

Individual Sources of Drinking Water

Water can be classified based on its origin:

1. Rain water- source of drinking water only exceptionally.
2. Source water- source of drinking water in countries with shortage of groundwater (eg. Czech Republic).
3. Groundwater- better source of mass water supply than surface water because of its relatively good and stable quality.

Supply of drinking water can be either:

1. Directly from water treatment plant network (centralized supply).
2. Local supply (individual supply).
3. From a distribution network (bottled water, table water).
4. In emergencies from cisterns.

Capacity of natural spring as a water source can be estimated by measuring the number of litres emitted per minute. Capacity of drilled or dug wells are estimated by pumping trials lasting for a minimum of 14 days. Physical, chemical and microbiological qualities of water must be controlled. water quality is determined by laboratory analysis.

Groundwater

- Groundwater: Karst water- less desirable due to lower quality.
- Crack water.
- Infiltrated water- either *natural* (eg: infiltration through gravel or sandy alluviums of rivers such as the Czech river Jizera) or *artificial* (requires construction of ditches or basins in alluvium. Deep wells are then constructed at appropriate distance from the ditches and basins).
- Passage water- best kind.
- Mixed water.
- Mineral and curative waters.
- *Phreatic water*= groundwater that has an open surface.
- *Artesian water*= groundwater that is covered (under pressure).
- *Vadose water*= originates from surface water that has soaked through the earth's surface.

Water Protection Zones

Hygienic protection zones should be maintained around sources of groundwater.

- 1st degree protection zone- zon with diameter 100m that protect water plant reservoir, all construction is sanitised, reforestation and planting of bushes and grasses, no new construction, no recreational activities, fish bred to improve water quality.
- 2nd degree protection zone –surrounds the first degree zone, further distance of 2-5km, protects reservoir and feeder stream from direct pollution.

Optimally, the entire watershed of the reservoir's feeder stream would be under strict and systematic control. Restrict nitrogen and phosphorus in feeder streams by controlling waste water, agricultural run off and land uses such as petroleum and land depots. Restriction in storage and application of non-biodegradable products used in agricultural and forestry.

Surface Water

Less preferable source of drinking water due to:

1. always need treatment,
2. physical, chemical and microbiological quality fluctuates.

Quality of water in reservoir depends on:

1. altitude,
2. depth.

Eutrophication of water- occur in summer, an increased concentration of nutrients (esp. nitrogen and phosphorus) cause overgrowth of seaweed. Some weeds are toxic to animals and irritate the human skin and mucous membrane. Eg. 'Algae blooms'-excessive growth of cyanobacteria during hot summer (spraying of algaecide can prevent this). Water from large valley basins- Best surface water, relatively stable composition. Pond water- exceptional source of drinking water usually polluted and requires special precautions (pond's shallow depth and muddy bottom) used as service or process water.

Surface water has self purifying capacity- the purifying factors:

1. dilution, dissolving, sedimentation, crushing of large particles in streams,
2. sunshine-induce life of green organisms which act as purifying agents,
3. aeration of water increases oxygen content- stimulates the activity of organisms that reduce the amount of organic pollutants.

Categories of Surface Water Purity

Useful for pollution control and for evaluating the suitability of surface water as source of drinking water. There are 5 categories:

1. very clean,
2. clean,
3. polluted,
4. strongly polluted,
5. very strongly polluted.

Good drinking water requires that the quality of water entering the treatment plant is reasonably good (Category I or II). Category III and IV - used as service water at very high treatment cost.

Rainwater

Formed by condensation of atmospheric water vapour. Particulate matter formed in car exhaust - production clouds and increases likelihood of rain, US eastern seabord, 22% higher chance of rain on Saturdays than Mondays. Acid rain produced by lightening, NO₂ or SO₂ in air. Clean rain has Ph 5.2 (CO₂+ H₂O in air - H₂CO₂).

Water Treatment in Emergencies or Field Condition

Water is treated by cloud of flakes, which turn into *microflakes*. The micro flakes:

1. accumulate near the top of the reservoir,
2. form a cloudy layer under the surface to a depth of about 1/3 of the reservoir's depth-this layer known as *layer of sludge* is permanently renewed, the water is being purified as it passes through the layer. The process takes 35-45 minutes. Good results esp. in treatment of highly polluted water.

Links

Related Articles

- Drinking Water
- Mass Water Supply

Bibliography

- BENCKO, Vladimir, et al. *Hygiene and epidemiology : selected chapters*. 2. edition. Prague. 2008. ISBN 80-246-0793-X.