

# Facts on Desertification

A Summary of the Millennium Ecosystem Assessment Desertification Synthesis



**DESERTIFICATION** is the persistent degradation of dryland ecosystems. It threatens the livelihoods of some of the poorest and most vulnerable populations on the planet. Desertification is largely caused by unsustainable use of scarce resources. What options exist to avoid or reverse desertification and its negative impacts?

*Summary written by GreenFacts*

## What is desertification?



Desertification affects the world's most vulnerable populations.

Desertification is the persistent degradation of dryland ecosystems by variations in climate and human activities. Home to a third of the human population in 2000, drylands occupy nearly half of Earth's land area. Across the world, desertification affects the livelihoods of millions of people who rely on the benefits that dryland ecosystems can provide.

In drylands, water scarcity limits the production of crops, forage, wood, and other services ecosystems provide to humans. Drylands are therefore highly vulnerable to increases in human pressures and climatic variability, especially sub-Saharan and Central Asian drylands.

Some 10 to 20% of drylands are already degraded, and ongoing desertification threatens the world's poorest populations and the prospects of poverty reduction. Therefore, desertification is one of the greatest environmental challenges today and a major barrier to meeting basic human needs in drylands.

## How are desertification and human well-being linked?

In drylands, more people depend on ecosystem services for their basic needs than in any other ecosystem. Indeed, many of their resources, such as crops, livestock, fuelwood, and construction materials, depend on the growth of plants, which in turn depends on water availability and climate conditions.

Fluctuations in the services supplied by ecosystems are normal, especially in drylands, where water supply is irregular and scarce. However, when a dryland ecosystem is no longer capable to recover from previous pressures, a downward spiral of desertification may follow, though it is not inevitable.

Desertification affects a wide range of services provided by ecosystems to humans: products such as food and water, natural processes such as climate regulation, but also non-material services such as recreation, and supporting services such as soil conservation. Changes can be quantified and methods are available to prevent, reduce, or reverse them.

When faced with desertification, people often respond by making use of land that is even less productive, transforming pieces of rangeland into cultivated land, or moving towards cities or even to other countries. This can lead to unsustainable agricultural practices, further land degradation, exacerbated urban sprawl, and socio-political problems.

## Who is affected by desertification?

**Desertification affects the livelihoods of millions of people, as it occurs on all continents (except Antarctica).**

Desertification takes place in drylands all over the world. Some 10 to 20% of all drylands may already be degraded, but the precise extent of desertification is difficult to estimate, because few comprehensive assessments have been made so far.

A large majority of dryland populations live in developing countries. Compared to the rest of the world, these populations lag far behind in terms of human well-being, per capita income, and infant mortality. The situation is worst in the drylands of Asia and Africa. Dryland populations are often marginalized and unable to play a role in decision making processes that affect their well-being, making them even more vulnerable.

Desertification has environmental impacts that go beyond the areas directly affected. For instance, loss of vegetation can increase the formation of large dust clouds that can cause health problems in more densely populated areas, thousands of kilometers away. Moreover, the social and political impacts of desertification also reach non-dryland areas. For example, human migrations from drylands to cities and other countries can harm political and economic stability.



Desertification processes can lead to the formation of large dust clouds that affect air quality and cause health problems thousands of kilometres away (Xinlinhot, China)

## What are the major causes of desertification?

**Desertification is caused by a combination of social, political, economic, and natural factors which vary from region to region.**

Policies that can lead to an unsustainable use of resources and lack of infrastructures are major contributors to land degradation. Agriculture can play either a positive or a negative role, depending on how it is managed. Policies favoring sedentary farming over nomadic herding in regions more suited to grazing can contribute to desertification.

The process of globalization both contributes to desertification and helps prevent it. Studies have shown that, in some cases, trade liberalization, economic reforms, and export-oriented production in drylands can promote desertification. In other cases, enlarged markets outside of the drylands also contribute to successful agricultural improvements.

Historically, dryland livelihoods have been based on a mixture of hunting, gathering, farming, and herding. This mixture varied with time, place, and culture, since the harsh conditions forced people to be flexible in land



**Serious erosion is threatening a farmer's land**

use. Population growth has led to the extension of cultivated lands and the irrigation of these lands has brought about desertification, as well as other environmental problems.

