WATER, HYGIENE AND SANITATION POST GRADUATE DIPLOMA

WATER HYGIENE AND SANITATION ASSIGNMENT 4

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1. List and briefly describe the measures by which the success or otherwise of a public-private partnership proving water can be assessed

In the major towns and cities, water is supplied by water utilities (also known as Town Water Supply Enterprises) but **public–private** **partnerships** (PPPs) can be helpful. A public–private partnership is any collaboration between public bodies, such as a municipality or even the government, and private companies. The belief is that private companies are more efficient and better run than bureaucratic public bodies, and the management skills and financial acumen that they bring will create better value for money for customers. The incentive for the private companies is the profit that can be generated. PPPs have become popular, to the extent that the number of people served by private water operators in developing and former Communist countries increased from 94 million in 2000 to more than 160 million in 2007 (Marin, 2009). Philippe Marin’s report, *Public–Private Partnerships for Urban Water Utilities*, which was a review of PPPs in urban water utilities in developing countries, was undertaken because of the interest generated in these arrangements. At the time of the report (2009), about 7% of the urban population in the developing world was served by private water operators. There are different ways in which PPPs can be set up (described later in this study session) but the sections that follow now briefly consider the factors that Marin covered in his report. Below are the private partnerships providing water that can be assessed

(i). Accessibility – the extent of coverage of the population, and the distance to the water point.

(ii). Affordability – the cost of the water needed should be less than 5% of the household’s income.

(iii). Cost recovery – the cost of providing the water should be claimed back from the population.

(vi). Minimization of non-revenue water – this should be reduced to 15% or less.

(v). Water quality – the water should meet national standards for quality.

(iv). Operational efficiency – the quantity of water supplied per capita, and the duration of water supply per da

These parameters can be used to evaluate whether a PPP is beneficial, with data from before the partnership’s creation being compared with data after the PPP has been running for, say, a year.

1. Give six possible causes of water emergencies, three due to natural causes and three due to humans.

**Emergencies** are sudden, unexpected, hazardous situations where there is a need for an immediate response. They can cause severe disruption because they are unexpected. Resources are needed to cope with an emergency and they may have to be brought in from outside.

Everyone will have to deal with emergencies in life at some time or another. I can think of an emergency that has occurred in my life. I can probably think of many. The last one that I had was when a pipe burst in my college’s compound St. Paul major Seminary in Khartoum in 2012. It was late in the night, and I had to call my friends Achuin Achuin and Yusuf to come and fix it, because I was not familiar with plumbing since it was my first time to be in big towns such as Khartoum.

A **water emergency**, such as the one described above, is an event that disrupts the normal supply of water. In town, it can occur due to natural causes or when there is damage to the major infrastructure of the treatment plant, water storage or water distribution system. Untreated or partially treated water may be inadvertently distributed in an emergency situation. Another cause of a water emergency could be contamination of the water supply, for example by a chemical leak.

As you can see, there are several different types of emergency that can affect water supply and some of these are described below, both natural and humans

The three possible causes of natural water emergencies are:

(i). drought

A **drought** occurs when there is a deficiency in precipitation over an extended period of time, resulting in a water shortage. You are probably familiar with the consequences of a drought. The lack of rain means that the water flow in rivers is reduced, lakes and pools shrink in size or may dry up, groundwater and soil moisture are depleted, and crops are damaged. Prolonged drought can lead to a major national and regional food insecurity crisis. Domestic animals might also die. Ethiopia has been associated with drought for a long time and many people have suffered from its effects. For example, in the drought of 1985 in the northern part of the country, an estimated 800,000 people died due to malnutrition and disease.

During a shortage of fresh water during a drought, people may be forced to use unprotected water supplies. Furthermore, people and animals may use the same water source, which increases the risk of contamination of that particular water source. This leads to increased exposure to waterborne diseases (such as diarrhea and dysentery) and water-washed diseases (such as trachoma).

(ii). Flooding

**Flooding** is an abnormal rise in the water level and may result in overflowing of streams or rivers. Flood waters can destroy infrastructure, including houses, roads and water supply systems, as well as agricultural crops, which ultimately causes a shortage of food supplies in the country. Besides the destruction of property, people and animals may be killed, especially when **flash floods** occur. (A flash flood happens when rain falls so fast that the underlying ground cannot drain the water away fast enough and rivers overflow their banks. Roads can then become like rivers and if there is a lot of water it can flood buildings and carry cars away.)

Floods can cause widespread bacterial contamination of wells and surface water sources with faecal matter washed from the ground surface or from flooded latrines and sewers, resulting in the outbreak of disease. For example, cholera commonly occurs after flooding.

(iii). Earthquakes

An earthquake can cause serious damage to infrastructure on and in the ground. Pipes and treatment plants will be destroyed by a high-magnitude earthquake and the communication systems (such as road and rail networks) often become non-functional, making the delivery of emergency water supplies difficult. Destruction during an earthquake can also cause chemical spillage at manufacturing plants and warehouses, which can lead to widespread chemical contamination of drinking water

The three possible causes of water emergencies due to human are:

(i). accidental contamination of water supply

This is one of the issues that may occur accidentally to contaminate water supply for instance. In July 1988 in Camel ford, a small town of 20,000 people in South-West England, 20 tons of aluminum sulphate was dumped into a wrong tank at the local water treatment center plant by a chemical tanker driver who was not familiar with the plant layout and delivery procedures. Aluminum sulphate went directly into the mains water supply, and this became the worst water poisoning incident in Britain. Residents complained because the water coming out of the tap was black, and curdled the milk in the tea. One man described how his hair had stuck together after he took a bath, as if his head had been smeared with glue. Symptoms such as stomach cramp, diarrhea, skin rashes, join pain, sore throat, short-term memory problems and general exhaustion were reported due to accidental contamination of water supply and this is usually happen in big towns where sewerage pipes are connected in big rivers and seas. Water supply may accidentally be contaminated any time especially industries that manufacture goods and other raw materials.

