Desert Ecosystem

- Desert ecology is the sum of the interactions between both biotic and abiotic processes in arid regions, it includes the interactions of plant, animal and bacterial populations in a desert habitat, ecosystem and community.

Characteristics of desert environment:

- Scarcity of water
- High temperature
- Dust storms
- Lack of vegetation

Geomorphology of deserts

- Deserts are created by changes in climate and accumulation of sand and other rocky wastes.
- Sand covers about 10 to 20 % of the deserts.
- The rest of the land consists mostly of gravels, boulders, mountains and various types of soils.

- Dunes are large piles of wind-borne sands reaching a maximum height of 250 m above the surface.
- Dunes show many shapes and patterns that change continually due to the highly active winds.
- Dunes are characterized by two-sided slopes one along the windward direction and the other along the leeward side.
- Soils in desert regions are generally fertile but lacks soil moisture encourage plant growth.

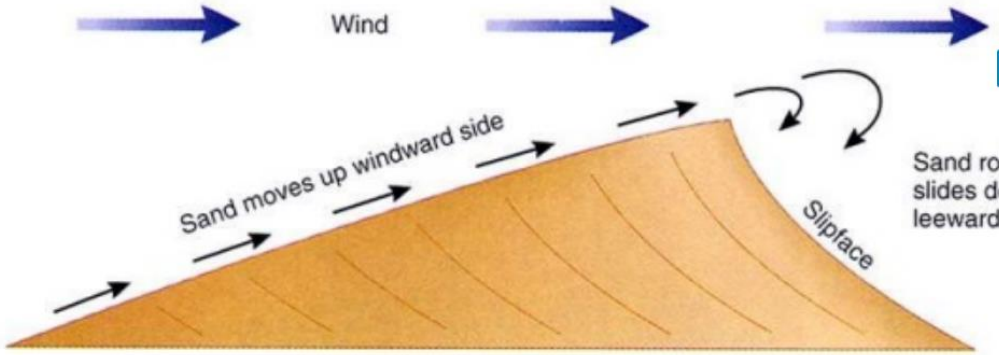


FIGURE 12.7
Cross section of a dune, showing sand moving up the gentle windward slope and falling off the steeper leeward slope.

Rainfall over deserts

Rainfall is a determining factor of desert and scanty in all desert regions.

- Characteristics that are common to all desert include:
- Irregular rainfall of less than 250 mm per year
- Very high evaporation rates often 20 times the annual precipitation, and
- Low relative humidity and cloud cover.

