Name of student: Michael Deng Kuau Akech

Admission number: SN207/11/2018

Course Code: PGD002

Course: Post Graduate Diploma in Water, Hygiene and Sanitation

Year: 2019

Month of Submission: 30/04/2019

Assignment: An Assignment of Module Three:

Institution of Learning: Strategia Netherlands

**ASSIGNMENT 3**

1. **Explain six major non-domestic use of water.**
2. **Irrigation**

About 70% of water used globally is in irrigation. In Ethiopia, the total area under irrigation is increasing and irrigation channels can be seen in some parts of the country. Spray irrigation, where pressurized water is sprayed over plants to feed them, is often used on large farms but greater efficiency of water use can be achieved by drip-feed irrigation systems. In drip-feed irrigation, water is fed to the roots of plants through narrow pipes dripping water onto the soil surface near the base of the plant. This takes the water directly to the growing crops and reduces losses by evaporation.

1. **Industrial use**

In many industries water is essential. Some industries use piped water supplied from water treatment plants while others draw the water themselves from underground sources and treat it on site for 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 example in a soft-drink plant. In the production process, it can be used for cooling, washing, diluting, boiling or cooking, transportation of raw materials (for example, moving potatoes in a food factory), and as a cleaning agent.

1. **Mining use**

Mining activities use huge amounts of water in processing or to extract minerals. In Ethiopia, mining for gold and other valuable metals is an increasingly important part of the national economy and would not be possible without the use of water.

1. **Use in power generation**

The rivers of Ethiopia have enormous potential for generating hydroelectric power (HEP). Hydroelectric power 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. However, it is important to realize that in HEP 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.

Another process under development in the Rift Valley area of Ethiopia is the use of geothermal energy, in which energy is derived from the heat of the Earth. This process involves drilling down into hot layers of underground rock and using this heat to convert water into steam, which is then used to drive generators to produce electricity.

1. **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. Although not currently practiced in Ethiopia, the business potential for aquaculture has been recognized and it may be introduced in the future (Rothuis et al., 2012).

1. **7 Recreational uses**

Water plays an important role in recreational activities and here again it is not consumed in the process of its use. Boat trips are popular on many of Ethiopia’s lakes and several resorts have been built on their shores.

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

* Water plays an important part in keeping us and our environment clean. It is essential for good personal hygiene. We use water to wash our hands and bodies, and also to wash places in our homes that could possibly harbour harmful microorganisms (such as toilets).
* Water makes up about 70% of an adult human being’s weight. In the human body, blood contains about 82% water and our brain is made up of about 95% water. Losing just 2% of our water content can result in signs of dehydration, fuzzy short-term memory and difficulty in focusing on smaller print or words displayed on a computer screen.
* 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.
* Many of our foods are prepared with water and others naturally contain large amounts of water (e.g. milk is made up of approximately 88% water; eggs 66%; fish 80%; potatoes 75%; and beef 77%).
* 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.
* 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 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. **List the types of people who are most vulnerable to waterborne diseases. Explain your answers why and how to overcome the diseases**

* Infants
* Young children
* Older people
* And people who are debilitated by diseases such as HIV/Aids are the most vulnerable to waterborne diseases.

Children are more likely to be affected because their immune systems are not fully developed; they constitute important reservoirs of the infections. Diarrhoea is a symptom of many waterborne diseases and it is the cause of 11% of death among children age under 5 across the world, with a reported total of 2195 deaths each day (Liu et al, 2002). Worldwide, 88% of diarrheal disease is attributable to unsafe water, poor hygiene and inadequate sanitation. In Ethiopia, 15% of all deaths are from diarrhoea, with the highest rate among young children (World Life Expectancy). Children, especially those under 5 years of age, are vulnerable to infection because they frequently put their unwashed fingers in their mouths.

Waterborne diseases are cause by causative agents which include bacteria, viruses, protozoa and helminths.

