

UNIT-3

DESERT ECOSYSTEM

INTRODUCTION

- ▶ Defined by interaction b/w organism population, the climate in which they live & any other non living influences on the habitat.
- ▶ Defined as a region which receives an annual precipitation of less than 250mm on an average.
- ▶ Large fluctuation b/w day & night temperatures characterize a deserts terrestrial environment.
- ▶ One of the most famous desert ecosystem is the Sahara desert, which takes up the entire top area of the African continent & is known as the largest hot desert in the world with a temperature reaching over 122° F.



TYPES OF DESERT

- ▶ Desert experiences a wide range of temperature & weather condition & can be classified into 4 types.

HOT DESERTS

- ▶ Experiences warm temperature year round & low annual precipitation.
- ▶ Low levels of humidity contribute to high day time temperature & extensive night time heat loss.
- ▶ The average annual temperature is 20-25 °C.
- ▶ However, extreme weather condition can lead to temperature ranging from -18-49 °C.
- ▶ Rainfall generally occurs in a concentration burst followed by long periods of dryness.



SEMI ARID DESERT

- ▶ Experience similar condition to hot deserts, however minimum & maximum temperature tend to be less extreme ranging from 10-38 °C.

COASTAL DESERT

- ▶ Cooler than hot and semi arid desert with average summer temperature ranging b/w 13-24 °C.
- ▶ They also feature higher rainfall values.

COOL DESERT

- ▶ Similar in temperature to coastal deserts, however they receive more annual precipitation in the form of snow fall.
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CHARACTERISTICS

- ▶ Aridity
- ▶ Extremes of temperature
- ▶ Absence of water vapour in air
- ▶ Very intense solar radiation
- ▶ Drought
- ▶ Extreme, specialized & very sensitive ecosystem
- ▶ High wind velocity
- ▶ Sparsity of cloud cover
- ▶ Potential evaporation is highest
- ▶ Scarcity of water in hot deserts



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- ▶ Dry climate due to rain blocking mountain ranges & remoteness from oceanic moisture.
 - ▶ Loose sandy soils devoid of organic carbon, nitrogen, moisture etc.
 - ▶ **Biologic soil** is absent in most deserts. Biologic soil is the volume of soil i.e, penetrated by plant roots & is the main source of water available to the plants directly.
 - ▶ **Uneven topography** due to shimmering mountains of sand rolling endlessly.
 - ▶ The annual season of plant growth is extremely short.
 - ▶ **Vegetation is scarce** & animals face shortage of food.
 - ▶ **Isolation** is absent in winter & intense and continuous in summer.



ADAPTATIONS

IN PLANTS

- ▶ Have short growing seasons & long dormancies.
- ▶ Have highly modified feature that helps them to thrive at extreme climatic conditions.
- ▶ The well known desert plants is a **succulent**, meaning it has thickened fleshy parts to store water.
- ▶ Stem is the only part that store water & water is stored as thick viscous liquid.
- ▶ Cacti stem is called **phylloclade** (ex: opuntia)
- ▶ lost true leaves during their adaptation, retaining only **spines** which are highly modified leaves.



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- ▶ **Phreatophytes** – adapted to harsh desert condition by developing extremely long roots, some of which are 80 feet long to reach the water table which ensures water supply to the plant.
 - ▶ They guard against extensive evaporation by reducing evaporating surface.
 - ▶ Drought tolerance refers to the plants ability to withstand dessication without dying
 - ▶ **Ephemerals/drought escapers** –those plants complete their life span in very short period before approach of dry condition but these are not true xerophytes (Ex:Boerhaavia)
 - ▶ Occur in all kind of environment.
 - ▶ Ex: opuntia, tree like cactus, golden barrel cactus, tall columnar cactus, desert lilly etc



IN ANIMALS

- ▶ **To avoid heat** – they avoid being out in the sun during day time & live in burrows to escape intense heat.
 - ▶ **To dissipate heat** – they have developed long body parts to provide greater surface area to dissipate heat. Most desert animals are pale in colour which prevents their body from absorbing more heat from the sun.
 - ▶ **To absorb water** – desert animals have extra tubules in their kidneys that help them extract most of the water from their urine & return it to the bloodstream & the wastes are usually secreted in the form of insoluble uric acid.
 - ▶ **To preserve water** – water is stored in fatty tissue whose oxidation releases energy as well as water.
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- ▶ **Burrowing animals** – kangaroo rat, gila monster, burrowing owl
 - ▶ Male **sandgrouse** have specialised belly features that are able to trap & carry water.
 - ▶ **Thorny devil** has developed skin that can absorb water like blotter paper.
 - ▶ **Unusual method of locomotion** is used by 2 species of venomous snake – the Mojave desert side winder & Namib desert viper.
 - ▶ **Hump** stores fat which can be used as food & water source.
 - ▶ **Fogstand beetle** drinks dew drops.
 - ▶ **Gila monster** living off of fat stored in its tail.
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- ▶ **Big ears** act like radiators
 - ▶ The **cape ground squirrel** takes shade everywhere it goes, use its bushy tail as a sort of parasol.
 - ▶ **Great road runner** of North America secretes excess salt from a gland near its eye.

