



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Course title

**Environmental Science and Disaster
Management**

Credit: 3 (2+1)

Course No: ASES 3101

**M.S. Swaminathan School of Agriculture
Centurion University of Technology & Management**



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Environmental Studies

- Environment - is derived from an old French word '*ENVIRONNER*' which means *ENCIRCLE*.
- In real world everything that affects an organism during its life time is collectively known as its Environment.
- Environmental study: Involves the study and understanding that even a single phenomenon can affect the environment in a variety of ways with varying degrees of complexity.



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Definitions

- Environmental science - the study of how various species interact with one another and with the non-living environment (matter & energy).

- It is the study of interaction of the biotic component (plants, animals and micro-organisms) among themselves and together with the abiotic components (temperature, rainfall, relative humidity, soil, air, fire, and atmosphere).



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Environmental Science

An interdisciplinary branch of science that investigates questions related to the human population, resources, and damages caused by pollution and disturbance.

Environmental science is integrative and involves complex biology, chemistry, politics, sociology, geology, agriculture, economics.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Why it is necessary to learn about the state of environment?

➤ To conserve biodiversity, to lead more sustainable lifestyles and to use resources more equitably.

➤ **Biodiversity:** The part of nature which includes the variety and richness of all plant and animal species at different scales in space *i.e.* Local, regional, country wise and global, and various types of ecosystems - both terrestrial/land and aquatic - within a defined area.

➤ **Sustainable development:** Implies the use of resources in a managed way as to provide resources for future generations.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Objective of This Course

- **Develop a concern for our environment.**
- **Begin to act at your own level to protect the environment where we live in.**



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Scope/possibility and Importance

- **Resources:** renewable (forest and water) and non-renewable (minerals and oil).
- Due to the increase in population these resources are getting depleted gradually.
- Need to understand about our natural assets and sustainably utilize the resources.
- Scope of environmental studies is very wide and nearly covers some aspects of every major discipline (biology, chemistry, physics, geography, resource management, economy, etc.).



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Environmental Calendar

Environment Calender

World Wetland Day	February 2
World Forest Day	March 21
World Day for Water	March 22
World Meteorological Day	March 23
Earth Day	April 22
International Biodiversity Day	May 22
Anti-tobacco Day	May 31
World Environment Day	June 5
World Ocean Day	June 8
World Population Day	July 11
Ozone Week	Sept. 16–23
World Car-free Day	Sept. 22
Green Consumer Day	Sept. 28
World Farm Animal's Day	Oct. 2
World Habitat Day	Oct. 3
World Animal Welfare Day	Oct. 4
Wildlife Week	Oct. 1–7
International Day for Natural Disaster Reduction	Oct. 13
World Conservation Day	Oct. 24
International Day for Biological Diversity	Dec. 29



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Scope/possibility of Environmental Studies

- | **Ecosystem structure and function**
- | **Natural resource conservation**
- | **Environmental pollution control**
- | **Environmental management**
- | **Environmental impact assessment**
- | **Research and development**
- | **Social development**
- | **Forest management**
- | **Environmental consulting firms**



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Factors Affecting Environmental Problems

- Rapid population growth
- Degradation of parts of earth's life support systems.
- Poverty
- Wide-spread use of fossil fuels (coal and oil).
- Rapid and indiscriminate use of resources with too little emphasis/importance on pollution prevention and waste reduction.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Major Environmental Problems

- Air Pollution
- Water Pollution
- Biodiversity Degradation
- Waste generation
- Food Supply Problems



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Steps for environmental protection

1. To reduce world consumption of fossil fuels
2. To reduce and clean up all sorts of pollution with future goal of zero pollution
3. Emphasis (special importance) on clean, alternative energy sources that have low carbon emissions
4. Sustainable use of water, land, and other scarce resources
5. Preservation of existing endangered species
6. Protection of biodiversity



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Challenges in agriculture

- Technology expanded food production
 - Leading to increased population and consumption
- One of humanity's greatest achievements, but it comes at an enormous environmental cost
- Nearly half of the land surface is used for agriculture
- Chemical fertilizers and pesticides poison and change natural systems
- Erosion, climate change and poor management destroy millions of acres each year



