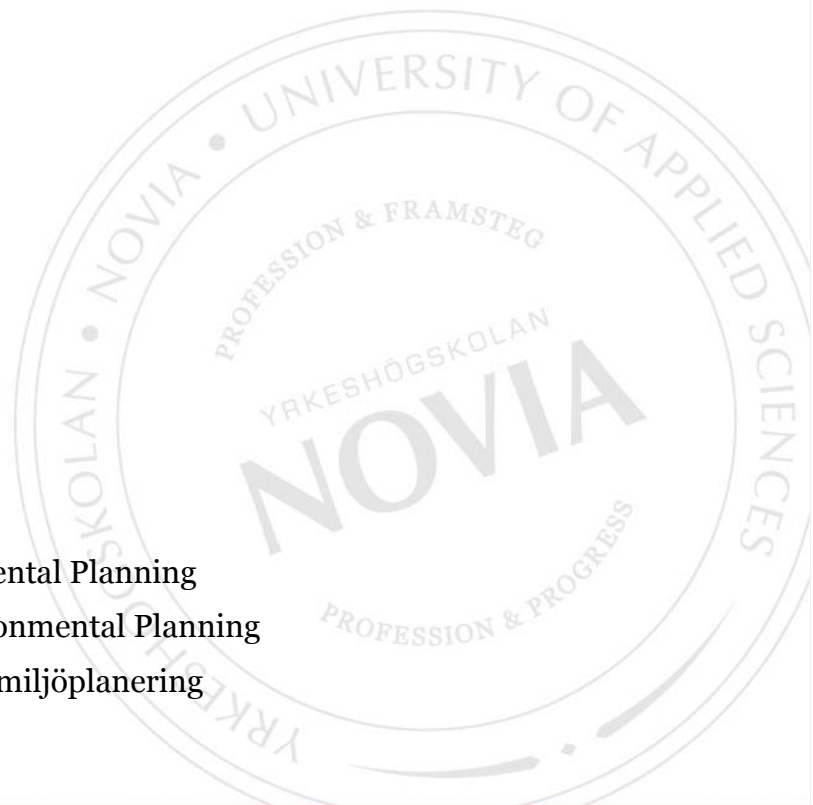




Dry Toilets as a Sanitation Solution in Makana Municipality, South Africa

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BACHELOR'S THESIS

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Summary

The aim of this thesis is to assist Makana Municipality in their work to develop the sanitation in the rural areas, with the focus on dry toilets. This thesis will try to answer the question of which type of dry sanitation solution would suit the rural areas in Makana Municipality and, therefore, it presents two possible types of toilets.

The recommendations in this thesis are based upon the feasibility study that was done from November to December 2011 by Henna Timonen and Sofie Lundin from Novia University of Applied Sciences, Raseborg, Finland. Information was gathered through interviews and site visits. The collected results from the visits are presented in this thesis.

The recommendation is to start with implementing composting dry toilets in the schools, where education plays a vital role. The composted waste can be utilized as fertilizer, thus also helping the finances of the schools. Since the rural areas of Makana are vast and hard to reach, the sanitation solution cannot be too technical, since support for this cannot be given. Ventilated improved pit latrines could be advisable in areas with proper soil conditions, it would be an improvement from open defecation, but composting dry toilets would be more beneficial, if implemented with enough education on use and management.

Language: English Key words: Makana Municipality, South Africa, sanitation, VIP latrine, composting dry toilet

EXAMENSARBETE

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Titel: Torrdass som en sanitetslösning i kommunen Makana, Sydafrika/Dry Toilets as a Sanitation Solution in Makana Municipality, South Africa

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Sammanfattning

Målet med detta examensarbete är att det skall fungera som ett hjälpmedel för kommunen Makana i deras arbete med att utveckla saniteten på landsbygden, med fokus på torrdass. Detta examensarbete ska försöka svara på frågan om vilken typ av sanitetslösning som skulle lämpa sig för landsbygden i Makana och presenterar därför två typer av toaletter.

Rekommendationerna i detta arbete baserar sig på en förstudie som utfördes 2011 av Henna Timonen och Sofie Lundin från Yrkeshögskolan Novia, Raseborg, Finland. Information samlades in genom intervjuer och besök av platser. Resultaten från besöken presenteras i detta arbete.

Rekommendationerna är att börja med komposterande torrdass i skolor, där undervisning har en självklar roll. Det komposterade materialet kan användas som gödsel, vilket också underlättar skolornas ekonomi. Eftersom landsbygden i Makana är vid och svårframkomlig, kan sanitetslösningen inte vara tekniskt krävande eftersom ingen support kan ges. VIP-latriner kan tänkas vara en lösning där marken är passande, det är en förbättring jämfört med frånvaro av sanitetslösning. Komposterande torrdass skulle vara fördelaktigt om de implementeras med tillräcklig undervisning om användning och hantering.