## How would different development paths influence desertification in the future?

**Population growth and increased food demand are expected to drive the expansion and intensification of land cultivation in drylands. If no countermeasures are taken, desertification in drylands will threaten future improvements in human well-being and possibly reverse gains in some regions.**

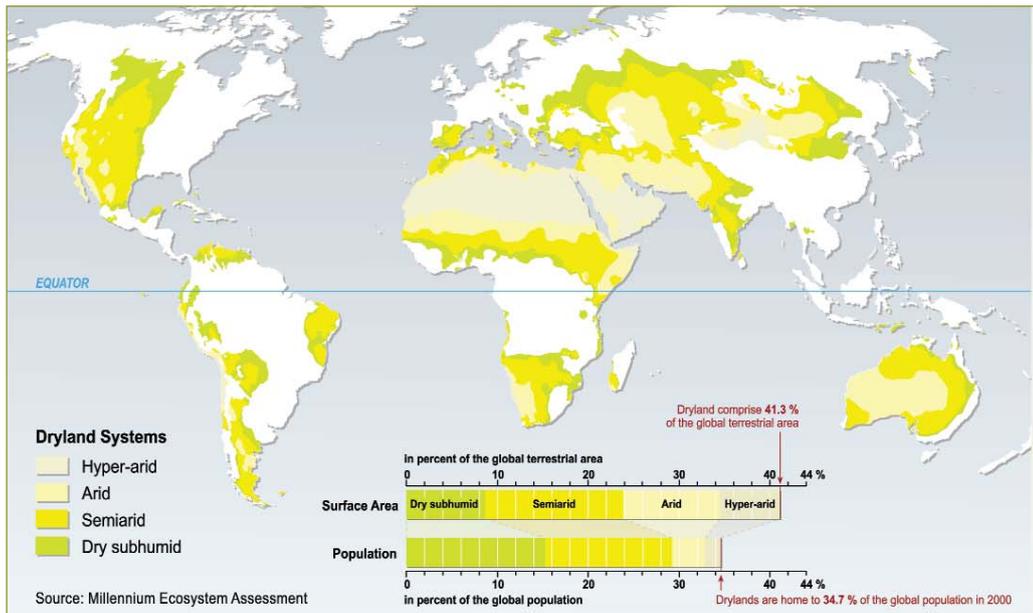
The Millennium Ecosystem Assessment developed four plausible scenarios to explore the future of desertification and human well-being until 2050 and beyond. The different scenarios are based on either increased globalization or increased regionalization, each combined with either a reactive or proactive way of addressing environmental issues.

In all four scenarios, the desertified area is expected to increase, though not at the same pace. Poverty and unsustainable land use practices will

continue to be the main factors driving desertification in the near future, and climate change will also play a role.

Local adaptation and conservation practices can mitigate some losses of dryland services, but it will be difficult to reverse losses in terms of biodiversity and in the provision of food and water which is linked to biodiversity. Freshwater scarcity, which already affects 1-2 billion people globally, is expected to increase, causing greater stresses in drylands and ultimately a worsening of desertification.

The implementation of the U.N. Convention to Combat Desertification (UNCCD) would be particularly difficult in a regionalized-reactive world (Order from strength scenario), while prospects would improve in a more globalized world with proactive ecosystem management (TechnoGarden scenario).



Drylands include all terrestrial regions where the production of crops, forage, wood and other ecosystem services are limited by water. Formally, the definition encompasses all lands where the climate is classified as dry subhumid, semiarid, arid or hyper-arid. This classification is based on Aridity Index values.<sup>†</sup>

<sup>†</sup> The long-term mean of the ratio of an area's mean annual precipitation to its mean annual potential evapotranspiration is the Aridity Index (AI).

**Notes:** The map is based on data from UNEP Geo data Portal (<http://geodata.grid.unep.ch/>). Global area based on Digital Chart of the World data (147, 573, 196.6 square km); Data presented in the graph are from the MA core database for the year 2000.

**Map: "Present-day Drylands and their categories"**

## How can we prevent or reverse desertification?

**Effective prevention of desertification requires management and policy approaches that promote sustainable resource use. Prevention should be preferred to rehabilitation, which is difficult and costly.**

Major policy interventions and changes in management approaches, both at local and global levels, are needed in order to prevent, stop or reverse desertification. Prevention is a lot more cost-effective than rehabilitation, and this should be taken into account in policy decisions. Addressing desertification is critical and essential to meeting the Millennium Development Goals which aim to eradicate extreme poverty and ensure environmental sustainability amongst other objectives.