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Challenges in pollution

- Waste products and artificial chemicals
 - Used in farms, industries, and households
 - Contaminate land, water and air
 - Kill millions of people
- Humans are affecting the Earth's climate
 - Melting glaciers
 - Rising sea levels
 - Impacted wildlife, forests, health and crops
 - Changed rainfall and increased storms

Since the Industrial Revolution, atmospheric CO₂

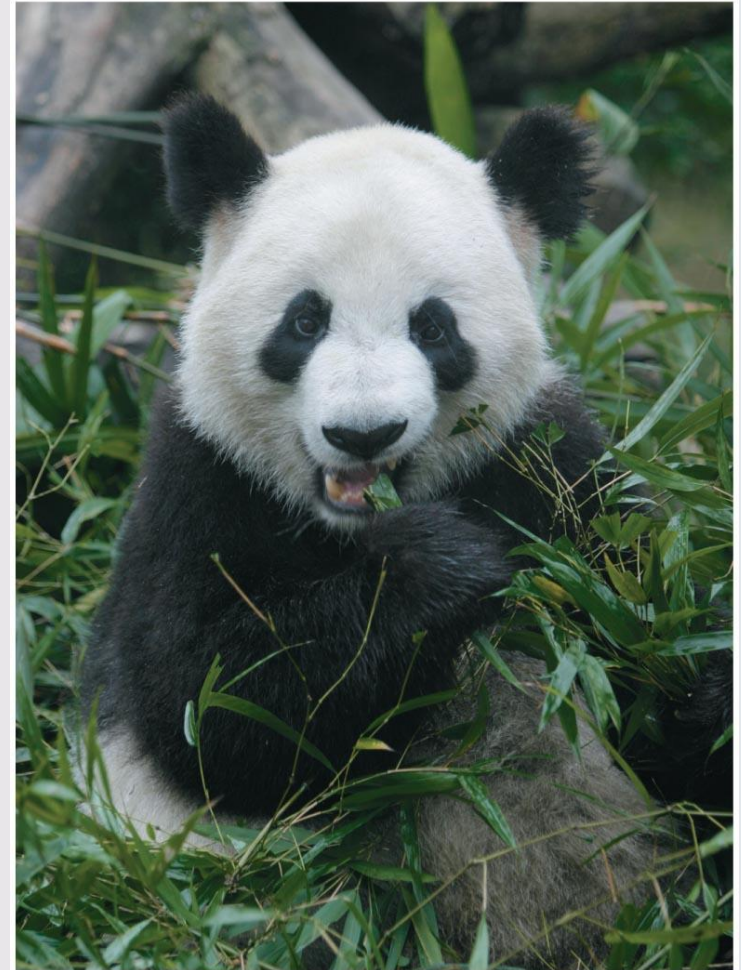
concentrations have risen by 39%, to the highest level in 800,000 years.



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Challenges in biodiversity

- **Biodiversity:** The cumulative number and diversity of living things
- Human actions have driven many species extinct
- Biodiversity is declining dramatically



© 2011 Pearson Education, Inc.

Biodiversity loss may be our biggest problem; once a species is extinct, it is gone forever



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Challenges in Energy Sector

- The lives we live today are due to fossil fuels
 - Machines
 - Chemicals
 - Transportation
 - Products
- Fossil fuels are a one-time bonanza
 - Supplies will certainly decline

We have used up ½ of the world's oil supplies; how will we handle this imminent fossil fuel shortage?



