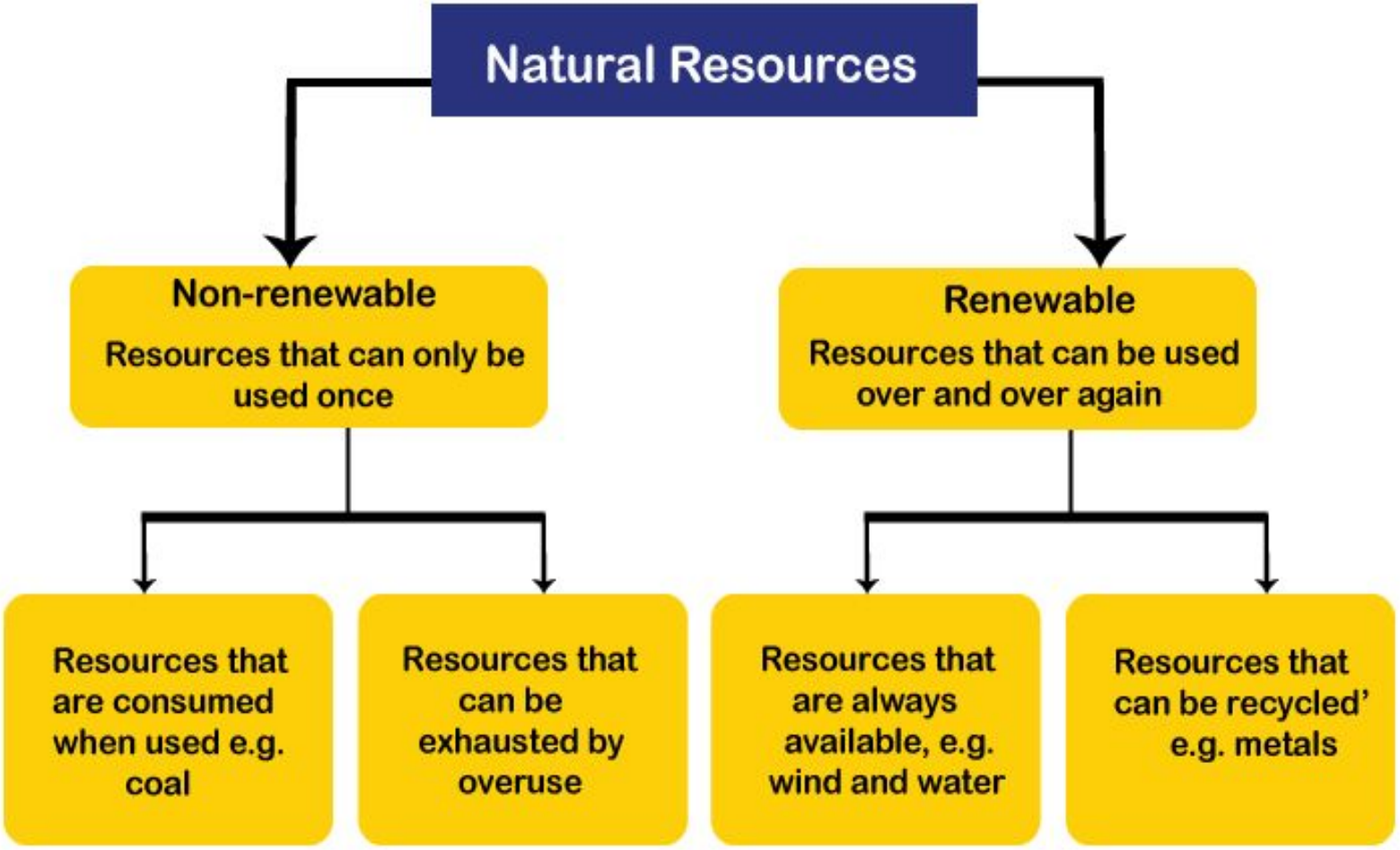
# Natural resources

- A natural resource may be defined as any material given to us by nature which can be transformed in a way that it becomes more valuable and useful
- On the basis of continuity, the resources are classified as under:

(1) Renewable Resources

(2) Non-renewable Resources


Natural Resources
Non-renewable
Resources that can only be used once
Renewable
Resources that can be used over and over again
Resources that are consumed when used e.g. coal
Resources that can be exhausted by overuse
Resources that are always available, e.g. wind and water
Resources that can be recycled' e.g. metals

# Natural resource management and its need

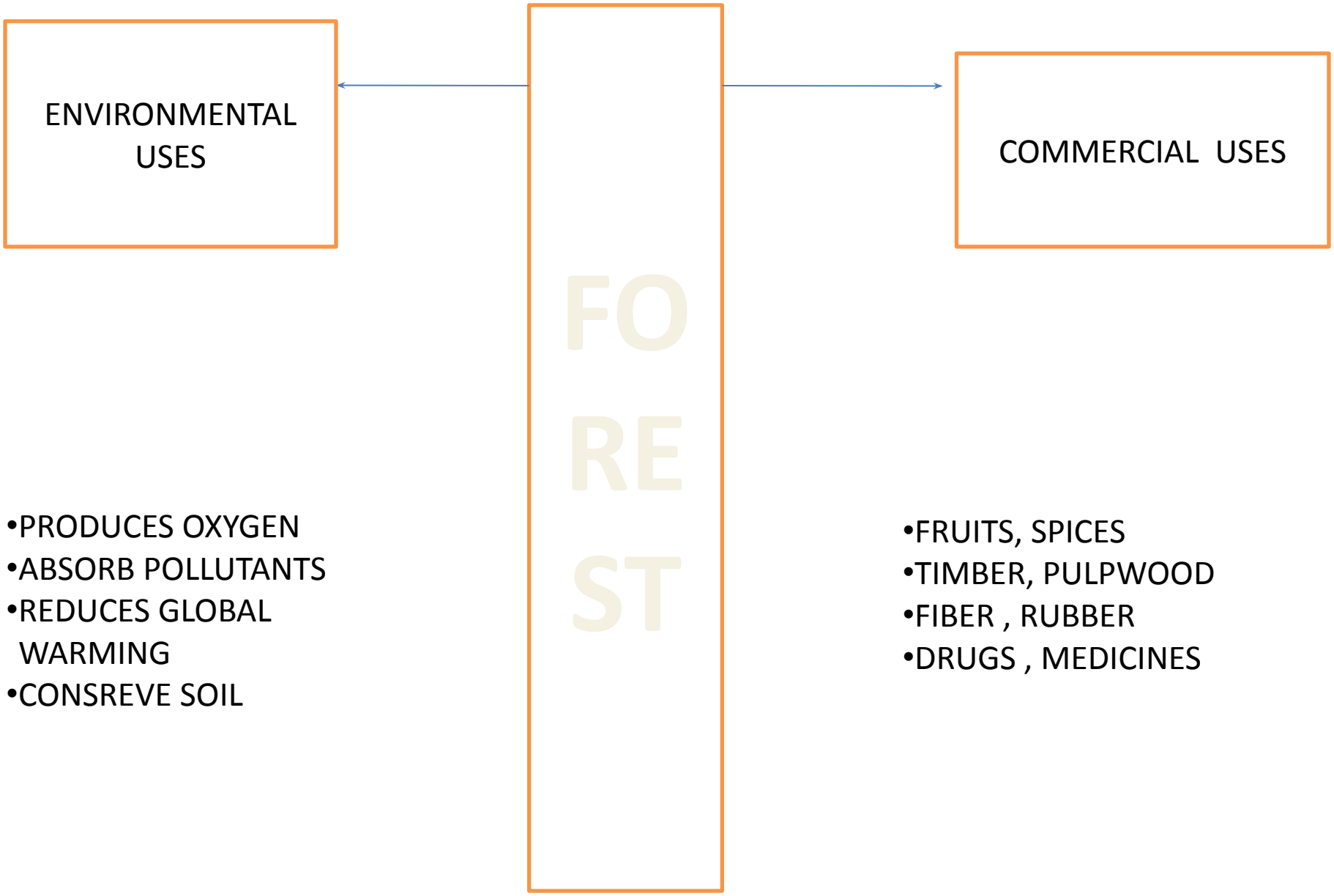
- Management of natural resources refers to the plan of action related to renewable and non-renewable resources. Natural resources like land, soil, water, plants and animals are affected by global warming, overpopulation, industrial expansion and other related reasons.