Språk: Engelska Nyckelord: Makana Municipality, Sydafrika, sanitation, VIP-latrin, kompostrande torrdass

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Tiivistelmä

Opinnäytetyön tavoitteena on toimia apuvälineenä Makana kunnan työssä edistää saniteettitasoa maalaisalueilla, keskittymällä kuivakäymälöihin. Tämä opinnäytetyö yrittää vastata kysymykseen, mikä saniteettiratkaisu olisi sopiva ja esittämään kaksi erilaista ratkaisuvaihtoehtoa.

Tässä työssä esiteltävät suositukset perustuvat soveltuvuustutkimukseen, jonka Henna Timonen ja Sofie Lundin Yrkeshögskolan Noviasta, Raaseporista, tekivät vuonna 2011. Soveltuvuustutkimus toteutettiin keräämällä tietoa saniteettitasosta haastattelemalla Makanan asukkaita sekä vierailemalla paikan päällä. Vierailun tulokset esitetään tässä opinnäytetyössä.

Suosituksena on, että kompostoitvien kuivakäymälöiden toteuttaminen aloitetaan kouluissa, missä valistus on jo itsestään selvää. Kompostoitu materiaali voidaan käyttää apulantana, mikä myös helpottaa koulujen rahataloutta. Koska Makanan maalaisalue on laaja ja vaikeapääsyinen, saniteettiratkaisu ei voi olla liian tekninen, sillä huolto on vaikea antaa. VIP-käymälät ovat hyvä ratkaisu siellä missä maaperä on sopiva, se on parannus olemattomaan ratkaisuun verrattuna. Kompostoitvat kuivakäymälät olisivat suotuisampi ratkaisu, jos niitä toteutetaan riittävällä koulutuksella käytöstä.

Kieli: Englanti

Avainsanat: Makana Municipality, Etelä-Afrikka, sanitaatio, VIP-

käymälä, kompostoiva kuivakäymälä

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1 Introduction

The aim of this thesis is to assist Makana Municipality in their work to develop the sanitation in the rural areas, with the focus on dry toilets. This thesis will present recommendations for dry sanitation systems, since different solutions can be suited for different places, depending on type of soil, placement or use. In addition to this, ideas on how to educate residents to use and maintain the toilets will be given. This thesis will try to answer the question of which type of dry sanitation solution would suit the rural areas in Makana Municipality and base these recommendations on the feasibility study that was completed in the spring of 2012 by students from Novia University of Applied Sciences.

The world's sanitation problems cannot be solved by building water latrines and sewerage systems. The building and maintenance costs are too high and, furthermore, this infrastructure cannot ensure a clean environment. The necessary quantity and quality of water for such a solution cannot be found in many regions of the world. It is preferable to find a sanitation solution that both works well, and is cheap and as simple as possible, both in the implementation stage and in use.

United Nations Economic and Social Council stated already in 1958 that *“no higher quality of water, unless there is a surplus of it, should be used for a purpose that can tolerate a lower grade.”* Therefore, it is necessary to develop cheap, technically simple and safe sanitation alternatives, which can be adjusted to meet the needs of different cultures and environments. It is also necessary to increase sanitation and hygiene education for understanding of the connections between human and environment health (de Ruyter van Steveninck E.D. & Schwartz K., 2004).

The Constitution of South Africa (Act 108 of 1996) states that everyone has a right to have access to a basic level of sanitation service. The government of South Africa has, therefore, set a target to deliver sustainable, safe and healthy sanitation services to all of its citizens by 2014, this including eradication of bucket toilets. To achieve this target, there is a need for sustainable, long-term service provision to ensure that the sanitation services are implemented and maintained in a way that does not pose a risk to human health or the environment. Since 1994, nearly 3 million households in South Africa have received

toilets, but the backlogs still remain high, especially in the rural areas (SALGA, 2009).

2 Background

The overall vision for the water service provision in South Africa is as follows:

“Water is life, sanitation is dignity. All people living in South Africa have access to adequate, safe, appropriate and affordable water and sanitation services, use water wisely and practise safe sanitation. Water supply and sanitation services are sustainable and are provided by effective and efficient institutions that are accountable and responsive to those whom they serve. Water is used effectively, efficiently and sustainably in order to reduce poverty, improve human health and promote economic development. Water and wastewater are managed in an environmentally responsible and sustainable manner” (City of Cape Town, 2008).