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

NATURAL RESOURCS

WATER RESOURCS



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

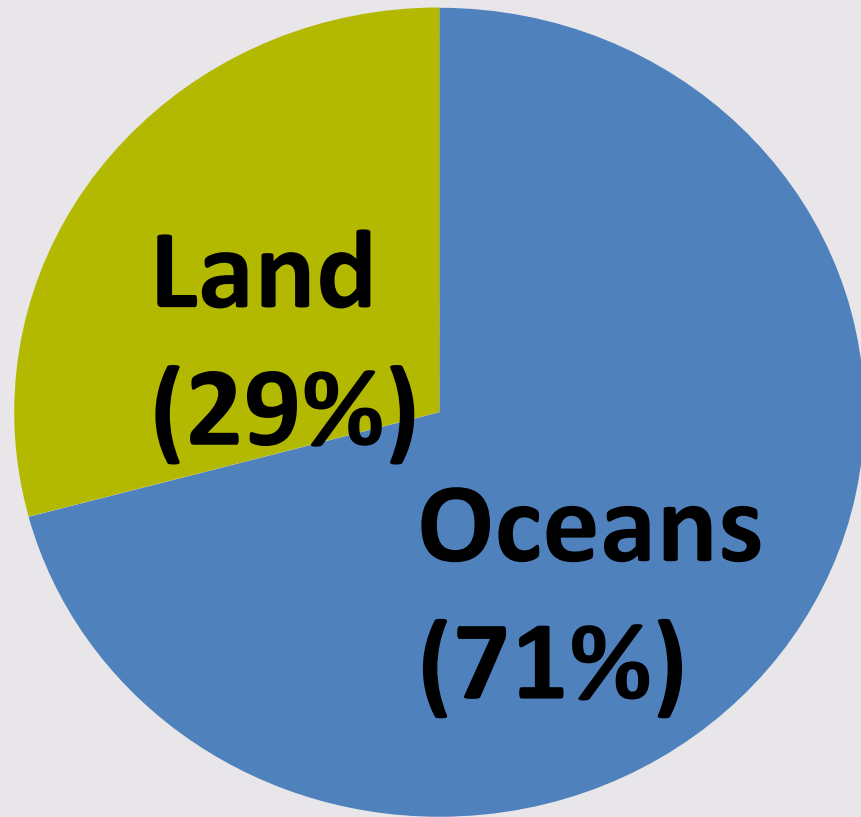
Global Overview

- While 71% of Earth's surface is covered by water, only less than 2.7% of global water is freshwater. Most of the freshwater (2.05%) are locked in ice caps and glaciers. Only less than 0.014% is available for human use.



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

**Most of the
Earth is
covered
by water**

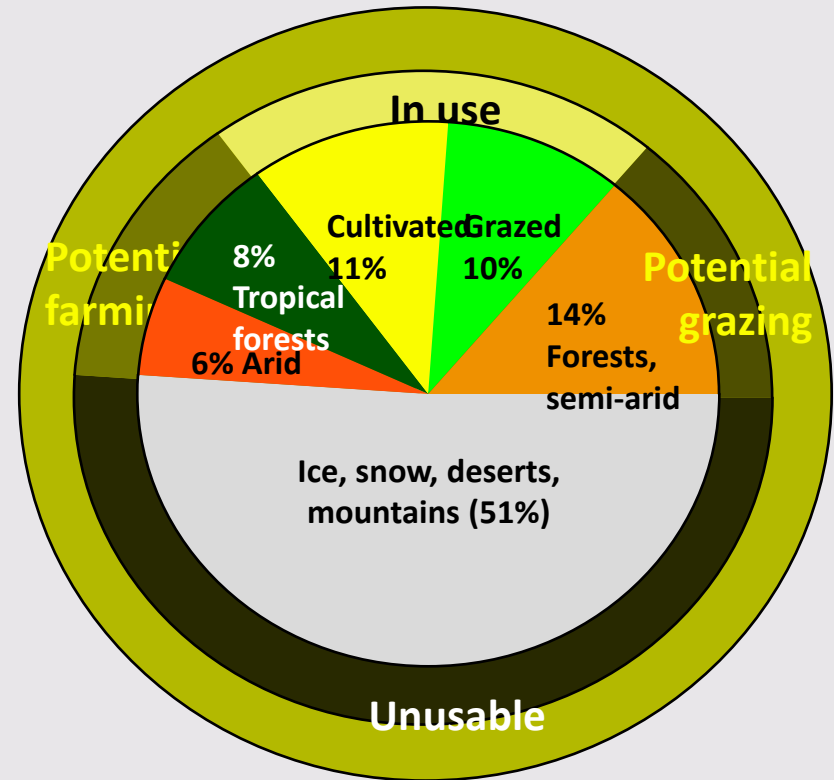
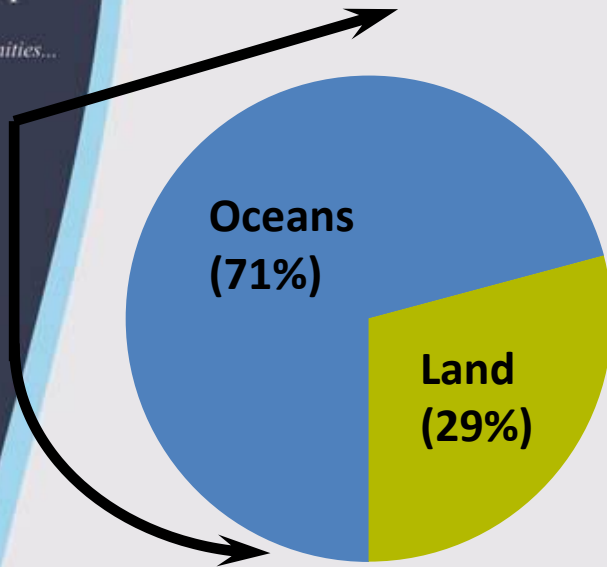