- To maintain a balance in the ecosystem.
- To avoid further destruction of the environment.
- To avoid over-consumption of the natural resources.
- Non-renewable resources such as fossil fuels such as oil and coal, which if extracted at the present rate, will soon be totally used up
- Though water and biological living resources are considered renewable. They are in fact renewable only within certain limit

# Forest Resource

- Uses and importance of forest

1. Ecological balance
2. Renewable resources
3. Economic development
4. Environment quality
5. Safeguard against pollution
6. Wind erosion
7. Attract rain
8. Control flood
9. Supply raw material


ENVIRONMENTAL USES
FO
RE
ST
COMMERCIAL USES
•PRODUCES OXYGEN
•ABSORB POLLUTANTS
•REDUCES GLOBAL WARMING
•CONSREVE SOIL
•FRUITS, SPICES
•TIMBER, PULPWOOD
•FIBER , RUBBER
•DRUGS , MEDICINES

# Over exploitation of forest

Population is increasing tremendously in our country. It has already crossed thousands of millions. Meeting its ever-increasing demand has resulted in over consumption of forests

1. Fuel wood, Timber and Pulpwood
2. Wood for Packing Purposes
3. Paper Board and Newsprint

# Deforestation

Deforestation is the process of felling trees indiscriminately resulting in nude or seminude land surface

Deforestation can be defined as the change of forest with depletion of tree crown cover more than 90%. However, depletion of forest-tree-cover less than 90% is considered as *forest degradation*

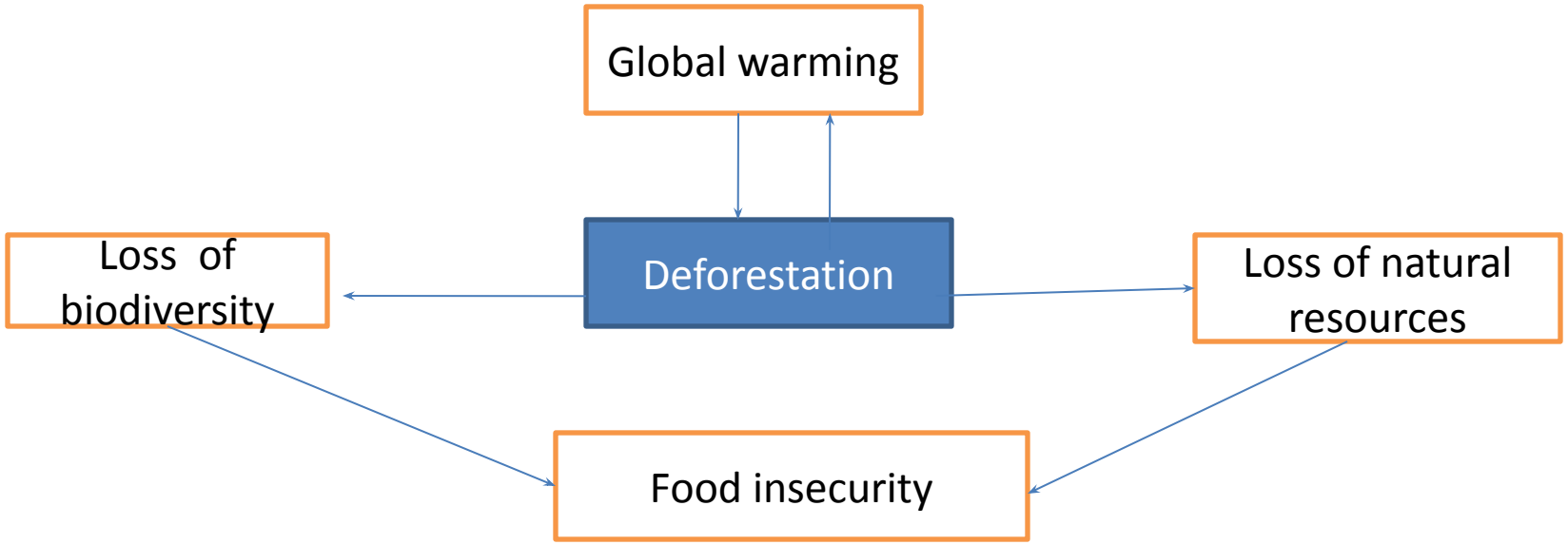
**Causes of Deforestation**

- Population explosion
- Agriculture: shifting cultivation, overgrazing, cash crop economy etc.
- Commercial logging: cutting trees for sale as timber or pulp
- Poverty
- Mining

- Dams
- Infrastructure creation for logging
- Forest fire
- Acid rain
- Development projects and housing projects

# ILL FFFETC OF DEFORESTATION

- Soli erosion
- Harm to fisheries
- More flood and droughts
- Habitat loss  of wildlife
- Local and global climate change
- Global warming
- Danger for the survival of local communities



# causes of deforestation in India

The deforestation in India is rooted in the commercially oriented forest use and ownership policies of British government which continued even after India gained independence. Immediate after independence, the other major causes of deforestation were

- State-sponsored agricultural expansion
- Rapid industrialization
- Urbanization
- Growing consumerism
- Policies and programmes of unsustainable developments like subsidies offered for making the paper and plywood industry a viable and profitable venture

- Lack of education and awareness
- Absence of strict implementation of laws
- Corruption

**Annual deforestation rate**

$$r = \left\{ 1 - \left[ 1 - \frac{A_B - A_E}{A_B} \right]^{1/t} \right\} \times 100$$

r= Annual deforestation rate(%)

t=number of years for given per

$A_B$ Area of forest at the beginning of period

$A_E$ Area of forest at the end of period

# Measures for conserving forest wealth

- Sustainable forest management
- Forest certification- be responsible consumers. Buy wood only from companies that follow sustainable practice
- Involve local communities in joint forest management
- Improve governance and accountability
- Accelerate education, research and training

