**STRATEGIA NETHERLANDS, INTERNATIONAL MANAGEMENT ORGANIZATION**

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**IN**

**WATER, HYGIENE AND SANITATION**

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ASSIGNMENT 3 questions:

1. Explain six major non-domestic use of water.
2. Briefly describe the important roles that water plays in the human body.
3. List the types of people who are most vulnerable to waterborne diseases. Explain your answers why and how to overcome the diseases
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?
5. The following are pollution sources. Give two specific pollutants for each source.
6. A residential area:
7. A metal plating plant:
8. Agricultural activities:
9. An uncontrolled landfill site:
10. Urban surface water run-off

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Water is one of the essential requirements for life. Water is used in different quality and quantity for to fulfill different purposes, including domestic ones.

To be more precise, the under listed activities are some of the non-domestic uses of water:

Adequate amount of water is used for irrigation; where water is applied by an irrigation system to assist crop growth. This includes water applied for pre-irrigation, field preparation, frost protection, and chemical application, weed control, dust suppression etc.

Much water is also used during mining activities: Extraction of underground resources is very hard without the help of water. Therefore the application of water makes it easy to extract naturally occurring minerals including solids such as coal, sand, and gravel and other ores, liquid such as crud petroleum and other natural gas. Water is also used during quarrying.

Hydroelectric power water use: Water is used in the generation of electricity, where the turbine generators are driven by the moving water and eventually converted to the electrical energy. However, in all these processes, water is not used in sense of being consumed, but rather to facilitate the process of power generation as it continues to its path in river channel. Example is Bujagali Hydroelectricity Dam in Uganda, where water is used to generate more than 250Megawatts of electricity, used across East Africa.

Aquaculture: Another use of water is to carry out aquaculture, which is the farming of fish and crustaceans for food. Fish survive and grow in lakes, rivers, streams and well dug ponds. Water facilitates fish growth from fish eggs hatchery under controlled conditions, till fish matured, ready for sale.

Industrial activities: In many industries water is essential, because it is used to facilitate almost all the industrial processes, including fabrication, processing, and washing, transporting and cooling processes. In most of these industries, water is tapped directly from a treatment plant and channeled through the pipes, while others end up drawing water from underground sources and treat it onsite for use. During industrial production, water is either used in the process of production or as an ingredient.

Recreational use of water: Many beaches and resorts are located the shores of big water bodies like Lake Victoria in Uganda. Many activities such as boat cruising, sun bathing are unavoidable at the resorts and beaches, thanks to water.

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

Water is very essential factor for all living things, including human body.

Human body is made up to approximately 60% water. And in Adult person Water makes up to 70 % weights.

Still in the human body, brain contains about 75% of water, and while blood contains about 83% of water.

It is important to note that just failing to replace 2% of the lost water can lead to dehydration , dizziness etc. Yet we continue to keep losing water over the day, through urine, sweat, and in our breath as vapour. In fact, the human body can last weeks without food, but only days without water; water is absolutely essential to life as indicated below.

Water, forms the base of many bodily fluids such as salvia and blood, which are very importance in a human body. Water, in salvia, acts as lubricant, during digestion system. It facilitates chewing and swallowing, hence making food to go down into stomach easily.

Water plays great role in facilitating delivery system in our bodies. When nutrients are broken down in digestive system, they are supposed to be transported to different parts of our bodies, where they are needed. It is only by the help of water that these valuable nutrients are easily transported around the body in the bloodstream. All body’s cells and organs depend on water in order to function well.

Detoxification: Water helps the body to remove all the waste products and toxins, through urination, and other excretion process. Kidney requires plenty of water to filter and remove impurities and wastes from the blood. The liver, our main detoxification organ, also needs plenty of water to neutralise substances so that they can be safely removed from the body.

Water is very important in keeping our bodies hydrated. Our bodies keep losing water through urine, sweat, vomiting, diarrhoea and other forms of excretion. The absence or drop of water level in our bodies always leads to dehydration, a condition that can trigger several health risks such as headaches, fatigue, dry mouth and lips, and other complications such as constipation, urine tract infection and kidney stones. Therefore, it’s only through taking or having sufficient amount of water that keep our bodies hydrated, hence avoiding such possible health risks.

