

ASSIGNMENT MODULE 3

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1. Explain six major non-domestic use of water.

The use of water can be mainly differentiated in domestic and non-domestic use of water. In the first case the water should have a good quality, since it is drunk by the members of the family, while in the second case the quality can have lower quality but the required quantity will be much higher.

As indicated by Smith (1972), some water demands, such as those of manufacturing industry and agriculture, are similar to public supply in being mainly abstractive, whilst navigation, recreation and amenity comprise non-abstractive requirements and are dependent on an adequate volume of water being left in rivers and other watercourses.

There are 6 types of major use of water: irrigation, industrial use, mining use, use in power generation, aquacultural use and recreational use.

The case of irrigation is the one taking the highest percentage of water use in the world, equal to about 70%. There are two options: spray irrigation and drip-feed irrigation system. The first one is less efficient than the other since it is spraying water over the plants, while dripping water exactly on the plant save a lot of water as it is in the second case.

The factories can use the water in different ways, and as part of the production process (for cooling, washing, boiling, cooking, diluting, as cleaning agent or to transport raw material) or as an ingredient of the product.

Looking at the mining use, the great amount is used during the extraction of material.

The use in power generation has to be considered as special because the water is not consumed in the use: the water, after passing in the turbines of the system, continues on its path in the river bed. Wherever is possible, also the construction of geothermal system to produce energy converting water into steam.

Another option for using the water is the aquacultural use, which it is known also as fish farming, where the fishes, crustaceans and molluscs grow in controlled condition in ponds or tanks, and at the proper time they are sold for food.

The last element of the list is the recreational use, where the water is not consumed (as in the case of power generation). One example of this is the water of the lakes, used for boat trips.

2. Briefly describe the important roles that water plays in the human body.

Water is a fundamental element of each human life. The human weight is made for about 60%, the blood is composed of 82% of water, and the brain for 95%. The human body needs to receive continuously water, and it should be potable, otherwise it can lead to diseases. The control centre is the hypothalamus. If the concentration of plasma in the blood increases, it means that the body is losing water (Encyclopaedia Britannica, 2013). The human body needs so much water that without it can survive only 3-4 days.

Water plays many relevant roles: thanks to it is possible to keep a sufficient level of hygiene; it is used to prepare food and also many foods have a high percentage of water, even if it is not immediately visible.

Water has also a key role inside the body: it is part of many aspects of the processing of the food once it enters in, from the saliva in the mouth to its function as lubricant during digestion and then when the nutrients are distributed in the different areas of the body. Also cells and organs of the body lives thanks to water.

Then in the process of eliminating the toxins and wastes water is also important because it is used in the urination and perspiration.

Another use of water in our body is the regulation of the temperature. In order to reduce the over-heating, the body starts sweating and the evaporation helps with a cooling effect on the skin (perspiration).

The water has also a vital role in the maintenance of a stable pH, which is essential to life. In fact, water is a measure of an acid and basic/alkaline balance, which falls on a scale range between very acid zero to a very alkaline 14 (McKeown, Bugyi, 2015).

3. List the types of people who are most vulnerable to waterborne diseases.

Explain your answers why and how to overcome the diseases

The waterborne diseases are the group of diseases that are within the wider cluster of the water-related health problems. These specific diseases can appear in the cases where water that is contaminated by pathogens originated by human or animal faeces. It falls under this denomination the cases where the food is prepared with contaminated water. The diseases are contracted when the infectious agent is entering the body. There are different categories of infectious agent: bacterial, viral, protozoal and helminths.

The most common diseases caused the infectious agent are diarrhoea and cholera. Within the population, the ones that are considered more vulnerable are the children, the older people, the disabled people, the ones with a long-term illness such as HIV/AIDS, and also the poorest households. All these people have more chances of contracting waterborne diseases because they have a weakened or not yet formed immunization system, or because they can have less opportunities to access to safe and adequate water or water-related services.

Globally, 88% of diarrhoeal disease is attributable to unsafe water, poor hygiene and inadequate sanitation. What should be borne in mind is that diarrhoea can lead to death, especially in the children under 5 years, which are very vulnerable due also to the frequency of the contact between their fingers and their mouth.

The most vulnerable categories should be sensitized on hygiene, including also the caretakers/parents. One aspect that is key in the reduction of the contamination of the diseases is the safe water chain, so that all the population should have clean water from the source where it is fetched up to the moment of its use.

Here below there is a simple table that shows with clear evidence how with an improvement in hand-washing the presence of diarrhoea can be much reduced.

Hygiene Practice	Impact
Hand washing with soap and water after contact with faecal material	35 per cent or more reduction in diarrhoeal diseases
Using a clean pit latrine and disposing of children's faeces in it	36 per cent or more reduction in diarrhoeal incidence
Improved Water Quality	14 per cent or more reduction in diarrhoeal incidence
Improved water quantity	22 per cent or more reduction in diarrhoeal incidence

Table 1: Esrey, 1996.

4. Suppose that inhabitants of a village obtain water from a spring. What advice would you give to the users about the prevention of contaminants entering the spring?

The spring is a particular source of water where groundwater is appearing on the surface. Its nature makes this type of source to be at risk of direct contamination from the run-off seeping through the topsoil. In case the water from the spring is coming from a deep and water-bearing layer can supply a higher-quality rather than a spring is next to the surface with a permeable layer.

Simple protection measures include fencing off or erecting a wall around the spring, building a headwall and a drainage system to protect the spring from erosion and steps or a ramp so that the users can access the source easily (Evans and Mara, 2011).

Regardless the position of the spring, a source that is considered protected should not allow any animal to access the water source or move very close to it, otherwise the risk of contamination will be high. So the construction of a stock-proof fence is going to protect it.

Also a good prevention in case of flooding or running surface water should be considered. In the situation where the spring is small, the people of the village can consider building a “spring box”, constructed around it with brick, or concrete, so that the water doesn’t reach the surface and flows directly into a box, and then flow out through a pipe. It should also be constructed a watertight cover with a lock, in order to allow inspection.

5. The following are pollution sources. Give two specific pollutants for each source.

a) A residential area:

b) A metal plating plant:

c) Agricultural activities:

d) An uncontrolled landfill site:

e) Urban surface water run-off

a) In the residential areas the risk is caused by open defecation and poorly constructed or maintained latrines where the human waste can pollute surface and ground water. As indicated by Evans and Mara (2011), they do cause groundwater contamination in some circumstances, but not in all circumstances. The unsaturated zone is very effective in reducing the travel of viruses and bacteria. The next consequence is the introduction of toxic substances into the aquatic environment due to the untreated or partially treated sewage.

b) Toxic effluents like cyanides and heavy metals can be present in wastewater from plating plant, which can also be the source of acidic wastes.

c) Where there is the presence of animal houses it will be produced a high quantity of organically polluted wash water: if there are any leakages in the lagoons or tanks where they are stored, it will pollute. In the agricultural activities another risk is the contamination due to the pesticides and fertilisers.

d) If the landfill site is not well designed or constructed, or very old, the risk is that generate leachate, which is highly polluting. The leachate is any liquid that has passed through matter and picked up dissolved substances and/or suspended solids as it passed through.

In addition to the organic matter, it is possible that in the landfill site toxic chemical pollutants may be produced in case industrial waste is dumped there.

e) The urban surface water run-off enters in contact with a number of different materials: sediment, copper, lead, zinc, hydrocarbons, rubber, detergents and litter.

Then this water may damage the rivers or lakes where it enters, degrading the quality of the water and its aquatic life.

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