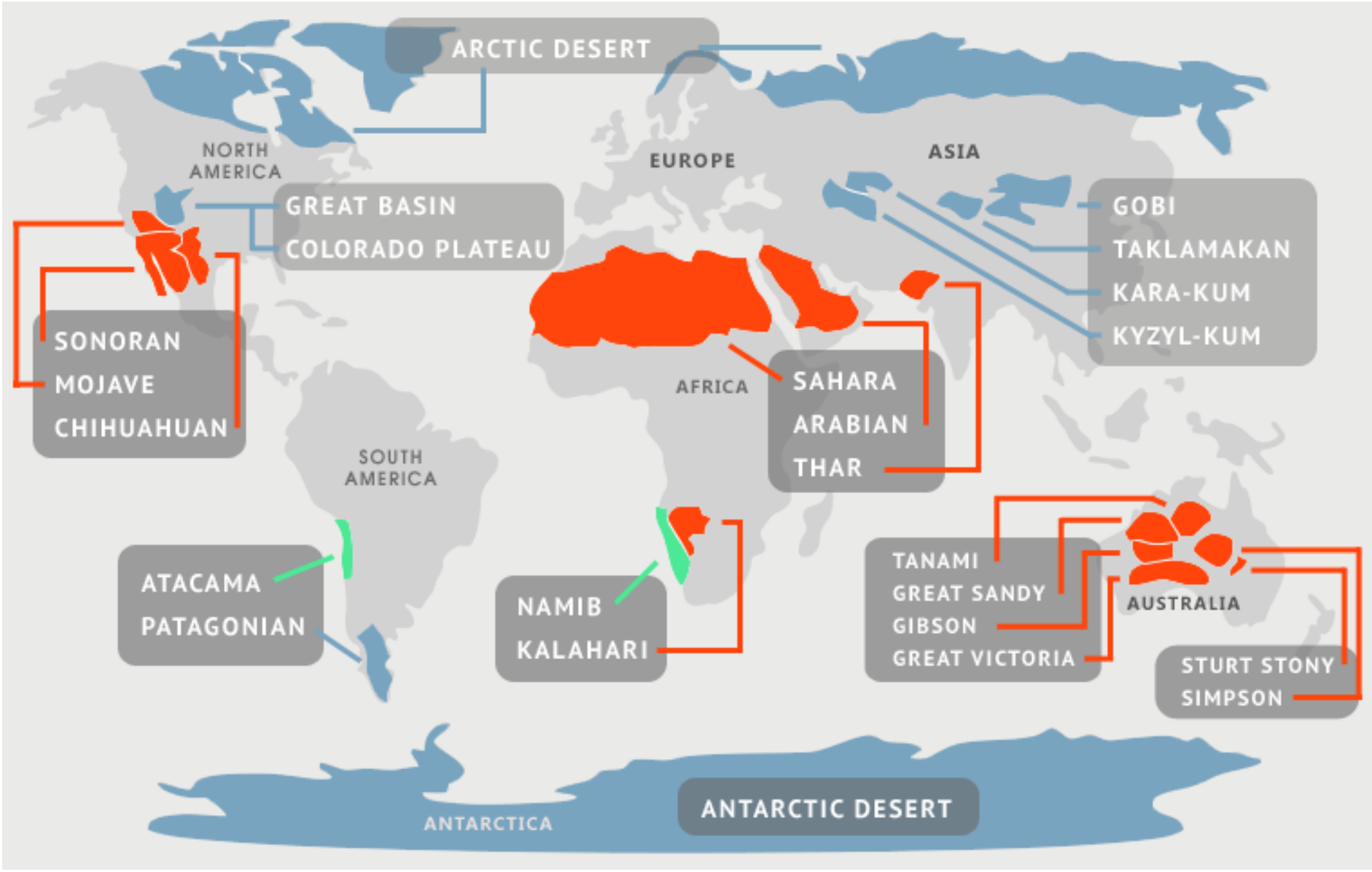
Water availability

- Only in some depressions very little water may exists.
- Soil moisture is a rare feature.
- Even soil moisture is present, due to hot climate and prevailing winds, it will be evaporated quickly.
- Drainage system is made of dried streams called “arroyos”.
- After rainfall, water fills the arroyos.
- They rundown the mountains and cut away the land, carrying deposits of gravel, rock and sand to the bottom.

Arroyos and oasis

- Oasis is a wet and fertile zone in a desert with vegetation. Underground water comes nearer to the ground surface.
- Open wells and springs do exist in such spots. Water that occurs within an oasis has been drawn through groundwater base flow from distant catchments like mountains or hills.
- Some oases may be small and can support only a few people, but others are large enough to support millions of people.