# Case study

- Chipko movement
- Appiko movement
- The Bishnois
- The green belt movement
- Social forestry

Chipko movement was spread through India during 1970

Take place under leadership of Sunder Lal Bahuguna and Chandi Prasad Bhatt in Tehri Garhwal

# Timber extraction

- Timber is a term used to describe cluster of trees. It is also used to describe wood throughout its processing from the time it is cut down to the time it is used as a structural material.
- It is durable wood of high quality used of making different structures
- *Timber extraction* is the removal of timber from forests. It require various cutting, felling and hauling practices.
- Logging is the work or business of felling and trimming trees and transporting the log to a mill

# Impacts of timber extraction

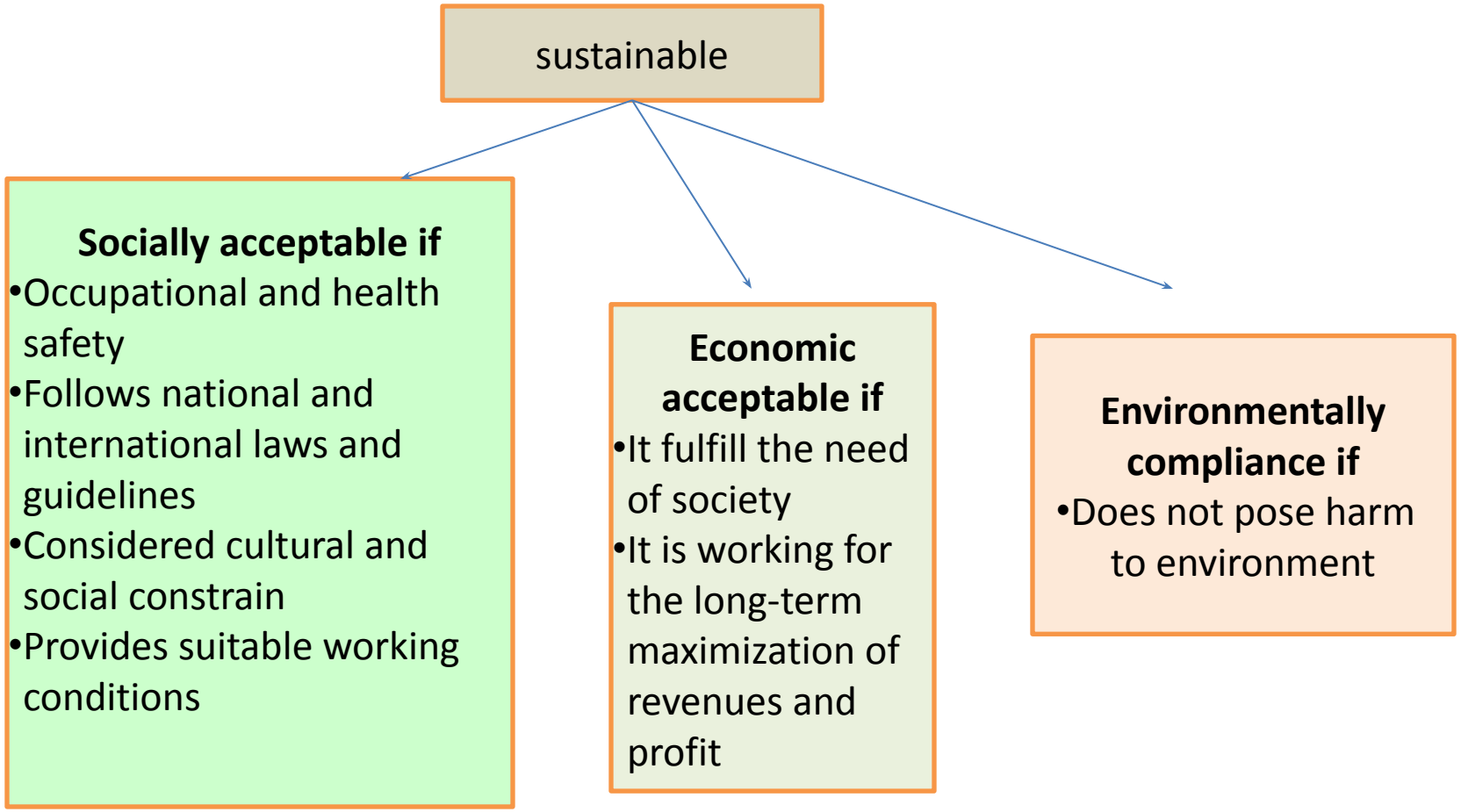
- Deforestation –(a) forest degradation -poor logging practice results in a degraded forest

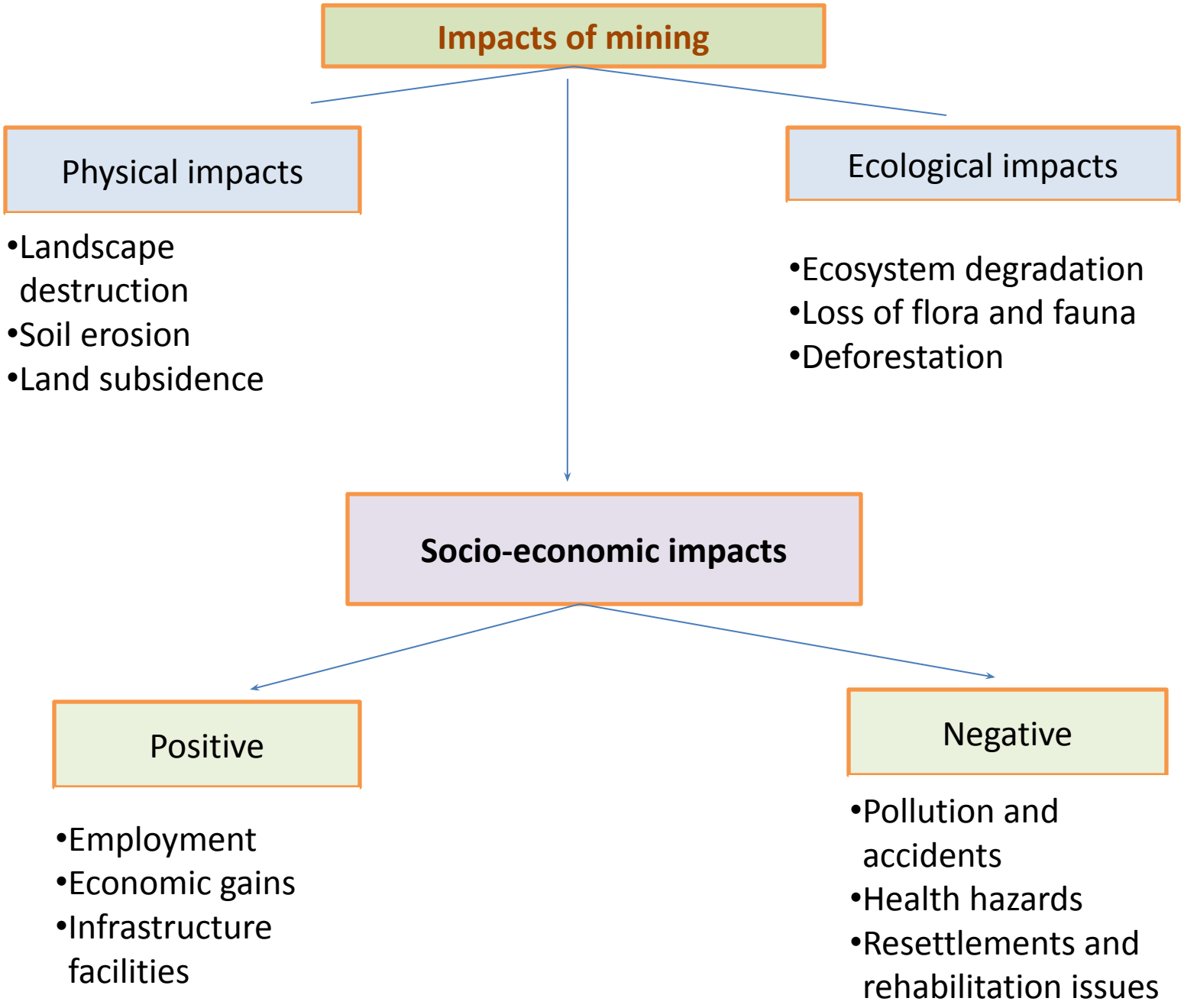
(b) Forest fire- timber extraction produces excess organic debris which make a forest more vulnerable to destruction in the event of fire

