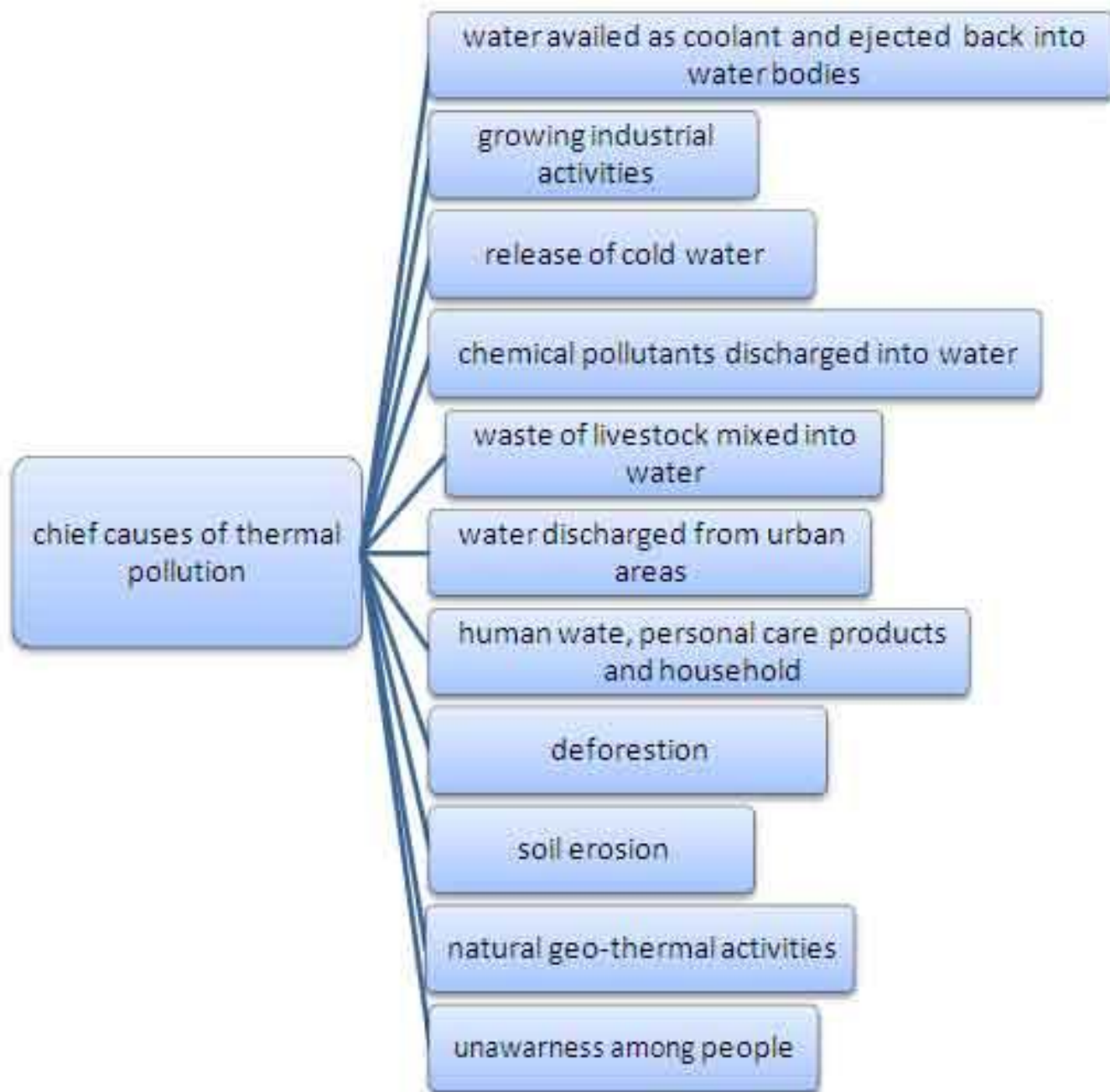


THERMAL POLLUTION

What is **Thermal Pollution**?

- Increase in the normal temperatures of natural waters caused by intervention of human activities.



Major Causes

- Nuclear power plants
- Hydro-electric power
- Coal fired power plants
- Industrial waste
- Deforestation
- Soil erosion
- Burning of fossil fuels

Nuclear Power Plants

- Nuclear power plants use water as a cooling agent.
- After the water is used, it is put back into a water supply at 9-20°C warmer
- Hydro electric power plants generate less heat compared to nuclear power plants

Coal Fired power plants

- Coal used as fuel
- Condenser coils cooled with water from nearby lake/ river
- Heated effluents decrease DO of water
- Damages marine organisms

Industrial Waste

- Discharged water from steam electric power industry using turbo generators
- Temperature of receiving water increases by 6-9°C

Deforestation

- The decrease in vegetation increases the amount of light that hits the water, which increases the temperature of the water
- Deforestation also increases erosion

Soil Erosion

- Erosion makes the water muddy, which increases the light absorbed

Effects of Increased Water Temperature

- **Thermal shock** – aquatic life adapted to a certain water temperature can go into shock when the temp is changed even 1 or 2 degrees.
- Oxygen dissolved in water decreases
- Increases the rate of photosynthesis, which increases the amount of plant growth
- Increases the metabolic rate of fish, which increases their need for oxygen

Possible Solutions

- Energy chips (Energy Ciptm) Hafnium oxide bismuth telluride chip that convrts excess heat into electricity
- Desalination plants
- Less nuclear power
- End shoreline afforestation
- Prevent soil erosion

Control measures

- Cooling towers: A tower like device in which atmospheric air circulates and cools warm water, generally by direct contact (evaporation).
- Cooling ponds: The pond receives thermal energy in the water from the plant's condensers and the energy is dissipated mainly through evaporation. Once the water has cooled in the pond, it is reused by the plant. New water is added to the system ("make-up" water) to replace the water lost through evaporation.

Control measures

- Spray ponds: An arrangement for cooling large quantities of water in open reservoirs or ponds; nozzles spray a portion of the water into the air for the evaporative cooling effect.
- Artificial lakes as reservoirs
- Cogeneration: a process where waste heat is recycled for domestic and/or industrial heating purposes.