* The transmission route of waterborne diseases is when people drinking contaminated water and eating contaminated food with faecal matter from infected person because the origin of the contamination is faeces of people who are already infected by the disease. And some diseases may be transmitted via the faeces of infected animals.
* Lack of basic sanitation whereby people practice open defecation is more likely to cause waterborne disease outbreaks. It can also be a problem in emergency situations.
* Present of standing water such as swamps, lakes, pools and open channels dug for crop irrigation can attract mosquitoes to breed in because female mosquitoes stay near home in order to take human blood which is needed to develop their eggs.
* Lack of adequate water for washing which cause trachoma.

**How to overcome the diseases;**

* Prevention of human wastes. If faeces are effectively separated from people then the transmission routes of waterborne diseases are cut off. Health education has to be given to people so that they can change their attitudes and behaviour about human waste disposal.
* Proper use of latrine prevents the spread of many infectious diseases including diarrhoea, dysentery, cholera and typhoid fever especially if coupled with hand washing with soap or ash.
* The only way to significantly reduce incidence of the disease in children is to encouraging them to wash their faces regularly.
* Provision of safe drinking water, effective sanitation and good hygiene behaviour including food hygiene. Water for public consumptions must be palatable and safe. Palatable water is pleasant to drink, meaning it is completely clear and free from tastes, odours and colours.
* People do not step into the water while collecting it.
* Latrines, solid waste pits, animal excreta and other sources of pollution are located as far away as possible from the water source and on ground lower in elevation than the water source.
* There must be drainage that is always cleaned at least 5 metres away from the water source to avoid stagnant water.
* Water point must have fence to prevent animals from entering into the water source.
* Containers for carrying and storing water need to be kept clean inside and outside and covered to keep the water clean.
* Take food safety precautions to learn about the fundamentals of food safety so that you can protect yourself, your friends, family and people in your community. Wash and/or peel all raw vegetables and fruits before eating. Drink and eat only pasteurized dairy products (milk, cheese, yogurt and ice cream) and juices.
* Wearing long-sleevered clothing and using insect repellents help to keep people from being bitten by mosquito. At night, mosquito nets (preferably impregnated with permethrin, which is toxic to mosquitoes) or various sprays or vapours can be used to keep them away.
* Eliminating mosquito breeding sites
* Killing of larvae in standing water
* Use of screens on windows and doors

1. **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?**

Animals should be excluded from the surrounding area by a stock-proof fence whether the spring originates from shallow or deep rock layers. 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 and should also be applied in larger springs serving the towns.

1. **The following are pollution sources. Give two specific pollutants for each source.**
2. **A residential area:**
3. Heavy metals and some pesticides are particular problems because they are persistent in the environment, meaning they do not break down and their effects continue over time, even long after their use may have stopped.
4. 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.
5. **A metal plating plant:**
6. Factories producing chemicals often generate low volumes of highly toxic waste streams.
7. 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.
8. **Agricultural activities:**
9. Cultivation and overgrazing can make soil erosion more likely, resulting in soil particles being washed into rivers and lakes. For example, this is a problem at Gondar, where run-off from the surrounding land has washed silt into the reservoir, thus reducing the volume of water it can hold.
10. The intensive rearing of animals results in large volumes of organically polluted wash water from cleaning animal houses. Other agricultural pollutants include pesticides and fertilizers.
11. **An uncontrolled landfill site:**
12. Landfill sites that are older and less well designed and managed generate leachate, which is highly polluting.
13. Where industrial waste has been dumped, a toxic chemical stream may also be produced.
14. **Urban surface water run-off**
15. Surface water run-off can cause damage to streams, rivers and lakes by degrading the water quality and harming aquatic life. The pollutants present can hinder the growth and reproduction of fish and other creatures, and affect photosynthetic activity.
16. Plant nutrients may contribute to eutrophication.

**References:**

Water Supply in WASH Module 3

1. Chapter 1: Introduction to water supply

Page 4 – 9

1. Chapter 2: Water and Public Health

Page 18 – 29

1. Chapter 3:Water sources and their characteristics

Page 36, 37, 47 – 48

1. Chapter 4: Water pollution

Page 56, 63, 65 – 68