2.2 The Millennium Development Goals

The aim of the Millennium Development Goals (MDG) is to push back poverty, inequality, hunger and illness. The seventh goal of Millennium Development Goals aims to ensure environmental sustainability. These goals are an agreement on cooperation signed by UN member states, UN organizations and international financial institutions (Huuhtanen S. & Laukkanen A., 2009).

The MDG pledge to half the proportion of people without sustainable access to safe drinking water and basic sanitation by the year 2015. According to the latest reports 67 % of humanity will use improved sanitation services by 2015. That is not enough to reach the target of MDG, which is 75 %. In 2010, about 2.5 billion people worldwide were without improved sanitation (WHO/UNICEF, 2012).

In South Africa, open defecation is practised by 11-25 % of the rural population. This is an alarmingly large number. Although there are many sanitation projects in place to improve the sanitation conditions, the targets of the MDG cannot be completely met by 2015 (WHO/UNICEF, 2012).

2.3 Raseborg and Makana municipal cooperation

Makana Municipality is a local municipality in South Africa that consists of Grahamstown, Alicedale, Riebeeck East, Fort Brown, Salem, Seven Fountains and Sidbury. The total population is approximately 70,000 people, with about 21,000 living in Grahamstown. Grahamstown was founded in 1812. Tourism and farming are the major industries in the municipality (Makana Local Municipality, 2011).

Raseborg was created 1 January 2009 from the towns of Ekenäs, Karis and Pojo municipality. The population is about 29, 000 (Raseborgs stad, 2009-2013).

The Raseborg and Makana municipal partnership is a project of cooperation between the Town of Raseborg in Finland and the Municipality of Makana in South Africa. It is part of the North-South-programme administrated by the Kuntaliitto in Finland/The Association of Regional and Local Authorities. The project is financed by the Development Agency of the Finnish Foreign Ministry. The planning phase of the project had its start on 1 July, 2010. The accepted implementation phase from 1 January, 2011 to 31 December, 2013 is divided into two periods; January 2011- June 2013 and July 2012 – December 2013.

The activities of part I of the cooperation are as follows:

1. Municipal Services; with the aim to produce a feasibility study for developing sustainable sanitation, water and waste management.
2. Education and Culture; with the aim to improve local curriculum and school administration system. Also to establish direct contact, communication and interaction between schools in Raseborg and Makana and to share experiences of participatory methods in culture.

Furthermore, the project has some cross-sectional activities included in part II of the cooperation that are as follows:

1. Promote tolerance in the North and South, by exchange of artists and actors.
2. Create active communication within the cooperation, through the Internet.

There are also plans to develop cooperation within the social field and in energy planning.

3 Sanitation

3.1 Definition of sanitation

”World Health Organization (WHO) defines sanitation as group of methods to collect human excreta and urine as well as community waste waters in a hygienic way, where human and community health is not altered. Sanitation methods aim to decrease spreading of diseases by adequate waste water, excreta and other waste treatment, proper handling of water and food and by restricting the occurrence of causes of diseases.”

The term sanitation includes the facilities and the service required to guarantee adequate management of human waste in and around the household. Not included in the term sanitation is the collection and treatment of wastewater (DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

When defining the term sanitation there has to be a clear understanding of what is considered to be improved sanitation solutions. WHO’s and UNICEF’s Joint Monitoring Program (JMP) *“Global water supply and sanitation assessment 2000”* defines the following techniques as developed sanitation services:

- access to public sewer
- access to a septic system
- pour-flush latrine
- pit latrine with slab
- ventilated improved pit
- ecological sanitation (dry toilets)

The aim of sanitation is to increase human health and maintain a clean environment. The provision of clean water, building and maintenance education on sewerage systems, wash up and toilet facilities are included in sanitation. Furthermore, health and hygiene education is a vital part of sanitation in order to teach users about health problems, how

diseases spread, and about personal hygiene.

Sanitation is not only about public health, it is also about people and their personal dignity, infrastructure provision and environmental management. Government policy states that basic sanitation is a human right, and emphasizes the importance of involving people in choosing, planning and implementing sanitation improvements that meet their needs (de Ruyter van Steveninck E.D. & Schwartz K., 2004; DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

3.2 Diseases and bacteria

Lack of access to clean drinking water and proper sanitation causes a lot of illnesses and also deaths. The most common health problems due to poor sanitation are:

- diarrhoea and dysentery
- typhoid
- bilharzia
- malaria
- cholera
- worms
- eye infections and skin diseases
- increased risk for people with reduced immune systems due to HIV/AIDS

The simplest way to prevent diseases is to care for proper hygiene, including hand wash and education on how diseases like diarrhoea spread. Over 2 million people die annually only of diarrhoea, most under the age of five (WHO/UNICEF, 2012; DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009).

