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ISSUES BRIEF
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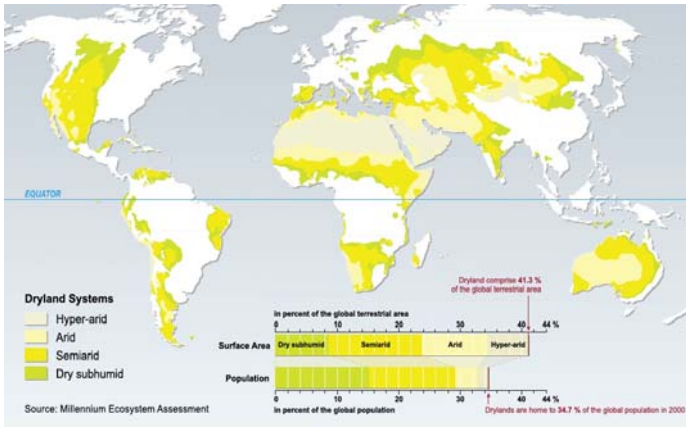
DRYLANDS AND CLIMATE CHANGE

- **Drylands are home to species and people that have developed unique strategies to cope with the climatic variability** unique to this environment.
- **Drylands are particularly affected by climate change** through changing rainfall patterns and land degradation, which reduces the ability of species and people to cope with dryland conditions.
- Climate change will likely **aggravate poverty, food and water insecurity in drylands**.
- Alongside ambitious emission cuts, countries can **restore dryland ecosystems and sustainably manage land** to address climate change in drylands.

What is the issue?

Drylands are ecosystems, such as rangelands, grasslands and woodlands, which occupy over 40% of the terrestrial surface, and are characterised by high temporal and spatial rainfall variability. Drylands are dominated by grasslands, which cover more than one fifth of the planet's terrestrial surface.



Millennium Ecosystem Assessment (2005)

People and species living in drylands have adapted over millennia to cope with extreme climatic variability. Plants and animals such as the African elephant and the Bactrian camel in Central Asia have developed unique physiological and behavioural adaptations. Human populations have similarly adapted management and behavioural strategies that enable them to use highly variable resources.

However, climate change is presenting an unprecedented threat to drylands with far reaching environmental, social and economic consequences. Climate scientists predict that global drylands will expand by up to 10% under a high greenhouse gas emission scenario by the end of the21st century, with as much as 80% of this expansion occurring in developing countries.

The dramatic shifts in rainfall patterns caused by climate change are expected to affect both the quantity and distribution of water. Loss of vegetation could lead to the hardening of the soil surface, increased water runoff and consequently reduced ground water recharge. The frequency and intensity of droughts are also expected to increase with climate change. This is of particular concern in drylands, where species and communities already have to cope with dramatic climatic variations.

Climate change is likely to accelerate land degradation, referred to in drylands as desertification. Land degradation is defined as a loss of the ecological and economic productivity of land.

About 20-35% of drylands already suffer some form of land degradation, and this is expected to expand significantly under different emission scenarios. Soil erosion is one of the more significant causes of land degradation in drylands, resulting in the loss of soil organic carbon present in roots and woody components of the soil, and the subsequent loss of land productivity.

Converting dryland areas to other uses, especially to cropland, can also cause land degradation. This can result in the loss of up to 60% of soil organic carbon below ground, and up to 95% of above-ground carbon. These losses contribute directly to greenhouse gas concentrations in the atmosphere, and reduce the capacity of drylands to sequester carbon.

Due to the biophysical, socioeconomic and cultural uniqueness of species and people living in drylands, they remain poorly understood and continue to be dominated by inappropriate investments and land management practices that contribute to further degradation. This increases the vulnerability of

drylands to environmental shocks including climate change.

Why is this important?

Drylands are home to more than two billion people, and are the source of a large proportion of the food and fibre used around the world. Grasslands alone produce 27% and 23% of the world's milk and meat respectively, and **support more than one billion livelihoods**.

The complex changes in land productivity and **disruption of dryland ecosystems due to climate change will affect more than 44% of the world's food system**, contributing to food insecurity and persistent poverty. Unreliable water resources will also have a negative impact on land productivity and consequently on livelihoods.

Dryland soils store at least one third of the world's soil organic carbon, which is important in enhancing soil structure and function, and determining soil productivity. Grasslands hold more than 10% of the terrestrial carbon and can store up to 70 tonnes/ha of soil carbon.

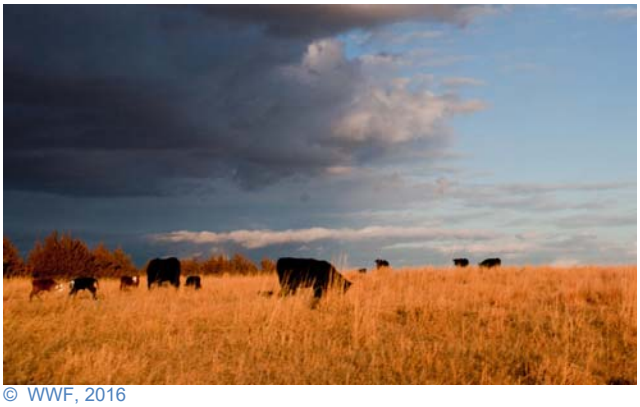
Grasslands, especially those dominated by perennials, can withstand conditions of high temperature and high carbon dioxide (CO_2) concentrations more than most other plants. These qualities mean that grasslands provide opportunities for adaptation and can continue to produce forage for grazing livestock as atmospheric CO_2 concentrations and temperatures increase due to climate change.

What can be done?

Conserving and restoring drylands presents an enormous opportunity to address climate change in this unique environment.

Investing in dryland restoration is a cost-effective approach to climate change mitigation. Maintaining soil health, and the organic carbon in the soil, can be achieved by increasing vegetative plant cover. Restoring dryland ecosystems improves their health and functioning, including enhancing nutrient cycling and the ability of soils to absorb and store carbon and water.

The key to climate change adaptation in drylands lies in recognising and respecting the role of traditional governance structures and practices in building resilience to extreme events. These adaptation strategies include planting drought-tolerant crops, water-efficient cropping practices, herd diversification practices that keep mixed herds of cattle, camel, sheep or goat, and maintaining livestock mobility across communal lands and borders. Policy processes governing dryland development should therefore strongly engage with communities within their existing local governance framework.



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Mobility is a complex but key adaptation strategy to climate change in drylands. It hinges on the opportunistic exploitation of sporadic grazing and water resources. Mobility is rooted in a larger system of governance, rights and responsibilities that allow communities to manage and share resources through long-term traditional tenure agreements. It allows humans and livestock to use the vast natural resources in a landscape without overexploiting specific sites.

These traditional structures of governance have changed over time, disrupting the access and use of grazing and pastureland. Dryland development policies should recognise and enable pastoral mobility as a strategy for climate change adaptation and sustainable land management.

Where can I get more information?

IUCN's Global Drylands Initiative
www.iucn.org/drylands

Laban, P., Metternicht, G. and Davies, J. (2018). *Soil Biodiversity and Soil Organic Carbon: keeping drylands alive*. Gland, Switzerland: IUCN.

IPBES (2018). *The IPBES assessment report on land degradation and restoration*. Bonn, Germany: Secretariat of IPBES.