Water helps in regain enough energy and good performance: As noted in the previous point, loss or a drop in water level, in our bodies causes dehydration and eventually loss of energy to perform normally. It is not only physical energy, but mental energy as well; ability to think clearly, mood, concentration and memory, all suffer when we are dehydrated.

Water stimulates our appetite: The feeling of being thirsty is always mistaken to be hunger, hence need for food. Likewise when one gets older, there is always loss of appetite, hence taking water may stimulate appetite.

Water helps in regulating our bodies weights: Pre-loading or taking water 30 minutes before each meal helps an adult person to lose weights, since his/ her stomach will be full, making him/ her to always eat less food. Taking foods with high water contents will always make us full, hence regulating our appetite. Foods such porridge, fruits, vegetable, milk are especially good for this.

Water helps in nourishing our skin. Dehydration causes our skin to become dry, to look dull and our wrinkles to look worst. But taking water helps in keeping us hydrated, which is essential for our skin to stay radiant, and to help prevent acne.

1. List the types of people who are most vulnerable to waterborne diseases. Explain your answers why and how to overcome the diseases

Waterborne diseases are the ones caused by pathogenic microbes spread via contaminated water.

These pathogens are transmitted through using infected/contaminated water for drinking, food preparation or even for washing clothes. Water can be directly or indirectly contaminated by human and animal faeces/ wastes.

Waterborne diseases are mostly enteric (intestinal related) and diarrheal diseases caused by bacterial and virus, when an infectious agent enters the body.

These pathogenic micro-organisms and the toxic, together with some contaminants cause these serious conditions such as cholera, typhoid, diarrhoea, Hepatitis, gastroenteritis, giardiasis, campylobacteriosis, scabies and other worm related diseases.

According to Nafui Abdulakadir, 2018, “waterborne diseases account for an estimated cases of 4.1% of the global disease burden, and about 1.8 million deaths annually”. In developing countries four-fifth of all illness are caused by water-borne diseases, with diarrhoea being the leading cause of deaths among children.

Therefore, the followings are more vulnerable to waterborne diseases;

The children within 0-5 years of age group are more vulnerable to waterborne diseases. According to World Health Organisation, 2009, around two million children in developing countries, die for waterborne diseases, especially diarrhoea Children have weak immune system to resist any form of disease, including waterborne. They also have less body mass than for the adult. This means that water pathogens may be dangerous to a child at a concentration which is relatively harmless to an adult.

Women, especially pregnant women are more vulnerable to waterborne diseases. Women are susceptible to waterborne diseases due to their roles in water collection, food preparation, washing clothes. It is also worth noting that women are responsible for taking care of the sick persons, including t waterborne related ones. Meaning that, women can easily contract these waterborne diseases.

Hepatitis E, A that spread by Faecal-oral route in particular are very dangerous for pregnant women, especially those in trimester, making them more vulnerable. It can be concluded that these faecal-oral infections may be one of the leading causes of maternal deaths, globally.

The chronically ill persons such as HIV/ and AIDS, cancer, and all the recipients of immunosuppressive therapies are more vulnerable to waterborne diseases. Due to such chronic illness, these people tend to have weak immunity that cannot resist any infection, making them so vulnerable. Furthermore, when someone is bed ridden or has been sick for long, he/ she becomes weak that cannot travel for a longer distance in search for clean and safe water. This means that they can stay for days without water or may end up using dirty water for domestic uses such as drinking and food preparation. In such a situation, their rate of vulnerability increases.

Poor household(s) are the most vulnerable to waterborne diseases. Poor households are more susceptible to diseases compared to the well-off. They lack adequate and improved supplies of safe water. They also lack improved waste disposal facilities. Therefore, lacking both improved water supplies and sanitation facilities create conditions that make faecal-oral diseases to be unavoidable. There is also lack of early diagnosis and treatment in households with limited resources such as money and means of mobility. When diarrhoea is not diagnosed and treated at the early stage, there is possibility that all the household members will be infected, since the household is also believed to be lacking all the improved hygiene practices.