- *“...water, water, every where*
- *nor any drop to drink!”*



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

But the supply of land too is limited...

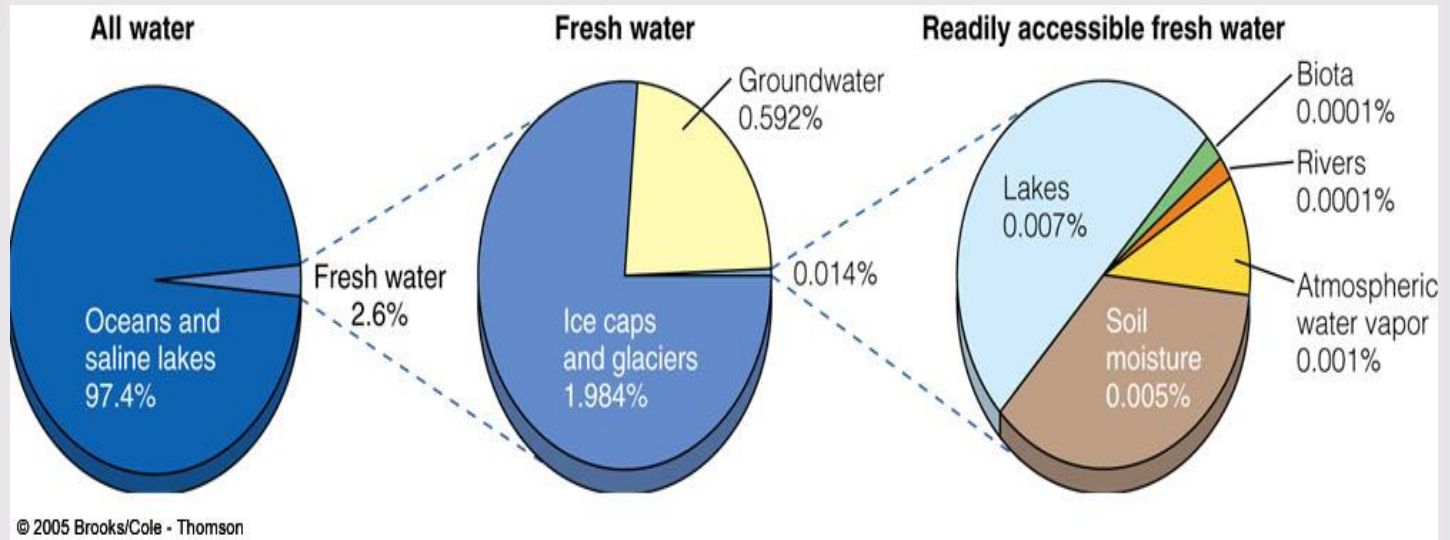


and barely a fifth of it is available for farming related activities.