- Atmosphere
- Harm to nature
- Climate change
- Soil erosion and siltation

# Mining

- Mining is the extraction (removal) 0f metal and minerals from Earth




Impacts of mining
Physical impacts
•Landscape destruction
•Soil erosion
•Land subsidence
Ecological impacts
•Ecosystem degradation
•Loss of flora and fauna
•Deforestation
Socio-economic impacts
Positive
•Employment
•Economic gains
•Infrastructure facilities
Negative
•Pollution and accidents
•Health hazards
•Resettlements and rehabilitation issues

# Dams

A dam is a huge and giant barrier constructed across a river to obstruct its natural flow. Consequently, an enormously large artificial lake is created to store water. The water thus store is utilize for multipurpose service such as power generation, irrigation, flood and drought control, etc.

Construction of dams in countries like India displace a large number of people because of the high population densities.

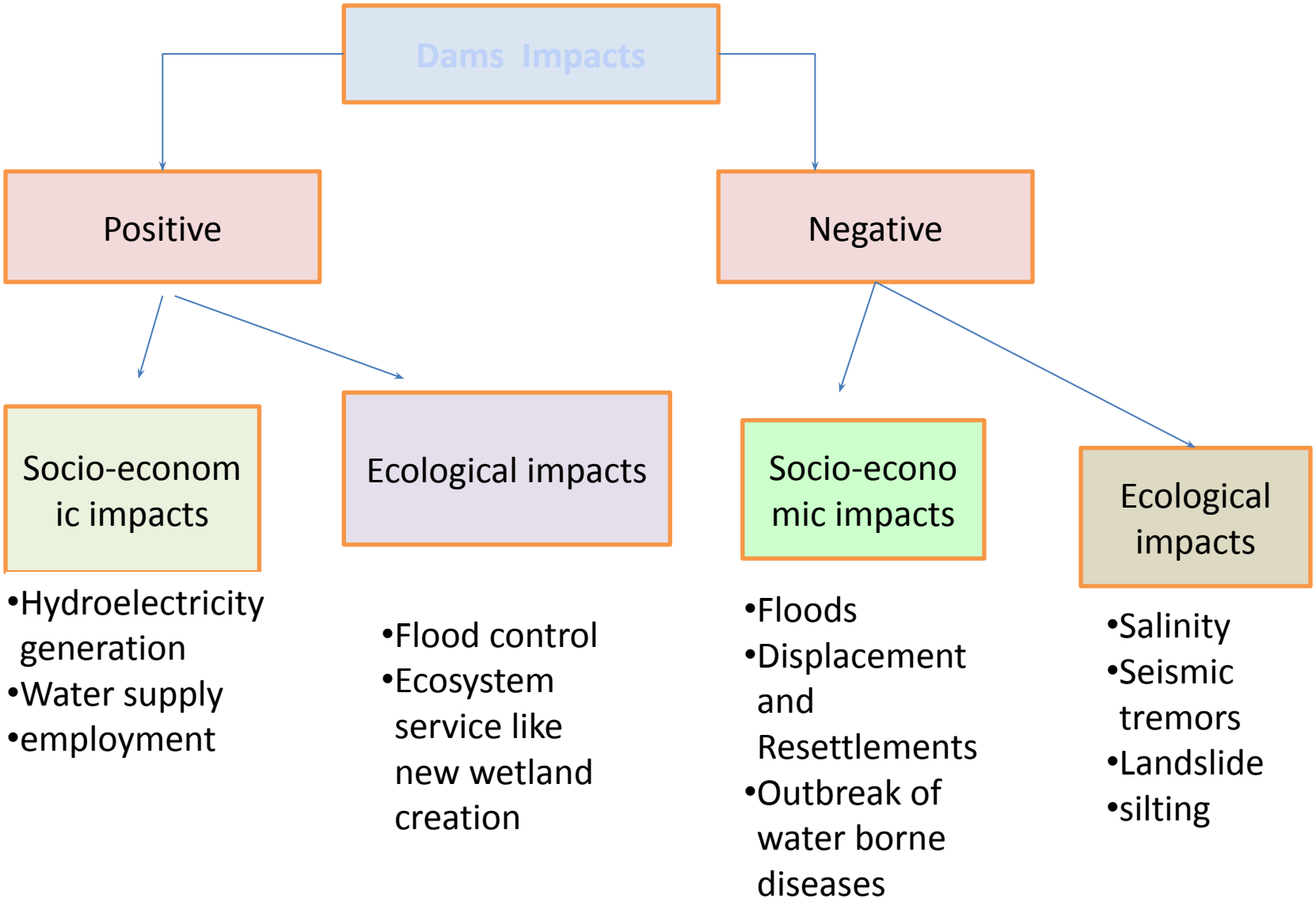
# Effects of dams on tribal people

- No human rights- human rights violet create unrest among tribals
- No basic amenities- force to migrate to urban slum
- No benefit sharing-hardly get benefits of development projects that cause their displacement
- No home- force to leave their ancestral home
- No cultural identity- tribal communities get displaced, traditional support system get broken and cultural identity get devaluated because of dams