Organisms that generally cause problems with health are pathogenic bacteria, viruses, parasitic protozoa and helminths. These can be found in large numbers in excreta from infected individuals. It is usually enough with a small amount of infectious agents to cause an infection. Shortage or lack of safe drinking water is the prominent reason for transmission of excreta related diseases. Infections mainly have two pathways; drinking of

contaminated water and inadequate hygiene due to scarcity of water. Pathogens move through different pathways, as illustrated in figure 1.

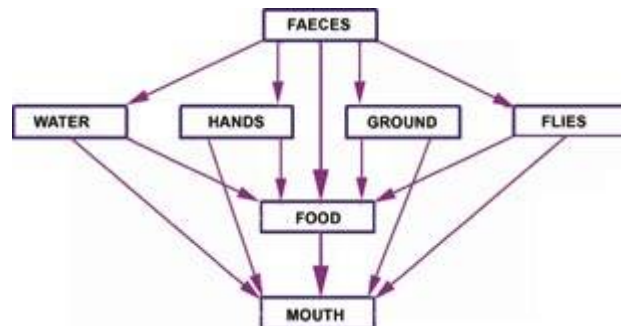


Figure 1: Transmission of pathogens through different routes (Huuhtanen S. & Laukkanen A., 2009).

Diseases also spread through hands, flies, water, soil and food that have been contaminated. This includes direct contact to human excreta, water-borne pathogens or contaminated drinking water. Other pathways for spreading of diseases are vegetables, shellfish or other food products exposed to contaminated water or soil, contact with animals that host parasites and pathogenic bacteria or through contact with infected individuals.

Therefore, it is crucial to include hand washing in order to prevent faecal-oral transmission. Hand washing ought to occur after defecation, after helping a child who defecates and before handling food or water, or before feeding a child. Hands should be washed with soap and running water, if possible. This is an easy way to prevent diseases from spreading.

A composting toilet forms a barrier between faeces and flies, fields and fluids, since it contains the faeces in a chamber. Likewise, the VIP toilet also has this barrier if the pit with faeces is kept isolated and not exposed to flooding or ground water (DWAF, 2001: Huuhtanen S. & Laukkanen A., 2009; Winblad U. & Simpson-Hébert M., 2004).

3.3 Sanitation coverage

The sanitation coverage in South Africa was 76-90 per cent in the year 2010. The ones lacking sanitation are mostly in the rural areas. Across Africa, as many as 355 million people live without access to safe drinking water. The situation of sanitation is even more worrying. An estimated 611 million people do not have access to adequate sanitation facilities.

When people have no access to a proper sanitation solution they resort to ways that spread diseases. Open defecation is practised in rural areas in every region of the developing world by a total of 949 million people (WHO/UNICEF, 2012; Huuhtanen S. & Laukkanen A., 2009; Chrispim M. C. & Nolasco M. A., 2012).

4 Dry sanitation

Sanitation problems are generally caused by water shortage. Dry latrine technology does not only reduce health problems caused by excreta but it also approaches the fundamental cause of the problem. Water is then saved for other more important purposes such as food preparation and hygiene.

The disposal of human waste without the use of water as a carrier is the definition of dry sanitation, also known as a waterless toilet. When the end product is used as a fertilizer it is also known as ecological sanitation. Ecological sanitation is based on the principles of preventing pollution, sanitizing the waste and using the end products for agricultural purposes, as fertilizer or soil improvement (Hamer N., 2005 ; Huuhtanen S. & Laukkanen A., 2009).

In developed countries, dry sanitation toilets were first designed for use in remote areas. However, increasing environmental awareness has led to some people using them as an alternative to conventional systems. Dry sanitation toilets can be a low cost, environmentally acceptable and hygienic option to water carried systems (Scott E., 2002; Rajesh U. A., 2012).

The pit latrine is the most simple and most commonly used latrine type in the world today. There are many different types of pit latrine solutions from simple to more advanced models. The general idea is a pit dug at a depth of at least 2 meters and with about 1 meter in diameter. A lid is constructed with a hole to squat over. The pit is used until it is filled, when a new pit is dug. The excreta can be dug out and used as soil enrichment material, however this is quite uncommon, the excreta is usually left underutilised (Scott E., 2002; HUUHTANEN S. & LAUKKANEN A., 2009).

4.1 Ventilated improved pit latrine (VIP)

A ventilated improved pit latrine (VIP) is similar to a pit latrine, but with the improvement of a vent pipe to eliminate flies and smells. The unpleasant odour is carried upwards by the chimney effect, which is achieved by adequate ventilation, such as constructing openings above and below the door or by building a spiral wall without a door. Flies are attracted to odour from toilets, but in a VIP toilet they are attracted to the top of the vent pipe rather than to the squat hole. There is a fixed screen across the pipe to prevent flies from entering, thus eliminating the fly problem. The pit should be constructed at least two meters above groundwater to prevent pathogens from spreading. The pit is used until it is filled. The function is illustrated in figure 2 (HUUHTANEN S. & LAUKKANEN A., 2009; SALGA, 2009).