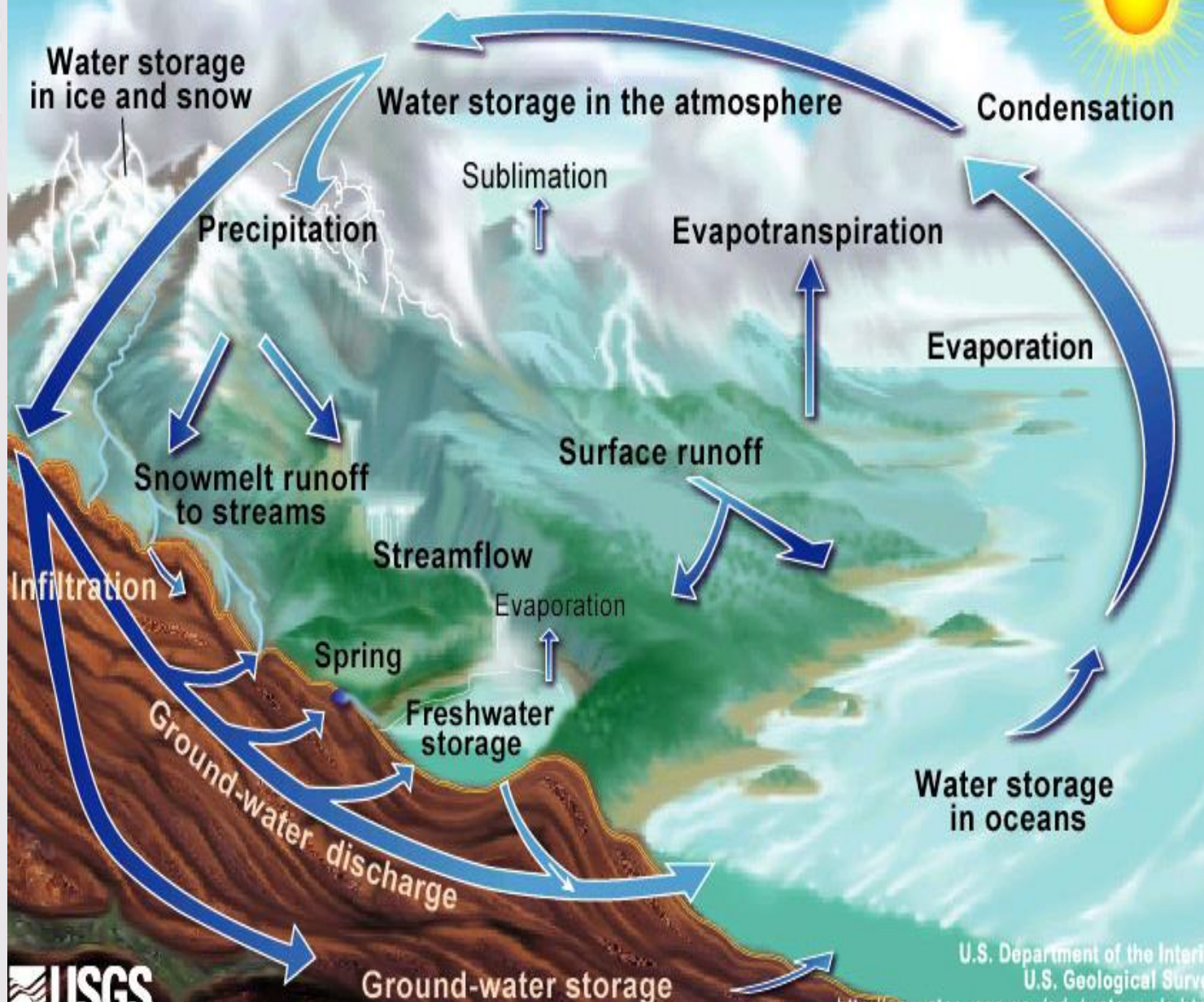
Supply of Water Resources

Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*



Small fraction (.014%) is readily available for human use

The Water Cycle



Centurion UNIVERSITY
Shaping Lives...
Empowering Communities...





Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Scarcity of fresh water

- On a global basis, fresh water is an increasingly scarce resource. It is partially caused by increasing population, consumption pattern and climate changes.



