands that do not occur anywhere else on earth – and cultivated plants and livestock varieties known as agrobiodiversity. Biodiversity in drylands also includes organisms which live in the soil, such as bacteria, fungi and insects – known as soil biodiversity – which are uniquely adapted to the conditions. Soil biodiversity comprises the largest variety of species in drylands – determining carbon, nitrogen and water cycles and thereby, the productivity and resilience of land. The loss of biodiversity in drylands is one of the major causes and outcomes of land degradation.



Soil biodiversity and ecosystem functions © IUCN

Food and water provision

Low precipitation and prolonged dry seasons in drylands can lead to water scarcity, and limit agricultural productivity and output. Drylands biodiversity maintains soil fertility and moisture to ensure agricultural growth, and reduces the risk of

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drought and other environmental hazards. For example, vegetation is decomposed in the stomachs of large herbivores in the drylands, after which the dung is transformed into nutrients by bacteria in the soil, which are absorbed by plants. Bacteria and other microbes also break down plants and animals into decomposing residues – soil organic matter, which helps the soil easily absorb rainwater and retain moisture. Each gram of organic matter can increase soil moisture by 10-20 grams, and each millimetre of additional infiltration of water into the soil represents one million additional litres of water per square kilometre.

Poor crop and soil management, and habitat destruction undermine the ability of drylands biodiversity to perform nutrient recycling, and water storage and filtration services. On severely degraded land – devoid of biodiversity – as little as 5% of total rainfall may be used productively. An estimated 20 million hectares of fertile land is degraded every year, and in the next 25 years global food production could fall by up to 12% as a result of land degradation – threatening the food and water security of the rising human population.

Climate change mitigation and adaptation
The world's soils contain 1,500 billion tons of carbon in the form of organic matter – two to three times more carbon than is present in the atmosphere. The carbon stored in soil is released into the atmosphere when land is degraded, and about 60% of the earth's organic carbon has been lost through land degradation. This represents a significant contribution to man-made greenhouse gas emissions. Increasing the quantity of carbon contained in soil, for example through agriculture and pasture management practices which increase soil organic matter, can reduce the annual increase in carbon dioxide in the atmosphere. It is estimated that improved livestock rangeland management could potentially sequester a further 1,300-2,000 million metric tons of carbon dioxide by 2030.

Climate change will also impact drylands, with models predicting even more climatic variability and extreme temperatures. Biodiversity in drylands has adapted over millennia to the seasonality, scarcity and variability of rainfall, and can be useful in helping people adapt to climate change. For example, the unique species in drylands provide a genetic reservoir for new varieties of cultivated plants and livestock breeds, which are resilient to the climatic variations.

What can be done?

Conserving biodiversity in drylands, including soil biodiversity, ensures that vegetation for agriculture and livestock farming is maintained all year round, especially in between rainfall seasons. IUCN works with national governments, businesses and local communities to preserve and protect ecosystem functions in drylands by restoring rangelands for livestock and sustainable land management practices.

Rangelands restoration
Livestock farmers (pastoralists) depend on drylands resources such as grasslands and seasonal ponds to nourish their livestock. Sustainable pasture management through managed herd mobility can prevent degradation and sustain livelihoods. For example, the practice of Hima in Jordan takes into account the seasons and life cycle of grasses to prevent overgrazing by livestock herds, which also transport fertile seeds around the landscape. Governments can institute appropriate policies and grant rights to local communities to sustain these traditional practices. For example, grazing lands can be recognised as protected areas, to prevent their conversion to other land uses.

Boran pastoralist with his cattle in northern Kenya © Rafal Obrzud

Sustainable land management practices
Sustainable land management practices often involve protecting biodiversity to boost soil organic matter and soil moisture. Traditional crop farming practices used by communities in drylands build up soil moisture and restore degraded land. For example, the zaï pits used by communities in the western Sahelian drylands (Burkina Faso, Niger and Mali) involves planting seeds in pits filled with organic manure to concentrate water and nutrients at the plant's base. Practices like agroforestry (planting trees together with agricultural crops) and low tillage agriculture (involving little or no ploughing of land) are based on traditional practices that have been revived and adapted to protect soil moisture and fertility of crop lands. Governments can encourage these traditional practices, and discourage less sustainable forms of land management such as prohibiting irrigation projects which intensely exploit water from small areas of land.

Where can I get more information?

IUCN's work on drylands
iucn.org/drylands

Davies, J. et al. (2012). *Conserving Dryland Biodiversity*.

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