A ventilated pit latrine needs no water, is cheap to build and does not require much expertise. A downside is that the location must be carefully selected to prevent runoff to groundwater or ground, and good hygiene is, of course, a must (HAMER N., 2005 ; HUUHTANEN S. & LAUKKANEN A., 2009).

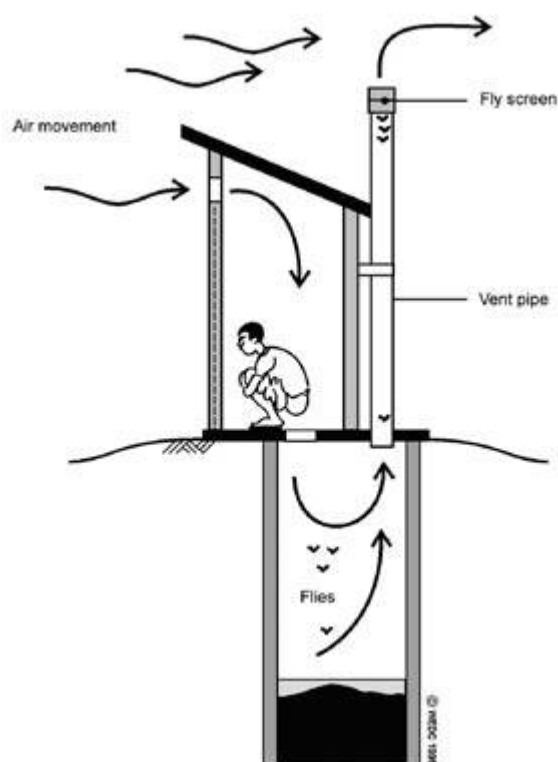


Figure 2: Illustration of VIP toilet (Huuhtanen S. & Laukkanen A., 2009).

With VIP toilets there is the issue of long-term sustainability. Full pit toilets are not only unusable, but they also pose a threat to public health and add to the indirect creation of a second sanitation service backlog. Since many of the VIP toilets built in South Africa since 1994 are now full or filling up, and with no service maintenance planning or funding provision to deal with this problem, the sanitation service backlog continues to increase.

When constructing VIP toilets the placement needs to be carefully planned. Placing a VIP toilet in a dense settlement is not a good idea, since that will lead to problems with no room for desludging equipment to move around or no room for a second pit when the first pit is full. Sanitation services in dense peri-urban settlements therefore require proper municipal sanitation planning and alternative sanitation solutions (SALGA, 2009; Hamer N., 2005).

Long-term requirements of pit servicing are easily forgotten, but very important. A pit with the volume of three cubic metres can serve a family of six for at least seven years. In areas with difficult ground conditions, pits with small volume will fill up faster. There are at least two ways of dealing with a filled up pit toilet:

- Seal and abandon the full pit. Then dig a new pit and build a new superstructure or use the old one over the new pit. This requires sufficient space and the filled pit may pollute the environment.
- Empty the pit to prevent a build-up of waste. Systems with urine diversion are designed for frequent removal and secondary disposal of dry waste. This requires access to desludging equipment.

However, desludging is expensive and heavy vehicles cannot always access the pit. Desludging intervals depend on the volume of the pit and on what other materials have been put in the pit. User education is therefore important to maximise the length that the pit can be used (SALGA, 2009).

4.2 Composting dry toilet

Dry sanitation toilets have obvious environmental, social and public health advantages. The main disadvantage is the possibility of insufficient reduction of pathogens. A composting toilet can vary in construction, material and use; sitting or squatting, but the common factor is the composting of the waste.

Composting toilets break down the faeces by bacteria and fungi. Some other organic matter is added to help the process of composting. Temperature, airflow and moisture content need to be controlled to maintain the needed aerobic conditions for the process. Excess urine is drained away or evaporated, or collected separately (Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

There are different types of composting dry toilets, what they all have in common is that the end material can be used as fertilizer. If the toilet also separates urine from the faeces the urine can also be used as a fertilizer. Research has shown that human urine can very well be used as fertilizer or as a supplement to conventional fertilizers (Srinivasamurthy C. A., 2012).

A composting dry toilet needs no water, has minor runoffs, and none or little odour if used correctly. Positive aspects in regards to public health are that the faeces are isolated from animals, such as pigs or rats, and from groundwater. Flies cannot as easily breed when the waste is isolated. Also, the end product has a minimal concentration of pathogens in comparison with open defecation.