# Effects of dams on forests

- Forest area get clear and submerged
- Forest area is also clear for the construction of infrastructure
- Forest are also destroy for getting fuel and timber
- Irrecoverable loss to ecosystem and biodiversity

# Dams-Benefits and problems

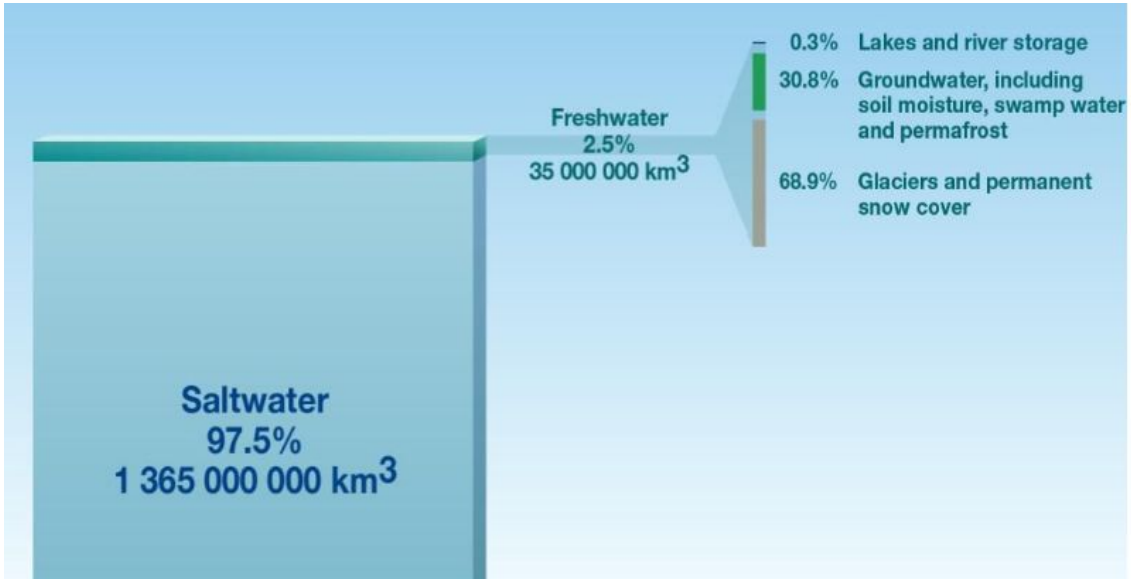


# Water Resource

- Water resources are sources of water that are useful or potentially useful to humans
- Prerequisite for the existence of human of life
- Water is essential for economic growth, environmental stability, biodiversity conservation, food security and health care

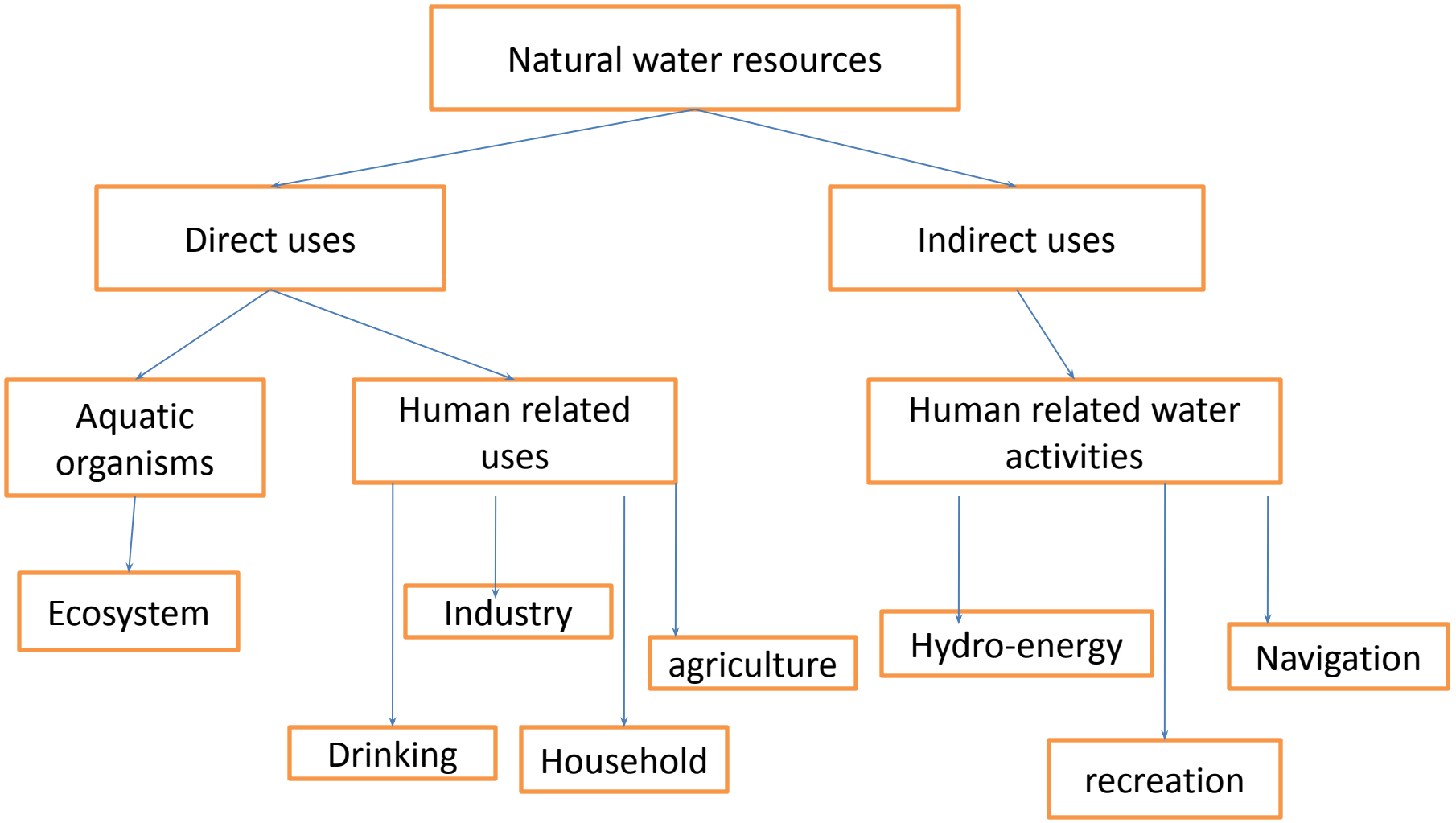
# Water Resource Distribution

- Earth is known as the "Blue Planet" because 71 percent of the Earth's surface is covered with water (National Groundwater Association)