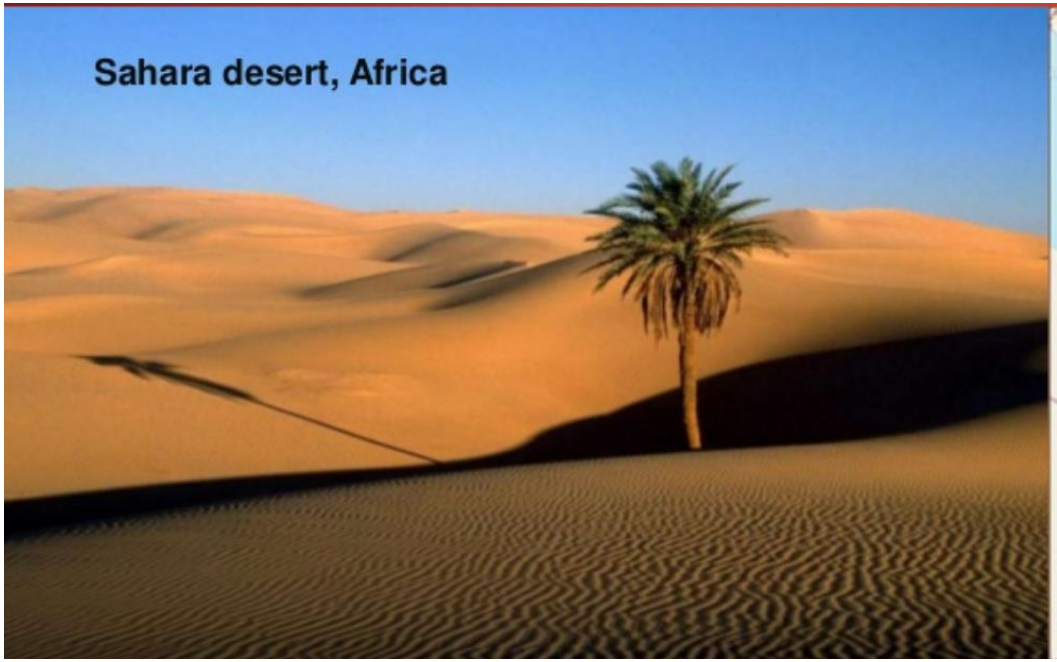
Oasis


ARCTIC DESERT
NORTH AMERICA
EUROPE
ASIA
GREAT BASIN
COLORADO PLATEAU
GOBI
TAKLAMAKAN
KARA-KUM
KYZYL-KUM
SONORAN
MOJAVE
CHIHUAHUAN
AFRICA
SAHARA
ARABIAN
THAR
SOUTH AMERICA
ATACAMA
PATAGONIAN
NAMIB
KALAHARI
TANAMI
GREAT SANDY
GIBSON
GREAT VICTORIA
AUSTRALIA
STURT STONY
SIMPSON
ANTARCTICA
ANTARCTIC DESERT

Types of deserts on the basis of locations

- North American desert
- South American desert
- European desert
- Asian desert
- African desert
- Australian desert


ANTARCTICA DESERT
North Africa desert


Sahara desert, Africa


EUROPE
ASIA
AFRICA
Mediterranean Sea
Red Sea
Persian Gulf
Arabian Sea
IRAQ
JORDAN
KUWAIT
SAUDI ARABIA
QATAR
UNITED ARAB EMIRATES
ARABIAN DESERT
OMAN
YEMEN
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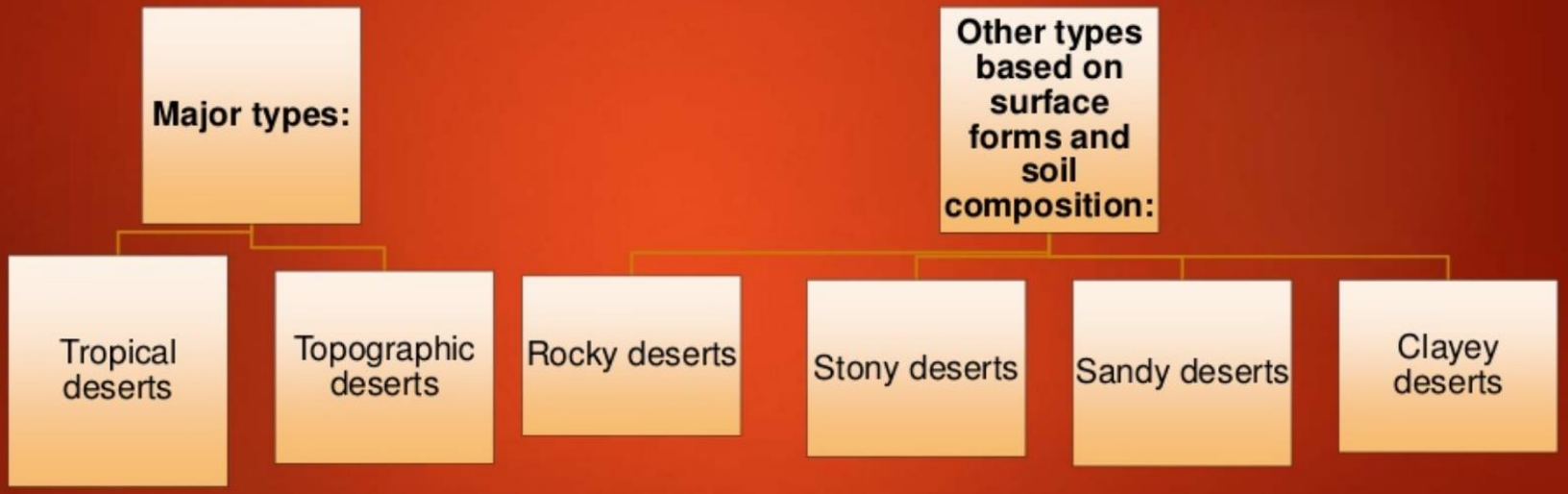
Types of desert based on rainfall