Communities with limited safe water sources are considered to be more vulnerable to waterborne diseases. Water source has to be within a relatively shorter distance (1.5 kms) and should not consume much time. But inequalities in accessing water, especially in rural areas, force women to spend many hours every day fetching water. In such a condition, a woman will be forced to draw water from any source nearby, even if it is unsafe source. According to USAID report 2017, Karamoja region in Eastern part of Uganda is one of the communities with little or access to safe water source. The place is semi-arid, flash flood and prolonged dry spells, with little or unreliable rainfall. Most households draw water from open pools, or dams, for all their domestic uses. This eventually makes all the family members vulnerable to waterborne diseases such as dysentery, cholera, typhoid schistosomiasis.

The elderly and the disabled persons are some of the most vulnerable group of people, in regards to waterborne diseases, due to dehydration. In most rural parts of developing countries, Uganda in specific, water sources such as boreholes, springs and well-maintained wells, are very far on average 2 – 3 kms far. Such condition makes it very hard for the disabled and elderly persons to access these much safer water sources.

Uganda health sector is underfunded, that health facilities without drugs hence no better treatments in case disease outbreaks. Therefore many people end up seeking for medical treatment from private health facilities. This is very expensive for the disabled and elderly persons, because they lack physical strengths to work or cultivate, in order to get some money. Further still many government health facilities are far away, and yet the elderly and disabled mostly in rural areas of Uganda lack transport means such as tricycles etc, meaning that in case of disease attack, they are left unattended to, making them and other household members vulnerable to all sort of diseases, including waterborne.

People who practice open defection are very vulnerable to waterborne diseases. As noted above, waterborne diseases come as a result of drinking or getting into contact with contaminated water. And the source of contamination is human faeces. Therefore, where people defecate in open places, their shits/ faeces will be washed away by running water, ending up into water sources such as springs and well. Still in such a community, flies will always get into contact with the faeces and transmit to food, cups and other utensil. All these will cause diarrhoea, cholera, typhoid etc in the community

People who live in slums and congested places are more vulnerable to waterborne diseases. According to Bastina Schnabel, 2009, most slums in Kampala, don’t have sewerage channel and they lack improved sanitary facilities. People share fewer latrines, while others defecate in kabera, or pills and throw into the few drainage channel. They have always blocked water system. Children always play in these drainage channel, when raining, making them very vulnerable to diseases such as typhoid, cholera etc.

Therefore, the following such be put in place for prevent waterborne diseases.

Expanding water sources in all parts of the country. Water is life and it should be easily accessible and affordable by everyone. Government must put all necessary resources and efforts together to drill or construct boreholes, springs especially in rural areas. This will reduce the number of hours women spent while fetching water. When a community has many sources of water, there is possibility of them always using only much safer and clean sources, since they have freedom to choose.

Availability of adequate and safer water sources, means, that, there will always be fewer cases of breakdowns, hence, continuity in usage of available safer sources.

Expanding and equipping public health facilities will always help in giving better treatment. If diarrhoea, cholera are not treated, there is possibility of other members of family to be infected too. A mother may who taking care of the sick person, may be the same person preparing food, hence much chance of reinfection. Therefore, having a functional public health facility in the community will always help to stop the drastic spread and effects of waterborne diseases.

Mass vaccination program against fatal rotavirus, the leading cause of fatal diarrheal infection among children. Vaccination has helped to reduce infant mortality and proved affordable in some countries like Vietnam.

Another preventive measure is to always talk to such communities to always boil water, since it’s much easily to get firewood, than to get clean and safe water source. Community leaders should always encourage their members, especially when to thoroughly wash all the foods, before cooking. They should also be told to clean all their water containers, including cups.

Local leaders should carry out the community water, sanitation and hygiene awareness campaigns. These campaigns can be done in churches, market places, and in schools, so that people get to be informed about key precautionary measures, such as boiling water, keeping their pots clean, maintaining proper hygiene.

Bye laws should be set by the local leaders about constructing and using latrines. There should always be a village sanitation committee in a community with poor Water, sanitation and hygiene practices. Every household should be encouraged to have a latrine and to make proper use of the latrine. This will help to have community open defecation free, and avoiding further contamination of water through human faeces.

All in all, the government and international bodies should be willing to lobby and invest many resources, in water sector. This will help to prevent all these waterborne and other related diseases.