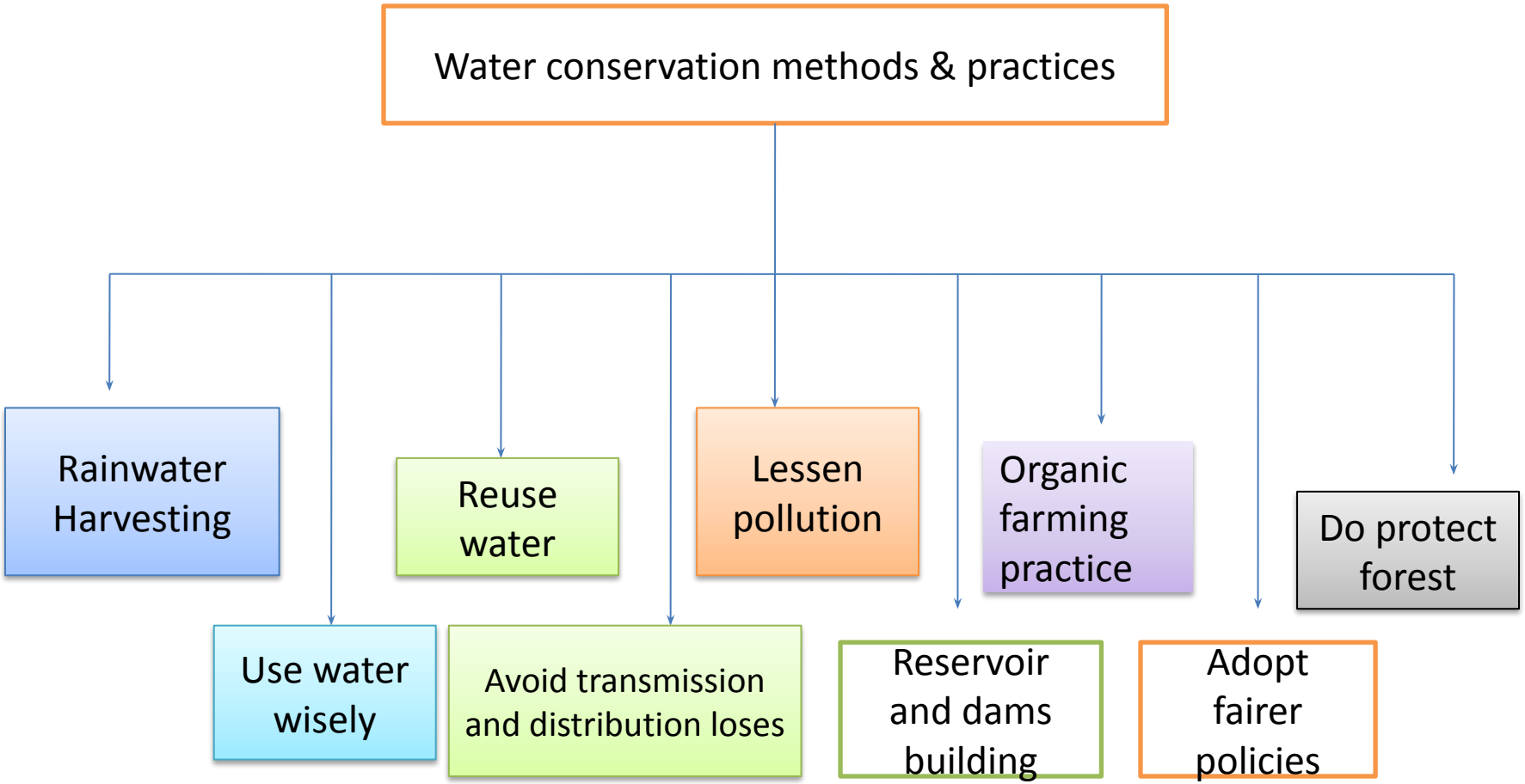

Source: National Geography Society

# Uses of water



# Water conservation

- Water conservation is the practice of using water efficiently to reduce unnecessary water usage
- Water conservation is the most cost-effective and eco-friendly way to reduce our demand for water



# Various methods of rainwater harvesting

Rainwater harvesting means collecting rainwater and storing/conversing it for later use

I ) Storage of water on surface for future use-traditional harvesting methods like artificial lakes, ponds, etc.

II) Recharge of groundwater- the structures are use for recharge of groundwater as follows:

(a) Hand pumps- the water should pass through a filter bed before percolation in the exiting hand pump. They are also used for recharging aquifers

(b) Pits- they are 1-2 m wide and 3m deep. They are also back filled with gravel and coarse sand to aid filtration before percolation to the ground. They are used for recharging a shallow aquifer.

(c) Dug wells- the rain water, after filtration, is put into existing dug well for storage

(d) Roof-Top and Road-Rop collection of rainwater- In urban areas, these methods are very useful to recharge aquifers.

# Watershed management

- Watershed is a geographical area of land that collects, store and release water.
- The area collects water from rain, snow, etc. This collected water is store in lakes, and ponds. The stored water is then release through streams, rivers, etc. Thus, a watershed means a land from where water drains into particular stream, lake, river, estuary, and even the ocean.
- Drainage basin and catchment basin is the other term used interchangeably with watershed.
- **It's a land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean**.
- A watershed is a natural system. All lands, humans, wildlife and their activities are one or the other watershed. When watershed kept in good condition, it provides sustainable benefits to humans, wildlife, etc.

Watershed management refers to the conservation, protection, and restoration of a watershed to secure water-both in quantity and quality for drinking, sanitation and agriculture in a sustained manner.

**Strategies for watershed managements: CUBS**

**C:** do the **cost-benefit** analysis of ecological effects of alternative actions

**U: Usage goals-** develop goals for use of water and land resource

**B: Background** of people and functions of watershed-find out present and historical structure and functions of the watershed system among people of diverse social background and values.

**S:** solution for **sustainability-** suggest innovative cost-effective solutions optimum resource use in long-term sustainability of the watershed and the ecosystem

# Action plans for watershed management

i) Mapping: mapping of watershed area, planting trees and grass for enhancing seeping of water to the ground and for preventing water contamination, torrents and landslides. Thus, plantation helps in the recharging of groundwater

ii) Constructing a series of long trenches and mounds along hills contours to hold rainwater and allowing it to percolate into the ground

iii) Making dams for preventing large amounts of water from rushing down the hillside. This helps in recharging of an underground aquifer. Moreover, streams and rivers flow for the whole year.

