*South Sudan*

*Lakes States –Rumbek*

*Mott McDonald (Water for Lakes project)*

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*Assignment 5*

1. Paul, a resident in the outskirts of your town, consults you about building a latrine in the compound of his house. He is an open-minded man who is keen to improve life for his family. He has a wife and three young children, and his elderly mother also lives with them. He doesn’t have a tap in his house and gets water from a nearby well. The area has heavy soil and the rock below is impermeable.

Which types of latrine are possible choices for him?

Answer:

(a)**Improved latrines**

Which types of latrine would you recommend, and why?

Answer:

(b) Improved latrine

For a latrine to be classed as ‘improved’ it should satisfy the following requirements:

* It should be safe to use (the pit may need to be lined)
* It should have a structurally sound and cleanable slab floor
* Handwashing facilities should be available
* The squat hole should be fitted with a lid so that excreta is not accessible to flies or other creatures
* It should be free from odours or unsightly conditions
* There should be no need for people to handle the excreta.

1. What other advice would you give him about the location, design and construction of the latrine?

Answer:

* If possible, the latrine should be 6–10 m from the home, and located downwind from the house.
* It is best not to build a latrine in areas where groundwater is used as a water source, but if this has to be done, the base of the pit should be at least 2 m above the water table. On sloping ground, it should be located below the level of any well or water source, so that any liquid seeping out of the pit flows away from the water source.
* The minimum horizontal distance between the pit and water source varies with location, soil type and geology.
* Generally, the pit should be at least 15 m away from a water source, although some authorities recommend a minimum distance of 30 or 50 m (Graham and Polizzotto, 2013). In Ethiopia, federal guidelines state that latrines must be sited at least 30 metres from any water source to be used for human consumption and if on sloping ground be lower than the source (MoH, 2004).
* The latrine should be on a mound so that any water runs away rather than into the pit, and diversion ditches should be prepared around the latrine. Diversion ditches intercept surface run-off that may flow towards the pit and channel (divert) it away in another direction.

If the soil formation is unstable and liable to collapse, the wall of the pit should be lined for at least the top 0.5 m. The diameter of the pit should be at least 1 m, but should not exceed 1.5 m because this increases the risk of the pit collapsing.

The lifetime of a pit latrine depends on several factors, such as the depth of the pit, the number of users, the type of anal cleansing materials used (e.g. water, degradable material such as paper, leaves or sticks, or non-degradable material such as stones), and the rate of decomposition of the faecal material in the pit. The pit should be designed for three to five years of use.

The accumulation rate of sludge on average, is 40–60 litres per person per year (Tilley et al., 2014). The depth of a pit latrine should be at least 1.5 m, but the figure can be calculated more precisely using the following formula (Faris et al., 2002):

Depth of pit = *P × S × NA* + 0.5 m

Where:

*P = average number of users*

*S* = sludge accumulation rate in m3 per person per year

*N = minimum useful life required in years*

*A* = cross-sectional area of the pit in m2

Note that in this formula the sludge accumulation rate is required in units of cubic metres per person per year. The additional 0.5 m is so that the latrine can be covered with 0.5 m of soil at the end of its life.

1. **Nancy is a laboratory technician. She is analysing a sample of wastewater collected from a pipe that discharges effluent into a river. Name two tests Worknesh could perform to assess the physical characteristics of the effluent.**

Answer

To assess the physical characteristics, Worknesh could perform a suspended solids test she could also the measure the temperature of the sample and assess the odour. (Note if she was measuring temperature she would have to do this at the point of origin because the temperature could change within short time.)

As part of the analysis she also does a BOD test on the sample and gets an unusually high result. What does the high BOD tell her about the wastewater? What effect could it have on the river?

Answer

1. A high BOD test result would tell Worknesh that there was a lot of organic matter in the sample. If this was discharged into the river it would remove oxygen from the water, which would harm fish and other organisms living in the river.