Catastrophic emergencies like floods and earthquakes will affect everyone, but the poor and vulnerable will always be at a disadvantage. In many situations, the people most likely to be severely affected are internally displaced people and refugees. In situations of war and conflict people naturally want to escape and so they move in large numbers away from the conflict zone. The places they arrive at frequently have no infrastructure and very limited resources.

**Internally displaced people** are people who are forced to flee their homes due to circumstances such as natural disasters or war, but who remain within their own country's borders. For example, during 2014, internal war and conflict caused thousands of people in the Central African Republic, Southern Sudan and Syria to flee their homes and move elsewhere in their country. Such events call for a fast and coordinated effort to provide basic services such as shelter, food, water, latrines, hand washing facilities, etc. When providing shelter, the choice of location is often dependent on the availability of water.

Conflicts of this kind can also result in people seeking refuge outside their own country. For instance, in 2015, there were more than 600,000 Syrian refugees in Jordan who had fled the conflict in their home country (UNHCR, 2015). Camps had to be set up in the desert, and of course the supply of water was crucial.

(ii). Microbial contamination of water sources due to human mismanagement i.e. cholera outbreak and

A **disease outbreak** is the occurrence of cases of disease greater in number than would normally be expected in a defined community, geographical area or season. A waterborne disease outbreak is therefore another type of emergency situation. It might be caused by one of the natural disasters described in the last section, or due to human error, or indeed both. The greatest risk of waterborne outbreaks is pollution of water sources by faecal pathogens. This might occur due to inadequate sanitation, poor hygiene or lack of protection of water sources.

Cholera, caused by Vibrio cholera, is a disease that is frequently associated with disasters and emergencies, where the breakdown of normal procedures and the collapse of infrastructure create conditions that lead to faecal contamination of water. This was the situation on the island of Haiti following the earthquake there in 2010.

(iii) Deliberate poisoning of the water supply as an act of terrorism.

It is possible that a deliberate attempt could be made to poison a water supply as an act of terrorism, but it is far more likely that human causes of water emergencies will be due to accident and neglect. There can be instances where the water supplied will be unfit for human consumption as a result of an accident describes such a case at a water treatment works in the United Kingdom.

b. What are the options for safe water supply during a water emergency?

The options possible for safe water supply during water emergency are:

(i). delivery of water to consumers by water tankers and bottles

(ii) Treatment of the water at the household to render it safe i.e. by boiling

1. You are about to set off to conduct a sanitary inspection of an abstraction point at a river.
2. **What would you take with you?**

a. I would need to take an appropriate checklist of questions to ensure that I inspect thoroughly and don’t forget anything. I will also need a notebook and pen or pencil to record all the information I collect

(b) **Explain four things you will be looking for during your inspection**.

b. Important things to look for include the location of any latrines or other possible sources of contamination (due to farming or industrial activities) relative to the river, the possibility of any landslide or mudflow, a good solid fence, a screen on the intake, the presence of a dam, the presence of a filter and, if a filter is present, that it is operating properly, and whether there is any uncontrolled flow. Your answer could include any four of these or related issues.

1. Explain briefly why a Water Safety Plan is necessary

A Water Safety Plan is necessary to ensure that the water that is produced and delivered to consumers is safe. It also ensures that the chance of an incident disrupting the continuous supply of water is minimized.

1. Distinguish between the two types of maintenance at a water utility and give reasons Why one of the is better

The two types of maintenance are breakdown maintenance and preventive maintenance. Preventive maintenance is better because it helps prevent breakdowns and ensures that the assets can be used until the end of their service life. By undertaking preventive maintenance, crises – which are costly – can be avoided

*Preventive maintenance*: this is a regular, planned activity that takes place so that breakdowns are avoided. Examples of preventive maintenance would include servicing of equipment, inspecting equipment for wear and tear and replacing as necessary, cleaning and greasing moving parts of equipment, and replacing items that have a limited lifespan. Preventive maintenance is important because it ensures that the asset fulfills its service life. It also prevents crises occurring and costly repairs (in terms of time and money) being needed.

Preventive maintenance ensures that the different components of the water supply system perform correctly over their service life (their expected lifetime). This in turn avoids the occurrence of a major fault or breakdown in the water supply system that calls for corrective maintenance that is many times more expensive. In some cases, the problem may require full replacement of a costly item of equipment, which also takes a significant amount of time to achieve. As a result, the service level of the water supply system will reduce or even be interrupted over the period of maintenance, causing significant inconvenience to users and reducing the income of the water utility.

Utilities should always ensure that an adequate level of preventive maintenance is in place for all of their assets in the water supply system. This requires that adequately skilled persons are employed as operators or maintenance crew, and that they are provided with the proper tools. A strict and regular schedule of work is also required to ensure that preventive maintenance is carried out at the appropriate time. The next section considers strategies and plans for maintenance.

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