# Need of watershed management

Misuse: the misuse of Himalayan slopes are increasing. Our water regimes are threatened resulting in the depletion of water resources

Unsustainable: the society is becoming unsustainable

Damage: the damage to irrigation system and reservoirs are increasing. Every year, during the rainy season, cost for controlling floods is increasing

# Advantages of watershed management

- Reduce water shortage
- It provides  wildlife and fish, food, habitat, and resting area etc., for sustainable revival
- It protects streams and river banks from erosion
- By retaining water and releasing it during summers, watershed management reduces chances and associated damages of floods
- Provide good quality water and food for human use

# Conflicts over water

- Water might be the source of the world's next big conflict. This is because fresh water availability is limited but its demand is rising day by day

I ) Infrastructure failure- the cost and environmental risk due to failure of drinking and wastewater infrastructure are high

II ) Rapid urbanization

III ) Population growth

IV ) Increasing Affluence- means more water consumption. Expansion of business activities requires more water supply

V ) Climate change-a) increase transpiration of surface water

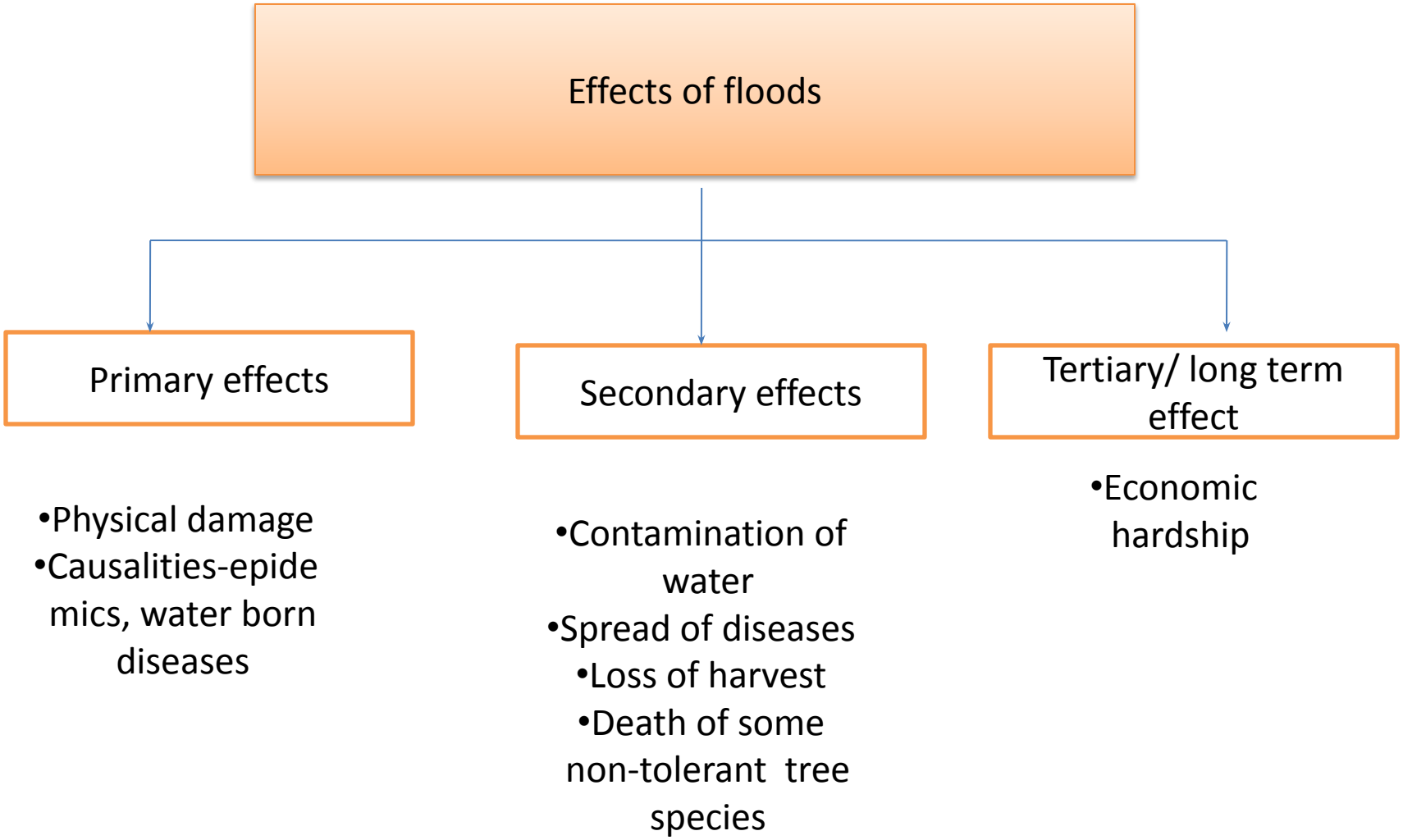
b) may increase rainfall and flood intensity challenging water management

VI ) conflict over equity, access, allocation, and quality

- Where water crosses cultural, economic, political, or legal boundaries, the stage is set for disputes between different users. The user try to safeguard access to a vital resource, while protecting the natural environment.
- Management and transformation of water conflicts require implementation of right strategies for anticipation, addressing and mediation between competing user
- If this is not done conflicts over water are likely to become more frequent, more intense and more disruptive around the world

# Floods

- Flood can be defined as a temporary rise of the water level, as in a river or lake or along a sea coast, resulting in its spilling over and out of its artificial or natural confines onto land that is normally dry or flood is a temporary covering by water of land not normally covered by water.


Effects of floods
Primary effects
Secondary effects
Tertiary/ long term effect
•Physical damage
•Causalities-epide mics, water born diseases
•Contamination of water
•Spread of diseases
•Loss of harvest
•Death of some non-tolerant tree species
•Economic hardship

# Benefits of Floods

- Water Availability- helps in recharging groundwater. And provide water in arid and semi-arid regions where precipitation is not distributed evenly throughout the year
- Ecosystem services-maintain ecosystem in river corridor and flood plain biodiversity
- Increase soil fertility
- Improved fisheries-flooding adds a lot of nutrients to lake and rivers which help in improved fisheries for some years. Fish, like weather fish, make use of floods to reach new habitat
- Benefits to Birds- from boost in production
- Higher viability of hydro-energy projects—higher in flood-prone regions

# Flood disaster impact minimization

- Forecast by responsible a agency
- Listen and follow the instruction of emergency
- All possible help by government and administration

# Drought

- Drought may be defined as the deficiency of rainfall (relative to the statistical multi-year average for a region) over an extended period of months or years.

**Types of Drought**

I ) Meteorological drought- it is brought about when there is a prolong period with less than average rainfall. According to IMD meteorological drought occurs when the seasonal rainfall receive over an area is less than 75% of its long-term average. The drought can be classified as ‘moderate’ of ‘severe’ depending on the rainfall deficit 26% to 50% or exceeds 50% respectively.

Usually, meteorological drought precedes the other kinds of drought

II ) Agricultural Drought- it is drought that affects crop production or ecology of the range. It is caused extended period of below-average rainfall resulting in a shortfall in water for the crops. It typically witnessed after a meteorological drought but before hydrological drought.

III ) Hydrological drought- when water available in sources such as reservoirs, lakes or aquifers fall below the statistical average.