**Important** **of** **BOD for wastewater**

Biochemical oxygen demand (BOD)/Biological Oxygen demand is an important water quality parameter because it provides an index to assess the effect discharged wastewater will have on the receiving environment. The higher the BOD value, the greater the amount of organic matter or ‘’food’’ available for oxygen consuming bacteria. If the rate of DO consumption by bacteria exceeds the supply of DO from aquatic organism plants, algae photosynthesis or diffusing from air, unfavorable conditions occur. Depletion of DO cause stress on aquatic organisms, making the environment unsuitable for life. Further, dramatic depletion can lead to hypoxia or anoxic environments. BOD is also used extensively for wastewater treatments as decomposition of organic waste by microorganisms is commonly used for treatment.

Regulations and permitting for biochemical oxygen demand effluent will vary by country and region, such as National Pollution Discharge Elimination system (NPDES) in the United States. In general, maximum allowable discharge fall around 10 mg/L BOD and maximum allowable concentration for discharge to sewer systems around 300 mg/L BOD.

1. What is the purpose of the report of a rapid assessment and who should receive copies of the report? Explain the contents of Rapid Assessment Report

**Answer**

**Rapid assessment**

Rapid assessment of urban sanitation and waste management is the process of collecting information from households and institutions to get a quick overview of the situation in an urban community. The results can then be used to identify the areas that need to be improved and suggestions of possible solutions. The assessment involves observations of the community and discussions and meetings with target households and other community members.

The report will be distributed to the organisation that commissioned the work. They may ask that the report is also sent to other interested organisations. In any event, the report should only be sent to other organisations with the specific permission of the funding organisation.

**Contents of assessment**

The first part of any assessment is to agree on why the assessment is being carried out and to identify any specific aspects of WASH that need to be looked at. An assessment that is carried out as part of a project to determine the need for latrines, for example, would need very different information than one looking at the possibility of setting up a waste composting scheme. This first part will normally be done by the team leaders working with the organization that requested the survey or provided the funding for the work. It is important that representatives of the community being assessed should be part of this process so that they can influence the decisions and remain informed. The output from this initial stage of the process will be an overall aim, together with a series of objectives (you can think of objectives as the aims for each smaller piece of the work).

All assessments should end with the production of a report, and it is important at the start to consider who this report is for. This will determine what data needs to be collected and what sort of data analysis is done. This in turn will determine some of the skills required of the project team and may identify where specialized computer data processing software is required

Based on the aim and objectives, the team should prepare a checklist of the information that needs to be collected. The advantages of using a checklist are that it:

* provides a standardised approach to what is reviewed during assessment
* helps supervisors to cover all issues without forgetting anything
* provides a means of documenting assessment findings in a simple manner that can be referred to in the future
* provides a record for tracking performance changes over time
* provides a basis for identifying needs for follow-up actions

The information gathered during the assessment will come from both primary and secondary sources. Primary sources are the information obtained by the survey team through observations, questionnaires and other methods, which are discussed in the next section. Secondary sources consist of the results of work that has already been done, such as previous surveys in the same area or in other locations that are similar to the survey area. Reviewing existing documents and reports can also provide valuable background information for the planned assessment. For example, demographic data such as the total population of the study area, the number of people of different age groups and the proportion of men and women will be useful. Having prepared the plan and agreed the process with community representatives, at the start of the survey the team should arrive at the community or kebele as scheduled and on time. The visit should start with introductions to the community (usually done through a small group of community representatives), including descriptions of each person’s position and responsibility in the project. The team leader should explain the objective of the assessment and agree with the community representatives how the assessment will proceed. The time required for interviews, reviews, discussion and action planning should be set at this stage. It is important to make sure that the community is aware that it is not being ‘judged’ in any way, but that the work is to find the best way of improving WASH in the community. At this point, the community should be reassured that all discussions with individuals and questionnaire responses will be treated in the strictest confidence.