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Use of Water Resources

Humans directly or indirectly use about 54% of reliable runoff.

Withdraw 34% of reliable runoff for:

Agriculture – 70%

Industry – 20%

- Domestic – 10%

Leave 20% of runoff in streams for human use:
transport goods, dilute pollution, sustain
fisheries

Could use up to 70-90% of the reliable runoff
by 2025



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Water consumption for food production

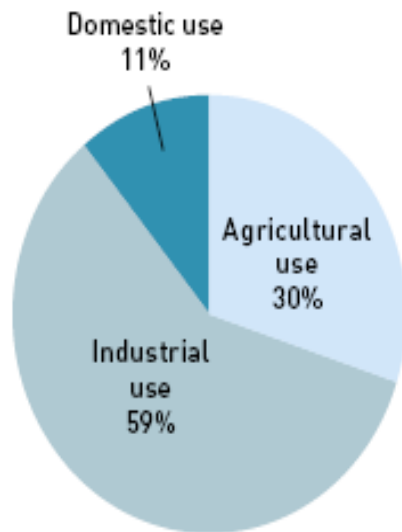
- Meat production use a lot of water when compared to growing food crops.
- A shift in food consumption pattern toward more meat consumption will cause a substantial increase in water consumption.



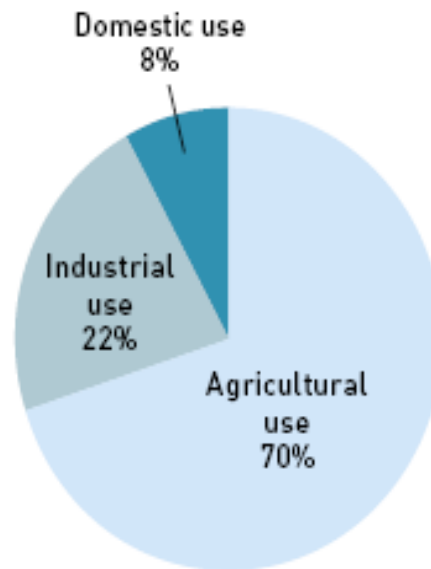
Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

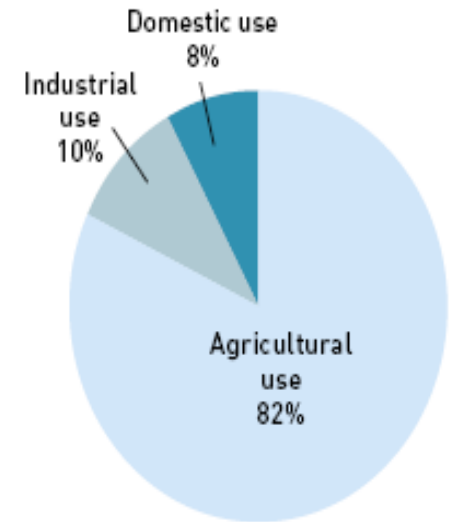
Competing water uses



Competing water uses
(high-income countries)



Competing water uses
(world)



Competing water uses
(low- and middle-income
countries)



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Competing water uses

- Industrialized / developed countries tend to use more water in their industrial production.
- Other countries tend to use more water for agricultural uses.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Water sources

Surface runoff – 2/3 lost to floods and not available for human use.

Reliable runoff = one third

Groundwater

Zone of saturation

Water table – top of zone of saturation

Aquifer – water saturated layers of sand, gravel or bedrock through which groundwater flows.