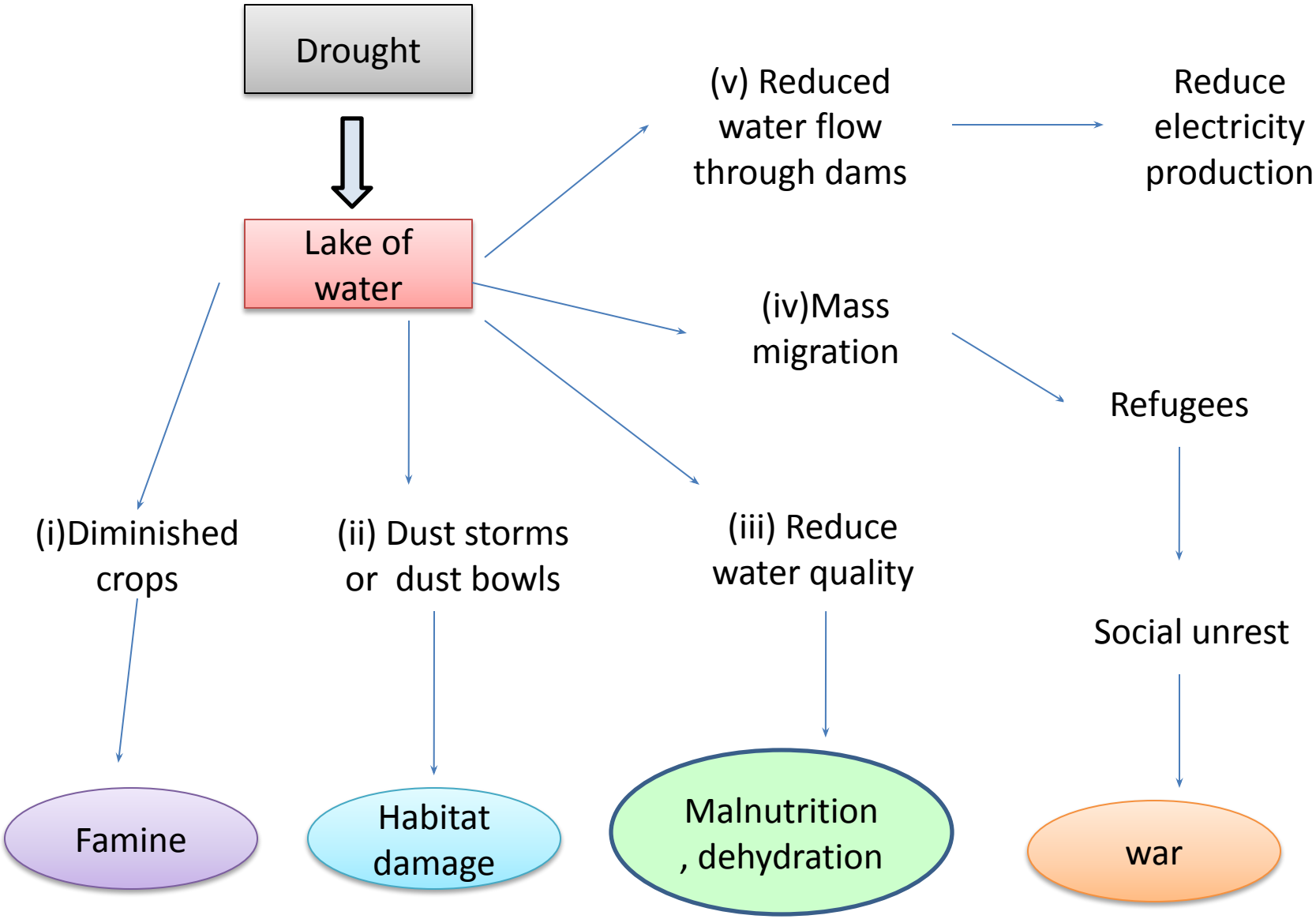



Fig: Effects of drought

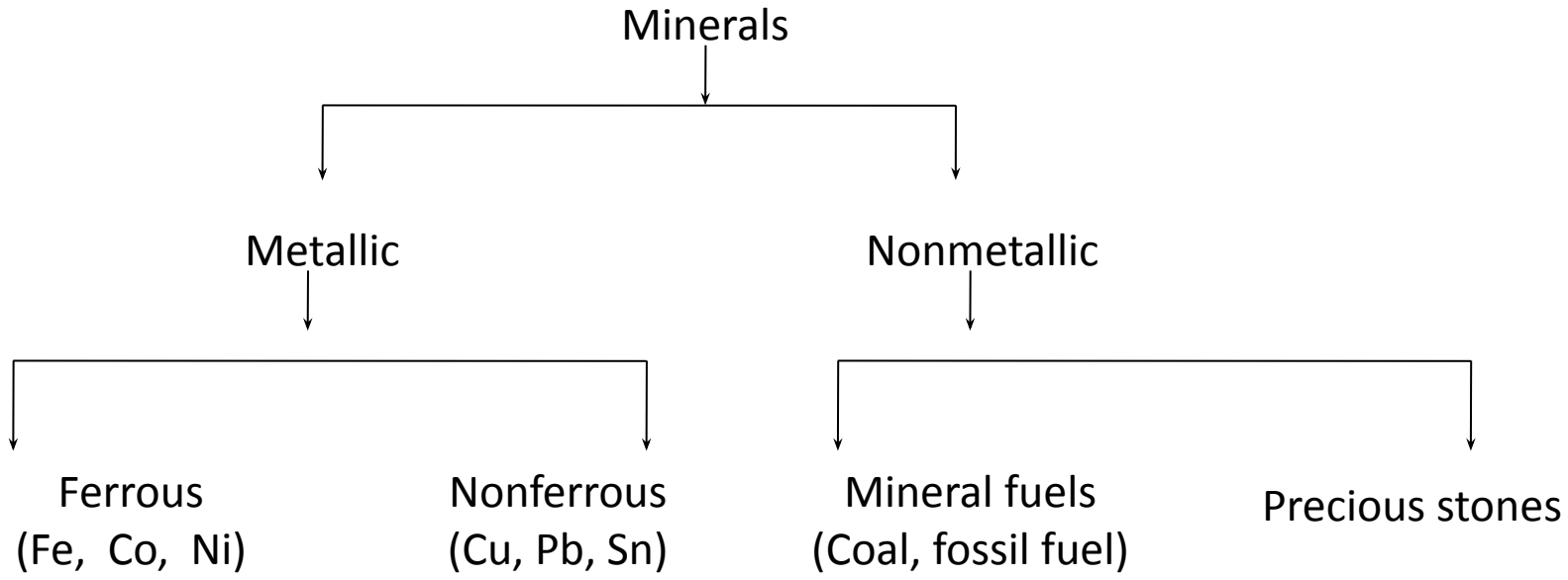
# Strategies for mitigation of drought impacts

- An artificial techniques of cloud seeding helps in inducing rainfall
- For consumption or irrigation, desalination of sea water can be done in time of scarcity
- Carefully planned crop rotation can help to minimize soil erosion.
- Rainwater harvesting
- Treatment and purification
- Redirecting river for irrigation in drought-prone areas
- Regulating water use

# Mineral resources

*Minerals* are naturally occurring, inorganic, solid, crystalline substances which contain a specific composition of elements.

A mineral which can be extracted and processed at a profit is known as an *ore*



# Importance of minerals

- Almost all rocks are made of minerals
- They have high aesthetic value, e.g. gemstones
- They have natural resource value:

(a) Minerals are source metals needed for electronic manufacture, airplane, cars, etc.

(b) minerals are raw materials for making window glass, plaster, etc.