The creation of a “culture of prevention” that promotes alternative livelihoods and conservation strategies can go a long way toward protecting drylands both when desertification is just beginning and when it is ongoing. It requires a change in governments’ and peoples’ attitudes. Building on long-term experience and active innovation, dryland populations can prevent desertification by improving agricultural and grazing practices in a sustainable way.



**Unsustainable use of resources can contribute to land-degradation.**

Even once land has been degraded, rehabilitation and restoration measures can help restore lost ecosystem services. The success of rehabilitation practices depends on the availability of human resources, funds, and infrastructures. It requires a combination of policies and technologies and the close involvement of local communities.

## Is there a link between desertification, global climate change, and biodiversity loss?

Desertification diminishes biological diversity, a diversity which contributes to many of the services provided to humans by dryland ecosystems. Vegetation and its diversity are key for soil conservation and for the regulation of surface water and local climate. Desertification also contributes to global climate change by releasing to the atmosphere carbon stored in dryland vegetation and soils.

The effect of global climate change on desertification is complex and not yet sufficiently understood. On the one hand, higher temperatures resulting from increased carbon dioxide (CO<sub>2</sub>) levels can have a negative impact through increased loss of water from soil and reduced rainfall in drylands. On the other hand, for certain species, an increase in carbon dioxide in the atmosphere can boost plant growth.

Environmental management approaches for combating desertification, conserving biodiversity, and mitigating climate change are linked in many ways, thus a joint implementation of the U.N. Conventions to Combat Desertification, on Biological Diversity, and on Climate Change can yield multiple benefits.



**Water-erosion and reduced soil conservation negatively affects ecosystem services**

## How can we better understand desertification?

Scientifically robust and consistent information about the extent of land degradation is important when it comes to identifying priorities and monitoring the consequences of actions.

Previous assessments had diverse shortcomings that made them unreliable. Remote sensing and long term monitoring are needed to better understand desertification processes and determine the extent of desertification. Additionally, to better comprehend the impacts of desertification on human well-being we need to improve our knowledge of the interactions between socioeconomic factors and changing ecosystem conditions.

Uncertainties remain about the way various biological, physical, social, and economic factors interact, which limits our ability to assess the actual effect of policies on desertification. Among other things, the impact of poverty reduction strategies on ecosystem services and desertification has not yet been fully explored. The impact of cities in dryland areas also has to be evaluated, since they may both increase and relieve pressures on desertified areas.

## Conclusion: Main findings

**FINDING 1.** Desertification poses one of the greatest environmental challenges today and constitutes a major barrier to meeting basic human needs in drylands.

**FINDING 2.** Desertification is land degradation in drylands that affects biological productivity as well as the livelihoods of millions of people. It is caused by a combination of human and natural factors that contribute to an unsustainable use of scarce natural resources.

**FINDING 3.** Some 10 to 20% of drylands are already degraded, and the ongoing desertification threatens the world's poorest populations. Various scenarios that explore the future of desertification and human well-being in drylands show that global desertified area is likely to increase. Prevention is the most effective way to cope with desertification, because later attempts to rehabilitate desertified areas are costly and tend to deliver limited results. Combating desertification yields multiple local and global benefits and helps fight biodiversity loss and global climate change.

**FINDING 4.** Efforts to reduce pressures on dryland ecosystems need to go hand in hand with efforts to reduce poverty as both are closely linked. Effectively fighting desertification will help reduce global poverty and will contribute to meeting the Millennium Development Goals.

## GLOSSARY

**Desertification** – The persistent degradation of dryland ecosystems by variations in climate and human activities. It results in a reduction or loss of the biological or economic productivity of drylands.

**Dryland ecosystems** – Drylands are ecosystems characterised by lack of water, which constrains the production of crops, forage, wood, and other ecosystem services. Drylands include cultivated lands, scrublands, grasslands, savannas, semi-deserts and true deserts.

**Ecosystem** – A complex system of interactions between living communities (plants, animal, fungi, and microorganisms) and the environment they live in. Ecosystems have no fixed

boundaries; a single lake, a watershed, or an entire region could be considered an ecosystem.