- Low rainfall desert
- Cold desert
- Hot desert
- Low nutrient desert (e.g. north American deserts)
- Toxic desert (e.g. volcanic desert)
- Salty desert
- Costal desert

Types of deserts



DESERT Food CHain

Large Predators

Hawk

Fox

Small Predators
Carnivores,
Insectivores

Snakes & Lizards

Scorpion & Tarantula

Primary Consumers

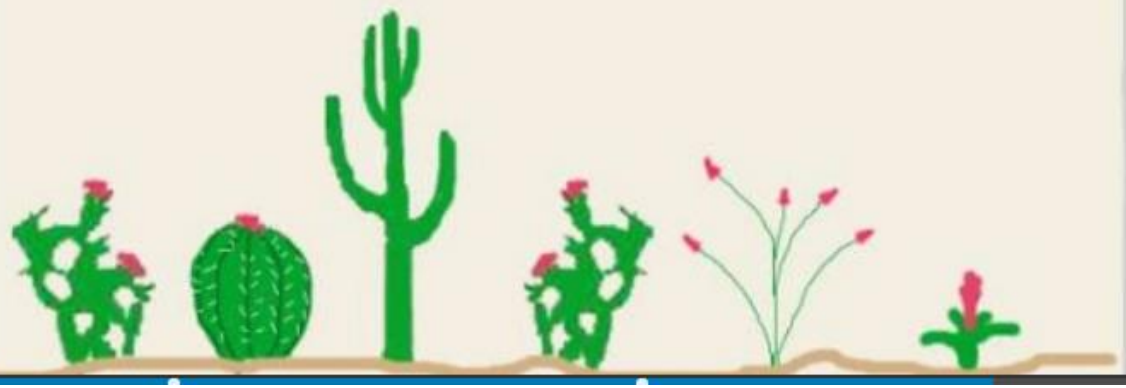
Small Mammals

Insects

Lizards

Primary Producers

Cacti, Thorn Acacias, Creosote Bushes, Sage Brush
Ocotillo, Rabbit Brush and flowering Annuals.

