

A Complete Survey of Grasslands



What is Grassland?

- Grasslands are areas where the vegetation is dominated by grasses.
- Grasslands cover around 40% of the Earth's surface and they exist in both temperate and tropical regions.

What is an ecosystem?

An ecosystem is a community of living organisms in conjunction with the non-living components of their environment, interaction as a system.

What is Grassland Ecosystem?

A grassland ecosystem is the collection of plants and animals and micro-organisms that live within an environment where the grasses are the primary form of vegetation.

Characteristics of Grasslands

- Grasslands are dominated by grass with few or no trees.
- They develop in areas where there is not enough rain for a forest and too much for a desert. Therefore, it is referred to as a transitional landscape.

- Grasslands are found in both temperate and tropical areas where rainfall is between 250mm and 900mm per day.
- Can be natural or a result of a human activity.
- Grasslands are also one of the most endangered biomes and easily turned into a desert.
- In Australia, they are one of the most threatened habitats.

Climate

- Grasslands often occur in areas where annual precipitation is between 500mm to 1500mm.
- Average mean annual temperature ranges from -5 to 20 degrees Celsius.
- Grasslands can exist in habitats that are frequently distributed by grazing or fire, as such disturbance prevents the encroachment of woody species.

Fauna of the Grassland

- Grasslands have high number of invertebrates than any other taxonomic group.
- Most reptiles and amphibians are predators.
- Few bird species inhabit grasslands.
- Small mammals like moles, shrews, squirrels are present in North American Grasslands.

Types of Grassland Ecosystem

- A grassland consists of large rolling fields of flowers and herbs.
- Two main types of grasslands are:

1. Tropical Grasslands:

- Tropical Grasslands are warm all year round with established rainy and dry seasons.
- During the rainy seasons, tropical grasslands receive 50 to 130 centimeters of rain.
- Most notable of the tropical grasslands is the African Savanna, which has an occasional tree and is home to many of the world's most spectacular species, such as elephants, giraffes, lions, zebras.

2. Temperate Grasslands:

- Temperate Grasslands are a division of a larger biome grouping of grasslands that includes tropical savannas. Both biome types are characterized by a dominance of grasses, yet temperate grasslands differ significantly from savannas.

Importance of grasslands and how it affects us worldwide

- Worldwide grasslands are under severe threat from ongoing degradation as land is converted to grow crops. According to the World Commission on Protected Areas

(ICUN), grasslands are considered the "most altered terrestrial ecosystem on the planet" and are recognized as "the most endangered ecosystem on most countries".

- Grasslands form a variety of ecosystems that are located in different climatic conditions ranging from near desert conditions (as seen in Africa), to extremely moist. The high and cold Himalayan pastures to the semi-arid grasslands of Australia.
 - Much of the grasslands are located in the great natural grasslands of central Asia, sub-Saharan and southern Africa, North and South America and Australia/New Zealand, and most are mainly grazed by ruminants.
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- Through climate, vegetation and wildlife varieties in these grasslands, one thing that they do have in common is that each has a distinct food chain. Primary consumers are animals that feed on plants while the secondary consumers are animals that eat other animals for survival.
 - Let's talk about the food chain in the African grasslands, also known as Savannas. Do you know about the wildlife that exists in these dry and arid Savanna?

Biodiversity Loss

At the recent UN Global Systems Summit, the WWF issued a call to kickstart grassland conservation.

"The awareness of grassland loss and the impacts it has have not been on the radar in a meaningful way, but this is changing and we are seeing more interest to understand the issue and account for it", said Patrick Lendrum, Science Lead for WWF's Northern Great Plains Program.

Conversion of grasslands is occurring on 'high-quality habitat' for various species, recent research focused on the US concluded. The study suggested conversion is producing 'marginal yields' – because 70% of the converted lands deliver yields below the national average – and this is coming with 'high costs to wildlife'.

"Grassland birds have experienced the largest decline of any guild. Seventy-four percent of species are declining. This is largely attributed to habitat loss and pesticide use. The list goes on and on be it pollinators, birds, mammals, or aquatic life, the effects of which are felt all the way down to the hypoxic zone in the Gulf of Mexico," Lendrum stressed.

Other ecosystem services, notably carbon sequestration and soil erosion control, are also being hit by grassland degradation.

One study places the soil carbon loss resulting from grassland conversion at 107 kg CO₂e per year. To put it in context, that's equivalent to the amount of CO₂ released into the atmosphere by 23M vehicles being driven for a year.