The most simple model of a composting dry toilet is a latrine that is constructed upon a pit with about one meter in depth. To prevent water from entering the pit, it needs to be constructed in a sufficiently high area. A composting toilet can also be built on a hill, but the waste container needs to be above the ground. When the pit is filled it is covered with ground material, about 30 cm, and left to decompose. This waste can then be dug up after a year and used as fertilizer, or fruit trees can be planted on top of the decomposed material. Another simple model is a latrine with two pits, which has the same function, but takes longer to fill up (Huuhtanen S. & Laukkanen A., 2009).

A composting dry latrine with two vaults (see figure 3) has a base constructed out of concrete bricks or similar material. With two vaults the waste in one of the chambers is let to decompose at least for a year while the other vault is in use. If urine is collected the toilet can be equipped with separate toilet bowls or buckets if it is a squat model. It could also be fitted with a separate urinal for men (Rajesh U. A., 2012; Scott E., 2002).

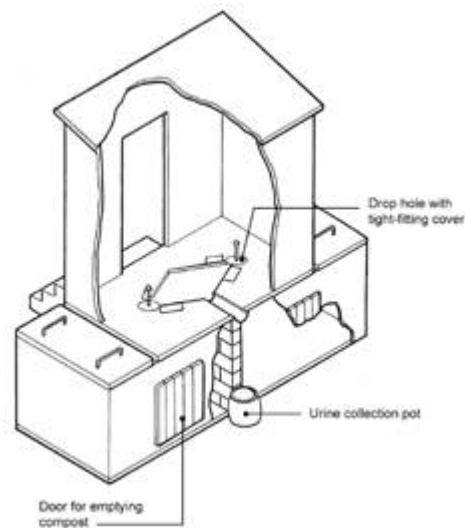


Figure 3: Illustration of a composting dry latrine with two vaults (Huuhtanen S. & Laukkanen A., 2009).

Negative aspects of composting toilets are that some kind of organic matter, such as chopped grass or wood chips, needs to be added to the waste to ensure enough oxygen for proper composting, which also requires time. Handling may be considered complicated and the material may be partially infectious during stages of handling. Correct usage and sufficient storage time is required to kill pathogens (Rajesh U. A., 2012; Scott E., 2002).

Short instructions for managing a composting toilet:

- Add dry matter after each use. Water should not get into the waste vault.
- If the toilet starts to smell, try adding more dry matter.
- If the vent pipe is not clean it will attract flies.
- One can use a stick or shovel to push the waste further down if it piles up.
- When the first vault fills up, use the other one and be sure to cover the filled vault properly.
- The waste should be let to decompose for at least a year before emptying the chamber.
- Litter has no place in the waste collection, since it does not decompose.
- The latrine should be kept clean and regularly checked that it is fully functioning.
- Using gloves and shoes when handling the waste is important and also washing of

hands after handling.

- Providing a place for hand washing is important (Huuhtanen S. & Laukkanen A., 2009).

If the latrine is urine separative, one should remember the following points:

- Urinal and urine separation hole should be flushed with a small amount of water on occasion.
- When the urine collector is full it should be emptied and made into fertilizer.
- As a fertilizer urine can be used both diluted or undiluted. Used dilutions is 3 parts water to 1 part urine.
- Collection of urine, handling and transportation should be kept isolated from excrement.
- When stored, urine should be stored in closed containers to prevent evaporation.
- Gloves should be worn and hands always washed after handling and spreading the urine.
- When it comes to spreading, it is preferable to do so at the beginning of the growing season.
- It is preferable to wait at least a month between spreading and harvest.
- The urine can also be poured on top of the compost to help with the composting process if it gets too dry (Huuhtanen S. & Laukkanen A., 2009; Chrispim M. C. & Nolasco M. A., 2012).



Figure 4: Composting dry toilet at Colingham farm, Makana, South Africa (Photo by Sofie Lundin).

4.3 The composting process

In the decomposing process called composting, micro-organisms break down organic matter and produce carbon dioxide, ammonia, water, heat and humus. This process destroys many human or plant pathogens, provided it reaches sufficiently high temperatures. When the composting is completed the waste pile becomes more uniform and dark brown to black in colour. The particles decrease in size and become soil-like, which can take from 6 to 18 months, depending on conditions.

For a successful composting process good aeration is needed. It can be achieved by having the right moisture content and by turning the pile, thus ventilating the waste. Turning also regulates the temperature. Moisture is needed to support the activity of the micro-

organisms. One can empty the toilet container and have a secondary composting pile to achieve full decomposing (Misra R.V., Roy R.N. & Hiraoka H., 2003).