**Ecosystem management** – An approach to natural resource management which aims to sustain ecosystems in order to meet both ecological and human needs in the future. Such ecosystem management can be “reactive” and address problems only after they become obvious or “proactive” and actively seek long-term maintenance of ecosystem services.

**Ecosystem services** – The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and dis-

ease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.

**Productivity** – In biology, productivity is a measure of the efficiency with which a biological system converts energy into growth.

**Sustainability** – Meeting the needs of the present and local population without compromising the ability of future generations or populations in other locations to meet their needs. An ecosystem is used sustainably if it yields benefits to present generations while maintaining its potential to meet the needs and aspirations of future generations.

## Facts on this publication

This publication presents a faithful summary by GreenFacts of the Desertification Synthesis Report, one of the leading scientific consensus reports produced in 2005 by the Millennium Ecosystem Assessment (MA): *Ecosystems and Human Well-being: Desertification Synthesis*.

*The Millennium Assessment* was launched by UN secretary-General Kofi Annan in 2001 to provide scientific information concerning the consequences of ecosystem change for human well-being and options for responding to those changes. It involved over 1300 scientists from 95 countries and a partnership among several international organizations, including the Convention on Biological Diversity, UN Convention to Combat Desertification, Ramsar Convention on Wetlands, Convention on Migratory Species, five UN agencies, the World Bank, and IUCN.

*The Desertification Synthesis Report*, one of the main products of this work, provides an overview of the links between desertification and the unsustainable use of resources. The full report is available on: [www.millenniumassessment.org](http://www.millenniumassessment.org).

A more detailed summary can be found on [www.greenfacts.org/en/desertification/](http://www.greenfacts.org/en/desertification/) in English, French, and Spanish.

## This publication was produced by:



**GreenFacts** is an independent non-profit organisation that publishes faithful online summaries of scientific consensus documents produced by international bodies such as the Millennium Ecosystem Assessment or the World Health Organization.

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## In collaboration with:



**Countdown 2010** collaborates closely with countries, regions, and civil society to help governments reduce biodiversity loss by 2010. At the World Summit for Sustainable Development and other occasions, world leaders committed to achieve this 2010 biodiversity target and meet the challenges outlined in this report.

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The **Environment Directorate-General of the European Commission** initiates and defines new environmental legislation and ensures that agreed measures are put into practice in the EU Member States. Its mission is to protect, preserve and improve the environment for present and future generations, and to promote sustainable development.

<http://ec.europa.eu/environment/>



The **Global Mechanism** is a subsidiary body of the United Nations Convention to Combat Desertification. As one of the partners in Convention implementation, it provides a range of specialized financial advisory services to the Parties, with the aim of increasing development finance for poverty reduction by promoting sustainable land management.

[www.global-mechanism.org](http://www.global-mechanism.org)



The **Swiss Agency for Development and Cooperation (SDC)** is part of the Swiss Federal Government for Foreign Affairs. Its main objectives are to improve access to education and basic health care, to promote environmental health, to encourage economic and governmental autonomy, and to improve equity in labor.

[www.sdc.gov.ch](http://www.sdc.gov.ch)



**TerraAfrica** is a partnership that aims to address land degradation by scaling up harmonized support for effective and efficient country-driven Sustainable Land Management (SLM) practices in sub-Saharan African countries.

[www.terrafrica.org](http://www.terrafrica.org)



The **United Nations Convention to Combat Desertification Secretariat** services the Conference of the Parties and its subsidiary bodies. In doing so, it ensures public awareness on desertification and facilitates the implementation process by liaising with core convention constituencies, mainly Parties, institutional partners and civil society.

[www.unccd.int](http://www.unccd.int)



The World Bank

The **World Bank** is a vital source of financial and technical assistance to developing countries around the world. With the aim to reduce global poverty and improve living standards, the World Bank provides low-interest loans, interest-free credit and grants to developing countries for education, health, infrastructure, communications and many other purposes.

[www.worldbank.org](http://www.worldbank.org)



Founded in 1948, the **World Conservation Union (IUCN)** brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 1000 members in all, spread across some 140 countries. As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

[www.iucneurope.org](http://www.iucneurope.org)