WATER HYGIENE AND SANITATION POST GRADUATE DIPLOMA

WATER, HYGIENE AND SANITATION ASSIGNMENT 3

NAME OF STUDENT

JAMES MAKUEI NHOMADIC

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SOUTH SUDAN

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E-MAIL ADDRESS; pancinkou2@gmail.com

COLLEGE;

STRATEGIA COLLEGE NETHERLANDS

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

The major six non-domestic use of water under water pricing policy, the local authorities identify and meter all non-domestic uses of their water sources. This includes

1. Businesses or commercial consumers means people or person to whom the authority has agreed to supply water for the purposes of distributive or retail trade or for professional businesses or for providing services to the public whether or not charge is made.
2. Agricultural consumers, this means people or a person to whom the authority has agreed to supply water for (a) watering of vegetables and flowers (b) breeding of livestock or poultry
3. Industrial consumers mean people or a person to whom the authority has agreed to supply water for the purposes of manufacturing goods.
4. Educational institutions consumers mean people or a person to whom the authority has agreed or issued to supply water for the purposes of managing the facility so learners are kept comfortable.
5. Water pipe or main means; any pipe laid by the authority for the purpose of providing a general supply of water as distinct from supplying to a consumer
6. Briefly describe the important roles water plays in the human body

Water plays every important role in the human body and it essential in the system and the function of the body has many responsibilities and these can be discussed below;

1. Water is a building block of the new cells and the key nutrient every cell relies on for survival
2. Water metabolizes and transports proteins and carbohydrates from the food we eat to nourish the body.
3. Water helps maintain a healthy body temperature through sweat and respiration when the temperature rises.
4. It is a part of the “shock absorber” system in the spine and protects the sensitive tissue.
5. It is also a part of the liquids that surrounds and protects the brain and the baby in the womb.
6. Water is the main ingredients in the saliva and can work to keep joints lubricate.
7. aids swallowing and digestion of the food that we eat
8. is used to remove toxins and waste products from the body
9. transports nutrients to where they are needed in the body
10. helps to maintain the body at the right temperature
11. List the types of people who are most vulnerable to waterborne diseases. Explain your answers to why and how to overcome the diseases.

**The types of people who are most vulnerable to waterborne diseases are mainly**

1. Infants
2. Young children
3. Old people and
4. People who are debilitated by diseases (such as HIV/AIDS ) and

The reason why infants and young children, old people and people who are debilitated by diseases (such as HIV/ AIDS) are especially susceptible to waterborne diseases is because their immune system is experiencing everything for the first time. The system of old people and the people debilitated by the diseases such as HIV/AIDs have weak immune system and their blood is reducing which turns to level of weakness therefore they are subjected to quick infection of waterborne diseases especially in developing countries where there is no proper use water for drinking. Women are also susceptible to waterborne diseases according to my observation because they are always close to water facilities i.e. they use to collect drinking water for homes and water for washing clothes, utensils and other cutleries hence there is high chance for them to get infection from waterborne diseases. Those who suffer from water borne diseases, especially pupils and students can’t stay in the class, they miss out the chance to learn and the cycle of poverty continues.

How to prevent waterborne diseases from infecting these people; water should be boiled to 100% degree before it is safe for drinking hence it can avoid rampant infection. Use of filters and chlorine tablets is also to be encouraged, that water should be filtered before drinking. Young children and infants should be protected from entering the contaminated sources of water and encourage bathing them at home with clean water collected from the protect sources.

1. Suppose 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 users of the spring should be advised to do the following steps systematically;

1. They should avoid open defecation around the spring.
2. Not to construct latrines above the spring because of the danger of contamination ground water.
3. Use latrines properly
4. Keep animals away from the spring.
5. Avoid washing clothes around the spring.
6. Prevent children from playing around the spring and within the spring because of danger of contaminating ground water.
7. They should use filters and chlorine tablets to purify water before it is safe for drinking.
8. They should be boiling water collected from the spring up to 100 degree before it is safe for drinking.
9. The following are pollutions sources. Give two specific pollutants for each source.
10. Residential area

In the residential area the major sources of pollutants are;

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. (Note the difference between the words ‘sewage’ and ‘sewerage’. **Sewage** is mixed wastewater that contains human waste from flush toilets, commercial and industrial wastewater, and frequently also surface water run-off. **Sewerage** is the network of underground pipes – sewers – through which the sewage flows.)

1. Wastewater containing dissolved and suspended organisms

Untreated or partially treated sewage can contribute to high levels of oxygen demand in the water and also introduce toxic substances into the aquatic environment, in addition to pathogenic micro-organisms. In Ethiopia, sewage may be treated in waste stabilization ponds. If not operated properly, these ponds can pollute rivers. In many parts of the world, sewage from large towns and cities is usually treated in large mechanical–biological plants that normally produce good quality effluent but can still be a source of pollution if systems fail. Other pollutants which are related to above mentioned are;

Airport, it is a major pollutant affecting people residing near it. This can affect hearing because of noise and vibration made by the airplanes. The diseases caused by the planes are headache and cough and sometimes difficulty in respiratory system because of dust and smoke it produced during flight and landing hours

Gas station; people residing near gas station are at risk because their homes are ever polluted daily and the people may have a chance of developing lung cancer and tuberculosis and that will be hard to treat. It can also affect hearing because of noise and vibration made by machine. The diseases caused by gas station pollution can be headache, cough or difficulty in respiration. Additional pollution diseases are not affecting only people who directly handle pollutants; they may also affect anyone of us without even knowing it. This is because pollutants concentrations that should raise health concerns are usually not easily perceived by any of our senses but may create long term health effects

1. A metal plating plant

The two major pollutants of a metal plating plant are;

1. Cyanides and

Perhaps the single most toxic chemical used in metal finishing on a weight-for-weight basis is cyanide. Electroplaters are most at risk for exposure to hydrogen cyanide (HCN) through ingestion and inhalation, either through a catastrophic event or low levels associated with processing. Skin contact with dissolved cyanide salts is somewhat less dangerous but will cause skin irritation and rashes (Mabbett 1993).