If one can reach composting temperatures of 50-60 °C, all pathogens and worm eggs die within a few days, however, temperatures of this type are seldom achieved. The composting process stops below 5 °C, and is slow below 20 °C. Pathogens are normally destroyed at 55°C.

It is also important to remember that temperature alone is not required for destroying pathogens. Both temperature and time function to eliminate pathogens. Lower temperatures can achieve acceptable pathogen kill if the material is stored during a sufficient amount of time. Most composting toilet models are designed for a retention time of 8–12 months. Prefabricated units for storage of composting waste work best to achieve the right conditions, but one can also easily be built (Scott E., 2002; Winblad U. & Simpson-Hébert M., 2004).

There are three stages in composting:

- Active composting, where the latrine or compost container is filled with waste.
- Resting stage, where the compost is turned and then left to decompose covered with dry litter or soil. Old compost should not be mixed with new waste.
- Further composting, where the compost is matured in a stack outside or in a container protected from the rain. When the compost process is completed the end product is dark, relatively dry and light and smells like soil (Huuhtanen S. & Laukkanen A., 2009).

4.4 Waste treatment

The composting process requires storing to eliminate pathogens. The solids that accumulate in the pit or tank are calculated to be about 40 litres per person per year. These need to be removed periodically or in the case of pit latrines, a new pit should be dug. One interesting way to use the nutrients available in a filled pit is to plant, e.g. fruit trees or tomato saplings on the site, after the latrine structure is removed, which should be done a couple of months after usage. If it is done earlier, the plants may die, since they cannot survive in waste that is not completely decomposed.

On-site sanitation and waste treatment is effective when there is no piped water available. When it comes to waste treatment and handling, one needs to consider the occurrence of shallow water wells, soil permeability, unit cost and social considerations (de Ruyter van Steveninck E.D. & Schwartz K., 2004; Huuhtanen S. & Laukkanen A., 2009).

5 Methods

5.1 Feasibility study

The aim of the feasibility study was to gather information about the current situation and map out the needs in the rural areas of Makana Municipality, South Africa. This was done during November - December 2011 by Henna Timonen and Sofie Lundin from Novia University of Applied Sciences, Raseborg, Finland. The issue was the suitability of dry toilets as a sanitation solution in rural Makana.

Since water is scarce in Makana the focus for the feasibility study was dry toilets as a method of collecting human excreta and urine, concentrating on farms in the rural areas. During our stay in Makana we visited 16 farms, 2 game reserves and 4 primary schools, as listed in table 1. At the site visits we had a council member from Makana Local Government as guide and interpreter, in total there were three different council members that accompanied the site visits.

Table 1: Date, place and number of residents at visited sites.

Date	Farms	Residents
Nov 14th	Mosslands	10 families
Nov 15th	Hope Fountain	10 persons
Nov 15th	Narraway	10 families
Nov 15th	Broughton	36 families
Nov 16th	Salem	17 families
Nov 16th	Don Bradfield	13 families
Nov 16th	Homeleigh	8 families
Nov 16th	New rest	8 families
Nov 17th	Devonshire	10 families
Nov 17th	“Pineapple farm”	30 families ~100 persons
Nov 17th	Aloe ridge	11 families
Nov 22nd	Outspan	4 families
Nov 22nd	Fort Brown	5 families
Nov 22nd	Douglas Heights	5 families
Nov 23rd	Waterfall	7 families
Nov 23rd	Thorn Kloof	11 families
	Game Reserves	
Nov 22nd	Kwandwe Game Reserve	unspecified
Nov 23rd	Ejala Game Reserve	unspecified
	Schools	
Nov 14th	Hendrick Kanise School, Alicedale	unspecified
Nov 16th	Kwamhala Primary School	25 children, 2 teachers, 1 cook
Nov 17th	Broughton Primary School	28 children, 3 teachers, 1 cook
Nov 23rd	Carlisle Bridge Primary School	17 children, 3 teachers, 1 cook

We interviewed the residents, asked questions about their water and sanitation to map out their needs, then summarized it all in a report and a presentation before the municipal council of Makana. During the visits we informed the residents about dry toilets and asked whether such a solution would interest them. Figure 5 gives a picture of the conditions at the sites.



*Figure 5: Site visit at Homeleigh farm, Makana, South Africa
(Photo by Sofie Lundin).*

6 Results

A map of the visited sites (figure 6) with attached information was generated to illustrate from where the information was gathered. The map is done using Google maps and it gives the information collected from sites when clicking on the place marker.