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?

A spring is where underground water naturally comes to the surface. This happens in a location, where the water table reaches the surface or where the boundary between a permeable layer of underground rock and an impermeable layer reaches the ground surface

Permeable rocks have tiny spaces between the solid rock particles that allow water and other fluids to pass through and be held within the rock structure.

The amount of water and the level of contamination vary from one spring to the other, depending on the amount of rainfall.

Contaminant is defined as any physical, chemical, biological or radiological substance or matter in water.

It’s everyone’s role in the community, to protect water sources such as a spring, if we must avoid waterborne diseases. This will help a community to live a healthy and prosperous life

Therefore, these are key important roles that the community must uphold and collectively implement to prevent contaminates from entering a spring.

I will always advice my community members to protect the spring. Community can do this by fencing all the area around the spring. This will help in preventing animals and other external contaminants from entering into the spring

Construction of a deep diversion ditches will be one of the best advises that I will give to the community leaders and members. All the spring users must collectively always try to protect it from flooding and all the surface water pollution by constructing deep a diversion ditch around the spring. This must be of a certain height above the spring. Once a community has constructed a well deep diversion ditch, all the surface water running toward a spring will be carried and diverted away from the spring, even during heavy rainstorm.

Planting of tress around the spring will be one of the key things; I will be sharing with the spring users. Planting trees all-round the spring helps in preventing the erosion, and cooling the water source, hence making it’s a pleasant place to fetch water from.

A spring box to capture water should be built by the community. A spring box is a covered container made of masonry, brick, or concrete that helps protect spring water from contamination. The spring box helps in preventing water from getting exposed to other outside pollutions such as birds dropping and surface runoff and animal faeces, since water flows directly out of the box to the pipe.

Another important advice is regular cleaning of the spring box and pipe, to enable the community member to continue getting clean water. Silt, dead animal and other things can collect in the pipe and spring box and this can block the pipe or contaminate water. Therefore, i will advise the spring users to always clean the pipe now and again in order to get steady flow and fresh and clean water. Where possible, the users should put wire screen on the pipe leading into the spring box, to prevent unsafe things from entering the pipe.

In addition to the above, the users of a spring must be advised to avoid;

Open defecation around the spring. Open defection is one of the causes of waterborne disease such as cholera, since human faeces end up getting into the water source after rain. Open defecation around a spring also makes it unpleasant to draw water from the spring. Pregnant women will always feel irritated whenever they come to fetch water, when they see faeces around the spring.

I will also advise the water users around the spring to stop construct the latrines near the spring. This move is to avoids contamination of groundwater that supplies the spring

Animals should be kept away from the spring, even after fencing the spring. The fence is not always strong enough to resist the external forces from the animal. Therefore I will advise the users to keep their animals ways. Animal’s troughs can be built some relative distance away from the spring.

1. The following are pollution sources. Give two specific pollutants for each source.
2. A residential area:
3. A metal plating plant:
4. Agricultural activities:
5. An uncontrolled landfill site:
6. Urban surface water run-off run-off

Pollution is the process of making land, water, air any part of the environment dirty, contaminated and not safe or unhealthy and unsuitable to use. This can be through the introduction of a contaminant into the natural environment.

Water pollution happens when chemical or foreign substances such as oil, sewage, pesticides and fertilizer from the agricultural runoff, and human and animal wastes/ faeces are introduced or come into contact with water.

1. A residential area

Septic system which consists of a buried big tank and series of pipes place sloping down from the tank, to soil is one of the pollutants. In the world, many people rely of septic system to manage their sewages. When placed in areas with clay soils, areas with high water tables and/ or improperly connected, septic system forces effluent from the tank settle near the surface and eventually get leaked in the nearby water source before properly be treated in the soils. This poses both environment and health hazards.

In Uganda, especially in big slums, and cities, used drinking water bottles, plastic materials, pampers, and condoms from lodges are dumped in drainage system, open grounds and along isolated roads. The end result is soil and water pollution, that threaten the both humans and other living things.

Smoke emission in the residential areas, especially rural parts, is the major pollutant. Greatest percentages of rural and some urban residents are using firewood and charcoal stoves for food preparation and home heating. To add on, this process is always conducted in an open area, or in the room without proper ventilation. Many people have been affected by too much quantity of inhaled smoke.