"While estimates of soil carbon are difficult to calculate as such a large scale and there is some variation among researchers, there is no doubt that conversion of grasslands contributes to climate in a significant way." Lendrum told FoodNavigator.

Lendrum believes that grasslands will 'absolutely' become a touchpaper issue for consumers in the future, in much the way that deforestation is today.

Assertations by notable scientists at the UN Agriculture summit.

Quotes by Patrick Landrum, Science Lead for WWF's Northern Great Plains program.

"Nearly 50% of grasslands have experienced some form of degradation be it conversion, invasive species, overgrazing, climate change or altered fire regimes, the conservationist told us. "Grassland conservation is of global concern and everyone needs to be working together to solve this problem to the benefit of climate change, biodiversity, other ecosystem services, and the livelihoods that depend on grasslands."

"The effects of climate change are upon us and being experienced by everyone across the globe. Action needs to take place sooner than later and avoiding grassland conversion is one of the most cost- effective ways to slow carbon emissions."



So What is harming Grasslands?

The Degradation of grasslands and its Consequences

What are the Threats to grasslands?

- Overgrazing: An unfortunate occurrence occurs when animals consume grass at a faster rate than it can grow back
- Climate Change: The increase in average temperatures of regions makes them less suitable for grass to grow.
- Human Interference: When humans convert natural grassland into farmland, they often harshly farm. They suck nutrients from the soil

Climate Change: The biggest threat to life on the planet and its impact on grasslands.

1. Due to large industrialization and carbon emissions, global temperatures are rising.
2. The increase in average temperatures of regions makes them less suitable for grass.
3. Due to more rapid evaporation of water that was formerly utilized by the grass
4. Warmer and drier conditions, brings about suitable conditions for the invasion of non-native grass species.

What if our grasslands disappear?

1. We will lose highly specialized ecosystem in which plant and animal species have adapted to over millions of years. Consequently, these species are endangered.
2. This shall be a big loss, as the genes of wild grasses are useful for developing new crop varieties.
3. Local people will not be able to support their livestock herds.
4. Decrease in arable land: Arable land under temporary agricultural crops.
5. With less biodiversity, this ecosystem is less adaptable to when disasters strike it.

Examples of grassland degradation:

Proof of this decline is that presently 15-20% of Tibetan Plateau species are now considered endangered; and now because of this animal and plant absence, the soil quality of these degraded lands is very poor. It does not hold the necessary nutrients, such as water, nitrogen, and carbon, essential to either supporting life or inviting life back to that land. As a result of such carbon and nitrogen loss in the Tibetan Plateau, \$8,033/ha and \$13,315/ha were respectively lost in economic terms. Soils are further weakened by dust storms whose frequency increases because of degradation. Erosion of soil becomes a bigger problem, since no longer are there as many plants to anchor in the soil. In the northern Chinese province alone, 400 million are affected every year with an associated 54 billion yuan of annual economic loss due to grassland degradation.

Sustainable grazing -> Overstocking -> Overgrazing

Degrees of Severity

Levels of degradation:

1. Lightly degraded land: The land in the first stage of degradation. It is characterized by patches of dead or no grass, spottily dispersed throughout.
2. Moderately degraded land: In this stage, there is a large loss of animal species. During this stage pests, be they rats, insects or other grassland animals start to disturb the environment by damaging the soil through, for instance, extracting from the soil nutrients vital to a plant's well-being or by just damaging to plants themselves.
3. Highly degraded land: Heitutan is a term that simply signifies severely degraded grasslands. A more common and more extreme term to describe degraded grassland is "black beach" or "black-soil-land", which is exactly what it sounds like: land with nothing but black, unusable soil that extends 10-15 cm below the ground level.



Grassland restoration Methods:

Successful grassland restoration has several dimensions, including recognition in policy, standardisation of indicators of degradation, scientific innovation, knowledge transfer and data sharing.

The earlier problem is addressed, the easier it is to restore that plot of land.

- Fencing an area off allows for that plot of land to be reprieved from grazing until it reaches its normal, healthy state.
- Planting semi-artificial grassland which includes weed control, fertilizing, reseeding, rodent control, and scarification.

- A method as simple as seasonally rotating fields in which animals graze have been seen as effective
- Rotate agricultural crops to prevent the snapping of nutrients
- Continue education efforts, particularly among farmers, on how to protect the soil and prevent soil erosion.
- Protect and restore wetlands, which are an important part of grassland ecology.
- Plant trees as windbreaks to reduce erosion on farmfields (though make sure it is the right species for the area).
- Controlled dry season burning to stimulate fresh plant growth and to restore calcium to the soil that builds up in the dry grasses.