**Assessment methods**

* *Interviews* are conversations between the investigator and members of the community, usually on a one-to-one basis. Depending on the information required, different types of interviews and questions can be used, the interviewer takes notes of the interview or uses a voice recorder. When conducting interviews it is important to gain the interviewee’s consent before starting and to make it clear how the information will be used. Generally, interviewee’s comments should not be used in reports in a way that allows the person to be identified.
* *Observation* is often combined with interviews. **Observation** simply means recording what you see or are aware of. For example, while visiting households, interviewers observe the availability and quality of the sanitation and waste facilities, such as the household latrine, solid waste storage and disposal, and handwashing provision. In addition, the interviewer will try and gain a picture of the use of these facilities through observation and discussions. At the same time, the general condition of the housing, water management and food handling can also be observed. There is a risk that the observer will assess the position against their own personal views (a **subjective** view), so it is important to have a set of standards to be used by all observers to make the assessment as **objective** (based on things that can be measured or counted and not influenced by personal opinion) as possible. General observations can be made simply by walking around the area and noting the condition of the town. A typical observation sheet to be completed while observing a household.
* *Discussions with the community* can provide valuable information about the concerns and health situation of community members that can help to confirm the findings of the interviews and observation. For example, one would expect a high incidence of diarrhea to be reported if an absence of latrines and handwashing facilities had been identified.

1. **Explain five ways in which urbanisation creates challenges for effective sanitation**

Answer

1. **Environmental challenges**

Urbanization can have a major effect on the environment in the following areas.

Challenges emerging from rural-urban interaction

Urban centres are usually surrounded by rural communities and the two areas depend on each other to supply many of their needs. Urban areas depend on the rural areas to provide food, fuel and construction materials. In return, the rural community depends on urban areas to supply employment, commercial products, advanced healthcare provision, education and equipment, machinery, and other industrial outputs. Having said this, problems may arise when there is a large temporary influx of people from the rural to the urban areas. Examples include:

* The increased demand for sanitation facilities in the area around a city market
* The manure generated by animals that are brought for sale or used for transport
* The congestion caused by the number of people and animals using the roads.

1. **Challenges emerging from the urban situation**

Even without the influxes from rural areas, urban centres are congested and crowded. They have often grown without any planning, so the problems arising from the lack of sanitation, waste management and the other infrastructure mentioned above are present. Urban growth also means that there is an increase in the area of land covered with concrete and other hard surfaces.

When rainwater falls on soil it will usually soak in. When it falls on concrete it runs off the surface and can cause flooding if the rainfall is heavy.

Urban development reduces the ability of the ground to absorb rainwater. In urban areas a high proportion of the ground is paved, which prevents the absorption of rainwater. Also, unplanned developments usually lack the drainage ditches or channels necessary to carry away surface waters. These two factors combine to create an increased risk of flooding and the outbreak of waterborne disease that can follow floods.

1. **Challenges from industrial discharges**

Most industries in developing countries discharge untreated or partially treated liquid wastes to sewers, where these are available, or to rivers, streams or ditches. Industries also release waste gases that may contain harmful substances and produce solid wastes that may contain **hazardous** materials (such as poisons, strong acids, infectious material, etc. that can cause harm to humans because of their properties). As a result, unregulated industries can harm human health and the environment in many ways.

1. ***Challenges from transport***

We have already mentioned problems from traffic congestion, but the use of a large number of often badly maintained petrol- and diesel-fuelled cars, Lorries and buses cause additional health problems. The exhaust gases from these vehicles contain fine particles, partly burned fuel and acidic substances that make breathing difficult and cause irritation of the lungs. While this is a problem for all people, it is much worse for the old, the very young and the ill, especially those with heart problems or who suffers from asthma.

1. ***Challenges to society***

Increasing urbanization puts pressures on society as a whole as well as on the environment. People who migrate to cities may become unemployed and then need to be provided for. This puts pressure on welfare provision and on the charities that provide assistance to the hungry and the homeless. Even people who have jobs find it difficult to find somewhere to live and may develop illegal unplanned settlements that affect the planning and service provision of the government sectors. These settlements also add to the city’s sanitation and waste problems.

The urban population requires daily supplies of food, fuel and other goods which can put pressure on the infrastructure needed to deliver and sell these goods. Once goods reach the end of their lives they become waste, increasing the pressure on the waste collection and treatment systems.

1. ***Challenges to administration***

A growth in population creates more work for the city’s administration. If funds are not available to increase staff numbers to deal with this demand, problems will occur. In the case of sanitation and waste management, as well as services not being provided to the whole of the city, the additional workload can reduce the effectiveness of the governance of these programmes, which can result in lower standards and a poorer service for the entire city.

