**MODULE 3 ASSIGNMENT**

1. 6 Major non-domestic use of water include:

* Irrigation: About 70% of water used globally is in irrigation. Spray irrigation, where pressurized water is sprayed over plants to feed them, is often used on large farms. Greater efficiency of water use can be achieved by drip-feed irrigation systems, in which water is fed to the roots of plants through narrow pipes dripping water onto the soil surface near the base of the plant. This reduces losses by evaporation as it takes the water directly to the growing crops.
* Industrial use: water is essential in many industries. Some industries use piped water supplied from water treatment plants. Other industries draw water from underground and treat it on site for their own use. The water may be used either as part of the production process or as an ingredient, where water is one of the components of the product, for instance in a soft-drink plant. In the production process, it can be used for cooling, washing, diluting, boiling or cooking, and transportation of raw materials.
* Mining use: Mining activities use huge amounts of water in processing ore to extract minerals. In Ethiopia for example, mining for gold and other valuable metals is an increasingly important part of the national economy. Water plays a very significant role these mining processes.
* Use in power generation: Hydroelectric power (HEP) uses the energy from moving water and converts this to electrical energy. The development of HEP has transformed energy supply in recent years and more schemes are under construction or planned. The water is not ‘used’ in the sense of being consumed, because after passing through the HEP plant the water continues on its path in a river channel.
* Aquacultural use: Water can also be used in aquaculture, which is the farming of aquatic organisms such as fish, crustaceans and molluscs for food. Fish farming obviously needs water for the fish to live in. In this case, water is used to hatch fish eggs under controlled conditions, and the fish are grown to maturity in tanks or ponds, before being sold for food.
* 7 Recreational uses: Water plays an important role in recreational activities and here again it is not consumed in the process of its use. People do boat trips, surfing and swimming in lakes and several resorts are built along the shores.

1. Important roles water plays in the human body are:

* Inside the body, water serves as a lubricant during digestion of our food. Water in saliva facilitates chewing and swallowing, and the food goes down into the stomach with the help of water. The functions of all the body’s cells and organs depend on water.
* Water is involved in transporting valuable nutrients around the body in the bloodstream. Nutrients are broken down in the digestive system and transported to where they are needed in the body.
* Water is used by the body to remove harmful toxins and wastes through urination and perspiration. Water also helps to reduce constipation. Drinking enough water helps body organs such as the kidneys and the liver to get rid of waste products and further reduce the risk of kidney failure and related diseases.
* Water helps to regulate body temperature. The body controls over-heating through perspiration. When sweat evaporates from the surface of the skin, it takes heat from the body and produces a cooling effect.

1. Types of people who are vulnerable to water borne diseases are: low-income households and households with many young children, older people, and people with long-term illness such as HIV/AIDS. This is so because in developing countries, waterborne diseases are a major problem which contributes to the vicious circle that people are in. In many developing countries, there is a lack of medicine to treat ill people. Vaccination is usually very scarce as well. Many people weaken because of waterborne disease and, as a result, are more susceptive to other infections. Their physical capacity decreases and they cannot work and provide their families with money and food. A lack of sufficient nutritional food weakens people, especially children, even further. They become even more susceptible to diseases. Children run behind at school, because they cannot be educated when they are ill. Waterborne diseases frustrate the economic development of many people. The appearance of HIV in developing countries makes more people susceptive to infectious diseases. During wars and natural disasters (floods) many people are infected with waterborne diseases. In addition to that, children are vulnerable to infection because they frequently put their unwashed fingers in their mouths. Older people and young people usually have low resistance hence are at high risk of contracting diseases.

Can be overcome by the provision of safe drinking water, effective sanitation and good hygiene behavior, including food hygiene.

1. The advice I would give to inhabitants of a village obtaining water from a spring about prevention of contaminants entering the spring is that as much as possible they should exclude animals from the surrounding area by a stock-proof fence. Springs should be protected from flooding and surface water pollution by constructing a deep diversion ditch above and around the spring. The ditch should be constructed so that it collects surface water running towards the spring and carries or diverts it away. It needs to be deep enough to carry all surface water away, even in a heavy rainstorm.

Small springs are typically protected by a ‘spring box’, which is constructed of brick, masonry or concrete, and is built around the spring so that water flows directly out of the box into a pipe or cistern, without being exposed to outside pollution such as run-off, bird droppings and animals. The spring box should have a watertight cover with a lock as shown in the diagram below.



Spring Box Diagram.

1. Two specific pollutants for each pollution sources

* A residential area:

1. Human excreta: Open defecation and poorly constructed pit latrines are obvious sources of human waste and can easily pollute surface and groundwater. Where water-flushed sewerage systems are present, inadequately treated sewage can also be a major source of human waste.
2. Plant nutrients (Nitrates and phosphates): human and animal wastes or fertiliser that has been washed into surface water bodies by rain. They stimulate excessive plant growth in the water which leads to sudden increase in the population of microscopic algae (simple plants). When the increased population of aquatic plants dies, the decay of the organic plant material by bacteria can cause deoxygenation of the water, resulting in the death of other organisms such as fish.

* A metal plating plant:

1. Manufacturing and industrial effluents: Water is used on most of the processes in manufacturing and industrial plants. The range of different uses and processes can produce waste in the form of many different types of organic and inorganic material in suspension or in solution. Toxic effluents can also be produced in the paper, leather and electroplating industries. For example, cyanides and heavy metals may be present in wastewaters from electroplating. These plants can also be the source of highly acidic wastes.
2. Heavy metals: arsenic, copper, lead, mercury and cadmium are chemical pollutants that may be found in lakes, rivers and groundwater. These heavy metals can harm aquatic organisms and humans. Farmers who use river water polluted by urban wastes for irrigation in the cultivation of fruits and vegetables may find their crops affected by the accumulation of these chemicals.

* Agricultural activities:

1. Organically polluted wash water from cleaning animal houses: which results from intensive rearing of animals. The slurry is often stored in lagoons or tanks prior to spreading on land but problems occur when these lagoons or tanks leak or overflow, allowing the slurry to flow into watercourses or infiltrate groundwater.
2. pesticides and fertilisers: also pollute the water as highlighted under nitrates and phosphates above.

* An uncontrolled landfill site:

1. Leachate: any liquid that has passed through matter and picked up dissolved substances and/or suspended solids as it passed through. Many landfill sites, particularly those that are older and less well designed and managed, generate leachate, and is highly polluting.
2. Biological pollutants: These are the infectious agents (bacteria, viruses, protozoa and helminths) that are harmful to humans and other forms of life. Biological pollutants may get into water with dust from the air as rain falls but the most likely source is from water that is contaminated with human and animal wastes.

* Urban surface water run-off

1. Sediment: One of the most common sources of suspended solids and sediment is soil erosion, where the soil is washed away into rivers by rainwater run-off. Large quantities of suspended solids may reduce light penetration into the water, which can affect the growth of plants. Sediments may even suffocate organisms on the river bed.
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* WASH Module 3 Notes