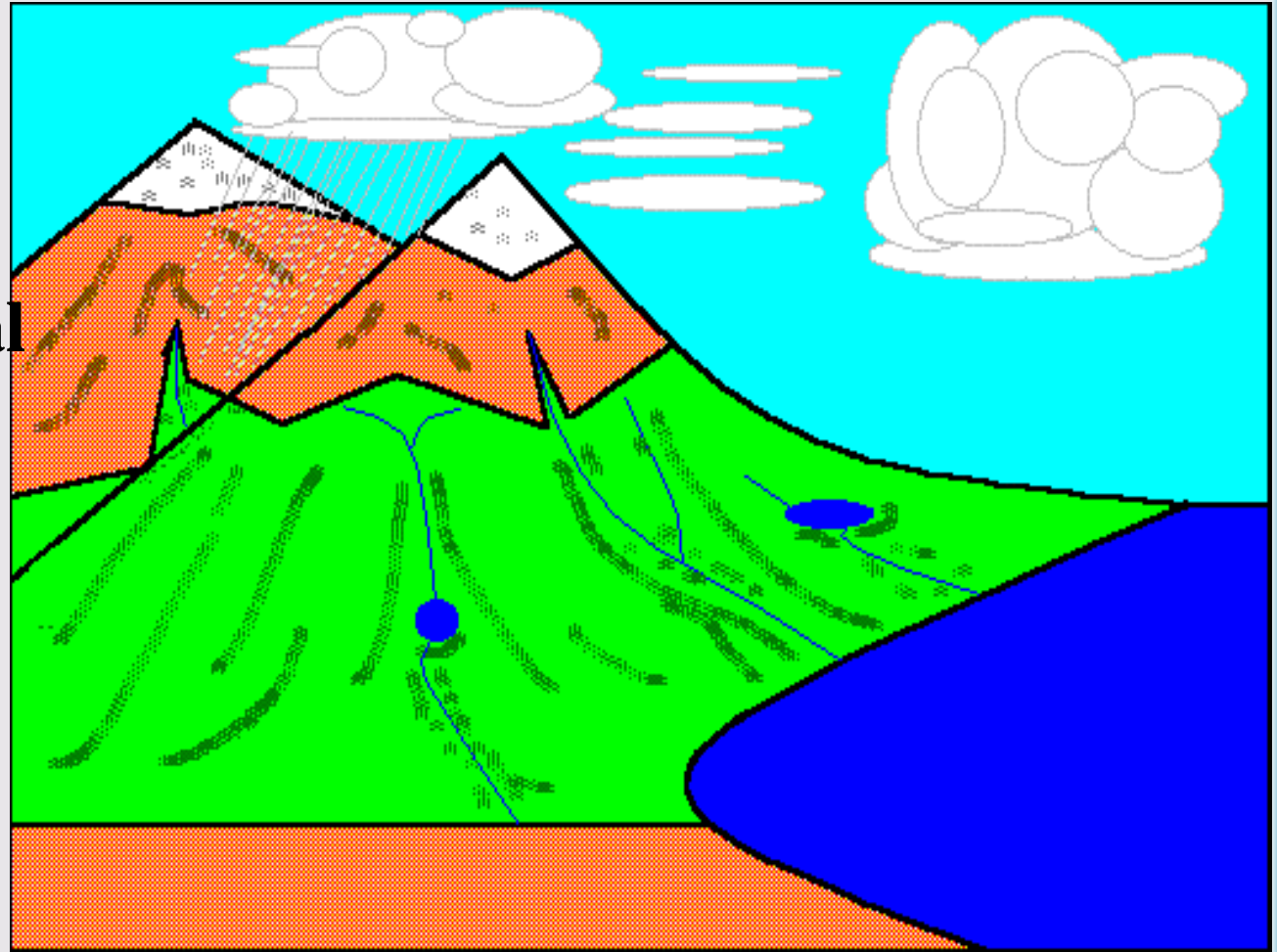


Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

hydro-logical
cycle is
merely
the re-
cycling
of water
between
land and
oceans.

The hydrological cycle





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Problems related to Water crisis

- Inadequate access to safe drinking water by over 1.1 billion people
- Groundwater overdrafting leading to diminished agricultural yields
- Overuse and pollution of water resources harming biodiversity
- Regional conflicts over scarce water resources sometimes resulting in warfare.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Threats to fresh water resources

