


1  **Deserts and Winds**


**Earth 9<sup>th</sup> Edition – Chapter 19**

2  **Deserts: summary in haiku form**

Deserts expanding  
yet rivers get diverted  
to make desert "bloom."

3  **Key Concepts**

- Distribution and causes of "deserts."
- Weathering and water in arid regions.
- Transportation of sediment by wind.
- Erosion by wind.
- Wind-related sedimentary deposition.

4  **Distribution & causes of dry lands**


- Dry regions cover 30 percent of Earth's land surface
- Two climatic types are commonly recognized
  - ☒ Desert or arid
  - ☒ Steppe or semiarid

5  **Desert and steppe regions of the world**

6  **Distribution and causes of dry lands**

- Dry lands are concentrated in two regions
  - ☒ Subtropics
    - ◆ Low-latitude deserts
    - ◆ In the vicinities of the Tropics of Cancer and Capricorn
    - ◆ Areas of high pressure and sinking air that is compressed and warmed


7  **Subtropical high pressure belts and dry regions**

8  **Distribution and causes of dry lands**


- Dry lands are concentrated in two regions
  - ☒ Middle-latitudes
    - ◆ Located in the deep interiors of continents
    - ◆ High mountains in the path of the prevailing winds produce a *rain-shadow* desert

9  **Rainshadow desert**


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11  **Geologic processes in arid climates**

- Weathering
  - ☒ Not as effective as in humid regions
  - ☒ Mechanical weathering produces unaltered rock and mineral fragments
  - ☒ Some chemical weathering in deserts does produce
    - ◆ Clay
    - ◆ Thin soils
    - ◆ Oxidized minerals

12  **Geologic processes in arid climates**

- Role of water in arid climates
  - ☒ Practically all streambeds are dry most of the time
  - ☒ Desert streams are said to be *ephemeral*
    - ◆ Carry water only during periods of rainfall
    - ◆ Different names are used in various regions
      - Wash and arroyo (western United States)
      - Wadi (Arabia and North Africa)
      - Donga (South America)
      - Nullah (India)

13  **Geologic processes in arid climates**

- Role of water in arid climates
  - ☒ Desert rainfall
    - ◆ Rain often occurs as heavy showers
    - ◆ Because desert vegetative cover is sparse, runoff is largely unhindered and flash floods are common
    - ◆ Poorly integrated drainage systems and streams lack an extensive system of tributaries
    - ◆ Most of the erosion work in a desert is done by running water

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**A dry channel contains water only following heavy rain**

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**Basin and Range:**

**Evolution of a desert landscape**

- Characterized by interior drainage
- Landscape evolution in the Basin and Range region
  - ☒ Uplift of mountains – block faulting
  - ☒ Interior drainage into basins produces
    - ◆ Alluvial fans
    - ◆ Bajadas
    - ◆ Playas and playa lakes

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**Basin and Range:**

**Evolution of a desert landscape**

- Landscape evolution in the Basin and Range region
  - ☒ Ongoing erosion of the mountain mass
    - ◆ Produces sediment that fills the basin
    - ◆ Diminishes local relief
    - ◆ Produce isolated erosional remnants called *inselbergs*

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**Inselbergs in southern California**

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**Wind in the desert**

- Transportation of sediment by wind
  - ☒ Differs from that of running water in two ways
    - ◆ Wind is less capable of picking up and transporting coarse materials
    - ◆ Wind is not confined to channels and can spread sediment over large areas

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**Wind in the desert**

- Transportation of sediment by wind
  - ☒ Mechanisms of transport
    - ◆ Bedload
      - Saltation – skipping and bouncing along the surface
      - About 20 to 25 percent of the sand transported in a sandstorm is moved this way
    - ◆ Suspended load

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**Wind in the desert**

- Wind erosion
  - ☒ Wind is a relatively insignificant erosional agent with most erosion in a desert performed by intermittent running water
  - ☒ Mechanisms of wind erosion
    - ◆ Deflation

- Lifting of loose material
- Deflation produces blowouts (shallow depressions) and desert pavement (a surface of coarse pebbles and cobbles)

28  **Formation of a desert blowout**

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30  **Formation of desert pavement**

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34  **Wind in the desert**

● Wind erosion

☒ Mechanisms of wind erosion

◆ Abrasion

- Produces ventifacts (stones with flat faces) and yardangs (wind sculpted ridges)

◆ Limited in vertical extent

35  **Wind in the desert**

● Wind deposits

☒ Significant depositional landforms are created by wind in some regions

☒ Two types of wind deposits

◆ Dunes

- Mounds or ridges of sand
- Often asymmetrically shaped
- Windward slope is gently inclined and the leeward slope is called the slip face

36  **Formation of sand dunes**

37  **Formation of Cross Bedding**

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39  **Kelso Dunes, Mojave National Preserve**

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49  **Wind in the desert**

● Wind deposits

☒ Two types of wind deposits

◆ Dunes

- Slow migration of dunes in the direction of wind movement
- Several types of sand dunes including barchan, transverse, longitudinal, parabolic and star dunes

50  **Wind in the desert**

● Wind deposits

☒ Two types of wind deposits

◆ Loess

- Blankets of windblown silt
- Two primary sources are deserts and glacial outwash deposits
- Extensive deposits occur in China and the central United States

51  **End of Chapter**