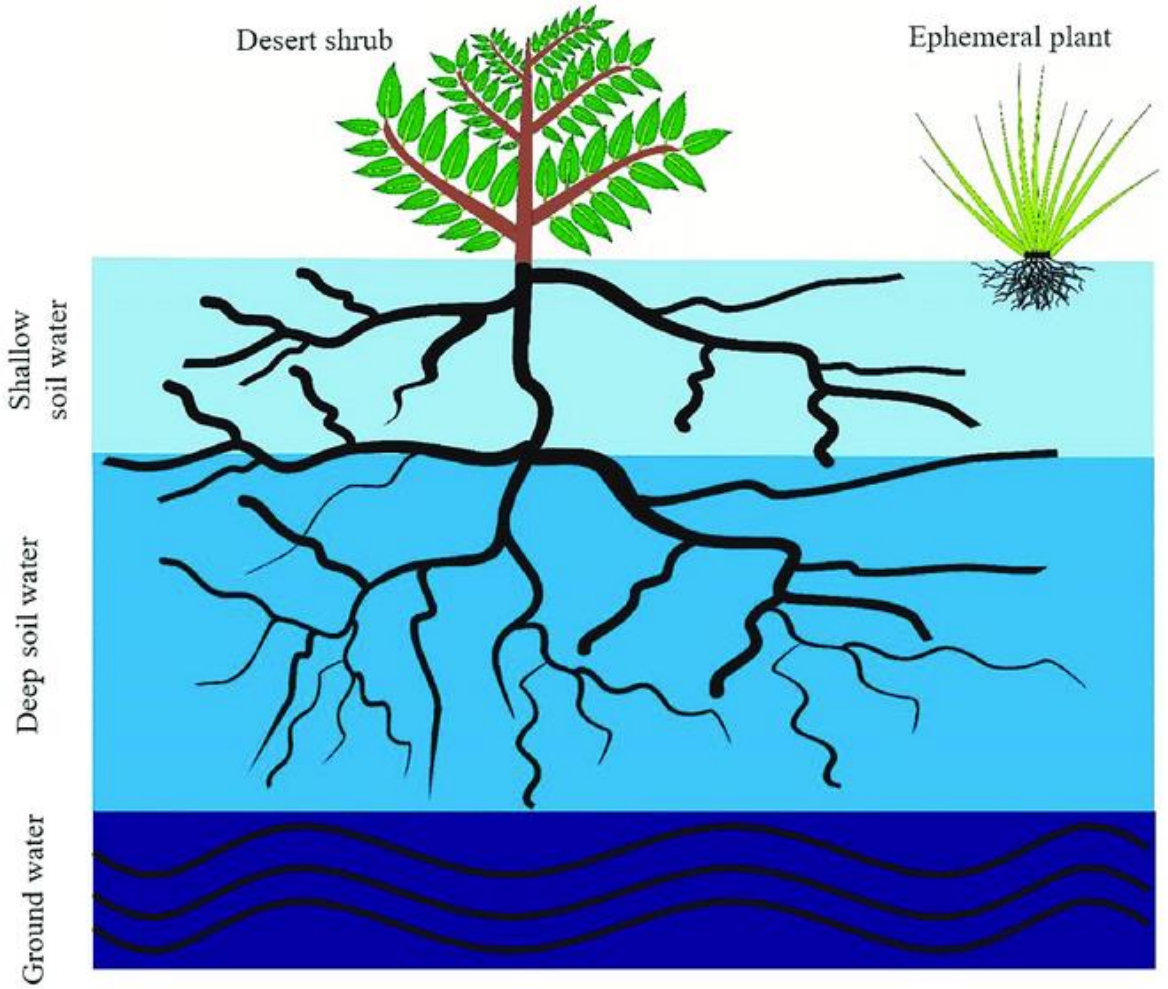


Desert community

- Producers
  - Ephemerals
  - Drought resisting plant (can store water, succulent plants)
  - Spiny or thorny bushes
- Consumers
- Decomposers

- *Ephemeral plants*

  Ephemeral plants are those plants that are born only after occasional rains and reproduce and die before a new drought comes, and they typically have therefore an extremely short life cycle.



Drought resisting plant or succulent plants

- Those are plants with parts that are thickened, fleshy, and engorged, usually to retain water in arid climates or soil conditions.
- Succulent plants may store water in various structures, such as leaves and stems.
- Some definitions also include roots, thus geophytes that survive unfavorable periods by dying back to underground storage organs may be regarded as succulents.

Spiny or thorny bushes

- Other plants lose moisture through their pores which they have on their leaves and stem.
- So, these desert plants need to avoid those pores to lock the minimum levels of moisture they have.
- Hence, these leaves don’t have pores and the leaves become hard with dry spines or thorns.
- These thorns conserve water by not letting out the moisture content at all.
- The greener part of the bottom part of a leaf has a minimum activity which helps the plant to survive.
- The spikes cover the pores as well defend themselves from getting nibbled.

Adaptations in animals

- Water conservation
- Water obtaining
- Heat tolerance
- Protection

1. Water conservation

A. to avoid evaporation through body surface

- Thick hide
- Reduction of sweat gland
- Impervious skin
- Heat tolerance

B. Avoid loss of moisture during respiration

C. Avoid loss of water during excretion

D. Other methods for water conservation

- Burrowing and nocturnal habit
- Dormancy
- Water storage

2. Water obtaining

- Migration
- Obtaining water from food
- Metabolic water
- Hygroscopic skin
- Obtaining water from seed
- Obtaining water from blood
- Obtaining water from succulent plants
- Obtaining water from dew drops
- Obtaining water from water hole
- Water less life

3. Heat tolerance

- Protective armour
- Presence of long legs
- Burrowing nature
- Absence of adipose layer
- Aestivation
- Tolerance against dehydration

4. Protection

- Nostrils
- Eye lids
- Presence of hair on ear
- Long legs
- Padded legs
- Protective colouration
- Spiny covering on body
- Venome
- Developed sense organs
- Other protective devices

Thank you