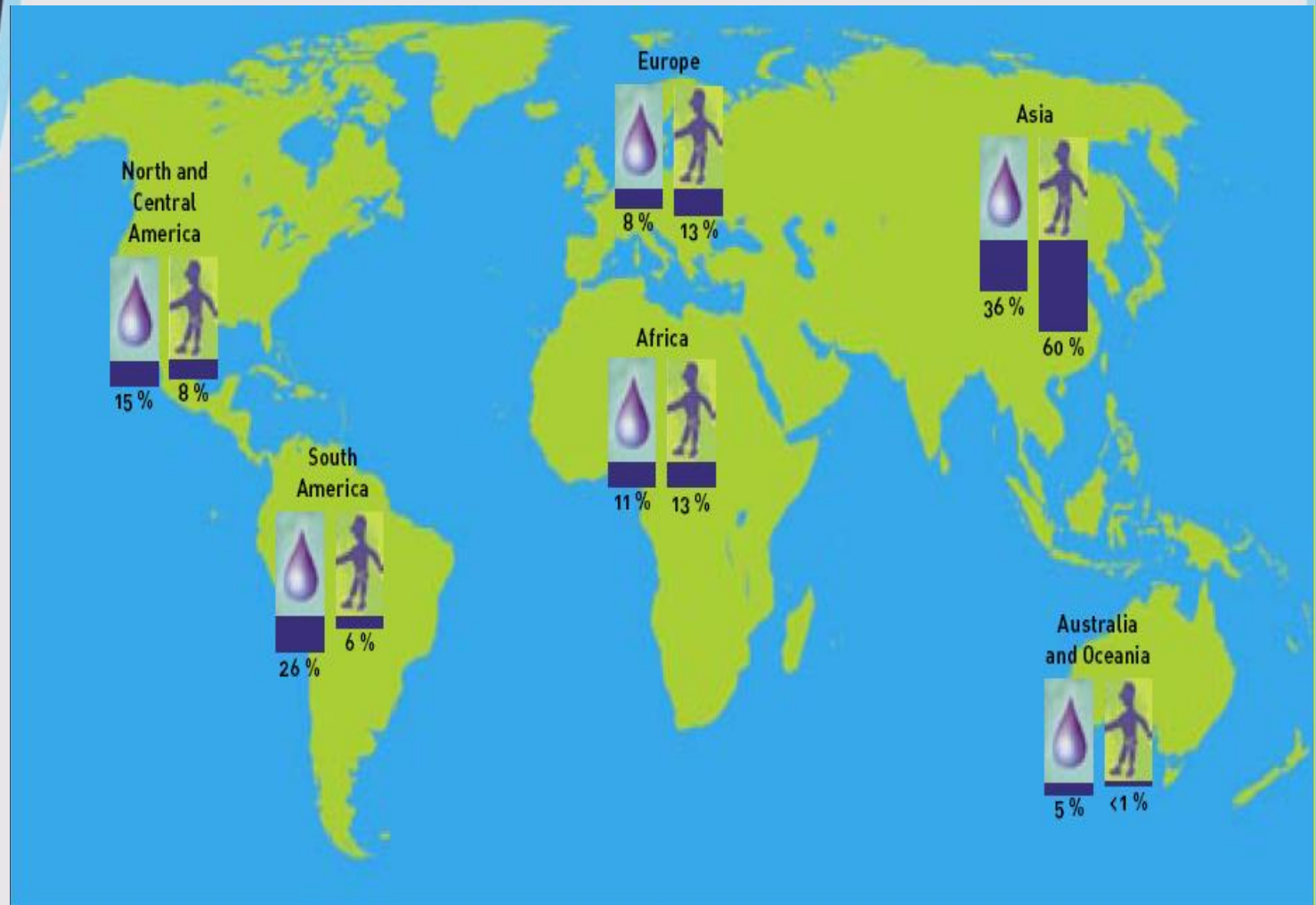
- Climate change causes change in frequencies of droughts and floods.
- Depletion of aquifers caused by over-consumption as a result of population growth.
- Pollution and contamination by sewage, agricultural and industrial runoff.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Distribution of population and water resources





Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Fresh Water Outlook

- Estimated from existing data, some countries are going to experience serious shortage of fresh water supply in the coming 20 years time.
- China, India and South Africa and Middle East countries may among the most adversely affected countries.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Desalination of sea water as fresh water supply

- Desalination of sea water can be done either via distillation or membrane process.
- Both process requires large amount of energy and thus costly, which means desalination remains an expensive option for providing reliable fresh water supply, restricted to only economically well-off countries.