1. A metal plating plant

Metal plating plant generates wastes; non-hazardous and hazardous in all physical state; liquid state, solid state, air emission, as it uses materials cadmium, platinum, goal and silver are very hazardous to public health.

Liquid waste is a source of pollutant. A lot of metal planting processes such as rinse water, cooling water, stream condensing and boiler blow down end up washing the effluents and hazardous substances into the soil and underground water.

Exhaust ventilation/ and scrubber solution spills, degreasing process and solvent cleaning, end up emitting contaminated alkaline, methane chloride, acid and other solutions in the air, causing air pollution. Much of these contaminated solutions generated from metal plating plants are also washed direct into the soil and open water bodies.

1. Agricultural activities

Agricultural activities include rearing of animals and crop production for livelihood. But these activities have always caused serious pollution, especially in developing countries where they have using rudimentary methods

Animal wastes are some of the leading pollutants. In some areas of Uganda, cows and goats are set free to graze, mostly after crop harvesting. During this time, they end up reaching to all the water sources by themselves in search for drinking water, with the caretakers. At most of these unprotected springs and community wells, they end up defecating in water, destroying water source fence. They also block drainage channel, hence contaminating and causing water stagnation. In some communities, cows’ kraals are made, or cows are tight to graze near water sources, and with this, when it rains, their wastes are washed into the water supply.

Soil erosion is also one of the pollutants caused by Agricultural activities.

Over cultivation, and grazing, has always caused soil erosion in some parts of Northern Uganda. When the soils are overworked, they become loose, to the extent that any running water easily washed the soil particles into the water supply. This eventually ends up polluting water source. Soil erosion washes away top layers or fertile layers that are very important for crop production. Once the soil is infertile, it means it already polluted.

Nitrate is one of the pollutants being realised due to agricultural activities, especially crop production. On many parts of the world, those who do crop production at the large scale end up using fertilizer to boast crop performance. But one of the ingredients used in making fertilizer is nitrate. Nitrates are easily washed away by the running water, carried straight to water supply. Nitrate is very harmful to babies, if presented in drinking water. According to US Geological survey report 2010, it was found out that 64 of all the shallow wells studied in agricultural areas had high nitrate level. The present of excess nitrate in the water bodies causes stunt growth of water plants, and kills fish as well.

1. An uncontrolled landfill site:

Landfill sites are gazetted places where our garbages are offloaded to be burnt or buried. In Uganda and South Sudan, these sites are not cemented or not having a concrete bottom layer to avoid leakage of these wastes into ground water.

And because of that, there are possible pollutants that originate from these sites.

Toxins: A lot of the different materials that end up in the landfill sites contain toxins that are eventually released and seeped into soil and underground water. Examples of those materials are computer, televisions and used Car batteries and paints. Mercury is another toxic substance that frequently appears in landfill, from mostly fluorescent tubes. They contain substances like arsenic and acid and lead, that when exposed to our environment (water), poses serious threats to public health. Inhaling small amount of mercury vapour can greatly affect your kidney

Another pollutant is leachate which is a liquid forms when landfill wastes breaks down and water filters through the waste and picks up toxins. When the landfill site is not well engineered, part of the liquid is easily washed into underground water. Chemical usually found in leachate, include carbon dioxide, methane, organic acid, which are very harmful to public health. Building Landfill with synthetic membranes to prevent mercury and other substances from escaping into the soil and underground water is the solution.

1. Urban surface water run-off

Water run-offs from urban surface carry along with them any pollutants. In urban surface, pollutants may originate from parking lots, residential home, and nearby bushes.

Some of the key pollutants here are;

Detergents which originates from domestic and industrial discharges

Litters that involve discarded materials such as plastics bags, cigarettes, windblown material and improper dumped wastes will be washed far downstream.

Oil left behind by a parked car can run off. Visible as a colorful sheen in puddles, automotive oil can become a nonpoint source pollutant that drains into streams, lakes, rivers, and oceans.

Pollution is becoming increasingly burdensome to the global population. International bodies and all countries, across the world should adopt strict regulatory measures against wastes discharge.

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