To deal with the problems of population growth, various organisations need to work together; for example, water, sanitation and health service providers, and non-governmental organisations (NGOs). When growth is rapid, these organisations can be overwhelmed and so coordination can break down. This may mean that in some cases, efforts are duplicated, and sometimes there will be gaps in addressing some aspects of the programme.

If public administration and regulation is already weak, the entire system can fail. In the absence of good regulation, standards of sanitation and waste provision can fall, increasing pressures in other areas such as health services.

1. **How do good sanitation and waste management practices bring a positive effect to urban inhabitants? Give examples for effects on:**

**Answer**

**Impacts on Health and education**

Diseases linked to poor sanitation and hygiene have a significant impact on children’s health and education. 38% of Ethiopian school children are infected with parasitic worms (Mahmud et al. 2015). These infections contribute to malnutrition because the parasites prevent the child’s body from absorbing nutrients from the food that they eat. Long-term malnutrition retards children's physical and intellectual development. The Young Lives survey (2014) reported that around 30% of Ethiopian children are stunted, which is a sign of long-term malnutrition. (Stunted means that a child’s height is less than expected for their age.)

Children are frequently ill as a result of parasites and other infections, which leads to poor school attendance and performance. Furthermore, if the school attended by an infected child does not have good sanitation and handwashing facilities the infections are likely to spread to healthy children.

There are also social impacts of poor sanitation provision in schools. An absence of latrines with separate facilities for girls and boys means that post-pubescent girls are more likely to stop attending schools, especially when menstruating .When healthy children attend a school with well segregated sanitation facilities, they are present more regularly and are better learners. This, in turn, makes them better able to find jobs that demand higher-level skills on finishing school; an advantage to them, their families and the community as a whole. This contributes to wider economic benefits, as discussed in the following section.

**Impacts on the economy**

A healthy community has many economic advantages over an unhealthy one. If people are healthy they will spend less money on health care and the loss of work days due to diarrhoea and other related infections is reduced. Illness can affect both the sick person and their family, for example when women have to take time off work to care for sick children.

Improving solid waste management has economic advantages in addition to the health advantages discussed above. Consider the following example.

It is said that a firm that throws something away pays towards it three times over. Imagine a firm that uses raw materials and puts them through a manufacturing process to make a final product. First, the firm has to pay its suppliers for the raw materials. Secondly, it pays its staff to transform the raw materials into products, and pays for the water and energy that it uses. Finally, the firm has to pay for disposal of what it throws away. So a firm that reduces the amount of waste it produces makes savings in all three areas.

A firm that uses basic materials such as glass or metal faces large energy bills for the processes required in converting these materials into products. But if they follow the principles of the 3 Rs (reduce, reuse and recycle) and substitute some of their input raw material with scrap glass or metal, they can reduce their energy bills and buy less raw materials. These materials are often imported, so using recycled scrap reduces

Ethiopia’s expenditure abroad, which benefits the national economy as well as individual firms.

There are further benefits from recycling. The initial stages in the recycling process (collecting material from households and businesses) is labor-intensive and provides employment for the poorest people in society. Giving them an income improves their health, which, in turn, reduces the country’s healthcare expenditure.

A householder in an urban area goes shopping for food. How can they apply the 3 Rs when it comes to packaging materials?

They can *reduce* packaging waste by buying loose fruit and vegetables rather than pre-packaged goods.

The can *reuse* carrier bags to take the shopping home rather than picking up new bags each time they shop.

They can *recycle* by taking any glass or metal food containers to collection points or by giving them to people who earn their living by collecting recyclable wastes

**Impacts on the environment**

What do we mean by ‘the environment’? You may think of it as your immediate surroundings in the town or where you live or work. However, it can also mean the wider natural world on a much larger, even global, scale. Poor sanitation and waste management have direct impacts on the local environment, but human practices can also have broader consequences.

There are obvious local environmental benefits from improved sanitation. This means that defecation only takes place in properly constructed latrines, areas of land are not contaminated with faeces and watercourses no longer act as sewers. This in turn allows plant life, fish and other aquatic organisms to flourish.

Improving waste management improves the local environment and also benefits the national and even the global environment. Good waste management means less litter in the streets and in the neighbor-hood of waste disposal sites. It also reduces the smell in the streets from decomposing wastes.

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