1. Heavy metals

Heavy metals such as 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.

1. Agricultural activities

The two major agricultural activities are;

1. Nitrates, phosphates and pesticides
2. Too much of Nitrates and phosphates in soil (Soil erosion and sedimentation) in agriculture contribute greatly to soil erosion and sedimentation or inefficient land cover. It is estimated that agricultural land degradation is leading to an irreversible decline in fertility on about 6 million half of fertile land each year.
3. Present of pesticides and fertilizers only a fraction of the nitrogen based fertilizers is converted to produce and other plant matter. The remainder accumulates in the soil or lost as run-off. High application rates of pesticides and nitrogen containing fertilizers combined with high water-solubility of nitrate leads to increased run-off into surface water as well as leaching into ground water, thereby causing ground water pollution. The excessive use of nitrogen containing fertilizers (be the synthetic or natural) is particularly damaging as much of nitrogen that is not taken up by plants is transformed into nitrate which easily leach. Nitrate levels above 10 mg/l (10ppm) in the ground water can cause “blue baby syndrome” (acquired methemoglobinemica). The nutrients especially nitrates in fertilizers can cause problems for natural habitats and for human health if they are washed off soil into water sources or leach through soil into ground water.

Pesticides should not be applied near wells or other water sources. If possible, biological methods of pest control should be used. Examples of these are the use of fish to feed on mosquito larvae in water bodies, and the use of the dung beetle to break down and bury cow faeces so that they are no longer available as a breeding place for flies.

Ideally, the whole catchment area should be managed to avoid pollution and erosion. To tackle pollution problems, especially diffuse pollution, all activities within a catchment should be considered. This involves many groups (residents, planners, farmers, etc.) working together, on aspects such as granting permissions for development, compliance with regulations, inspections of activities, and regular surveys and investigations of water pollution.

Nitrates and phosphates are common pollutants generated from residential areas and agricultural run-off. They are usually associated with human and animal wastes or fertilizer that has been washed into surface water bodies by rain. Nitrates and phosphates are plant nutrients, so they stimulate plant growth. If present in large quantities, they can encourage excessive plant growth in the water causing the phenomenon known as an **algal bloom**, which means a sudden increase in the population of microscopic algae (simple plants). There may also be an increase in larger plants such as the invasive water hyacinth. When the increased population of aquatic plants dies, the decay of the organic plant material by bacteria can cause de-oxygenation of the water, resulting in the death of other organisms such as fish. If a water body has high nutrient levels it is said to be eutrophic and the process is known as **eutrophication.**

1. An uncontrolled land fill site
2. Leachate containing dissolve organic matter, inorganic components and heavy solid wastes

Domestic and commercial solid waste should be disposed of in a properly designed and constructed landfill site. Many landfill sites, particularly those that are older and less well designed and managed, such as the one shown in, generate leachate, which is highly polluting. (**Leachate**is any liquid that has passed through matter and picked up dissolved substances and/or suspended solids as it passed through.) Leachate can contain dissolved organic matter and many different types of inorganic components depending on the type of waste. Where industrial waste has been dumped, a toxic chemical stream may also be produced. These leachates should be collected and treated so that pollution of groundwater and rivers does not arise.

1. Urban surface water run-off
2. Sediment, metals hydrocarbon, rubber detergent litter

Sediments and suspended solids consist of fine particles of mostly inorganic material.**Inorganic material** is derived from non-living sources and includes mud, sand and silt washed into a river as a result of land cultivation, construction, demolition and mining operations, where these take place. 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. The presence of solid particulate material suspended in the flowing water is the reason why many rivers look brown in colour, especially in the rainy season. The particles are called **suspended solids** while they are carried (suspended) in flowing water and **sediments** when they settle to the bottom. 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.

Rainwater that runs off road surfaces, roofs, parking areas, etc. carries with it a variety of components. The bulk of the contaminants can be traced to motor vehicles. 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. Plant nutrients may contribute to eutrophication

The two other major specific pollutants of urban surface water run-off are;

1. Motor bikes oil in this case water run-off of these impervious surfaces tends to pick up gasoline, metals trash and other pollutants from the road and parking lots as well as fertilizers and pesticides from towns.
2. **Organic matter**, such as human and animal wastes, is derived from living organisms. As organic matter decomposes, it removes oxygen from the water and this can have a damaging effect on fish and other aquatic organisms that are sensitive to poor water quality. If a large quantity of organic matter is present in surface water, this can lead to anaerobic conditions. (**Anaerobic**means without oxygen, as opposed to **aerobic**, which means oxygen, is present.) In this situation many aquatic organisms are unable to survive and the water will be stagnant and smell unpleasant.

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