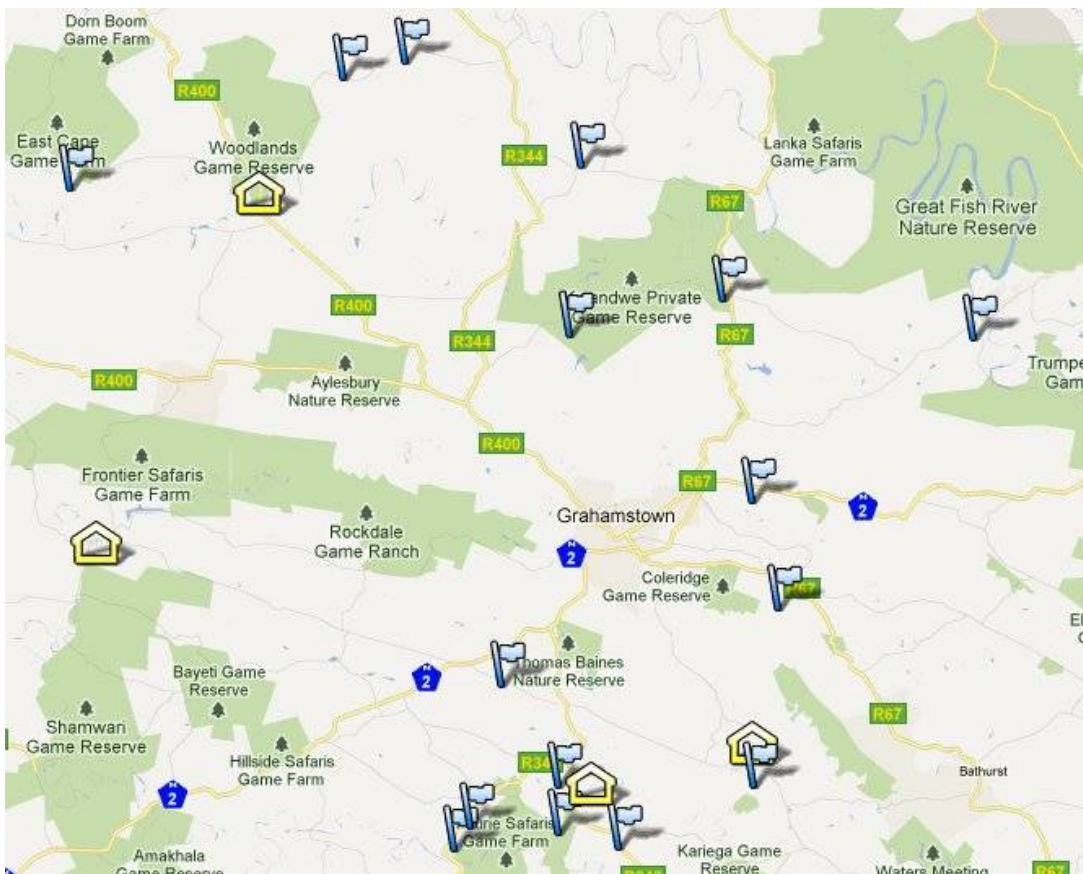


Figure 6: Blue flags indicate visited sites, yellow houses indicate the schools. © 2011 Google © 2011 Tele Atlas

As table 2 shows, open defecation is practised on 12 sites, which is most of the sites. At one farm they mentioned that the waste polluted the water, since the water they use comes in contact with faeces.

At eight of the visited sites there were pit toilets. There were complaints that the pits were filling up and that the pits began to overflow after heavy rains. At other sites there were problems with flies in the pit toilets. It was also pointed out that the pit toilets made the children sick.

Table 2: Type of sanitation method

Date	Farms	Flush toilets	Pit toilets	Open defecation
Nov 14th	Mosslands		x	
Nov 15th	Hope Fountain			x
Nov 15th	Narraway			x
Nov 15th	Broughton			x
Nov 16th	Salem			x
Nov 16th	Don Bradfield			x
Nov 16th	Homeleigh		x	
Nov 16th	New rest			x
Nov 17th	Devonshire			x
Nov 17th	“Pineapple farm”			x
Nov 17th	Aloe ridge			x
Nov 22nd	Outspan		x	x
Nov 22nd	Fort Brown		x (too few)	
Nov 22nd	Douglas Heights			
Nov 23rd	Waterfall			x
Nov 23rd	Thorn Kloof			x
	Game Reserves			
Nov 22nd	Kwandwe Game Reserve	x		
Nov 23rd	Ejala Game Reserve	x		
	Schools			
Nov 14th	Hendrick Kanise School		x	
Nov 16th	Kwamhala Primary School		x	
Nov 17th	Broughton Primary School		x	
Nov 23rd	Carlisle Bridge Primary School		x	

All of the visited schools had pit toilets, which worked well. When asked about the opportunity to use the composted material in gardens, all of the schools were interested. Some already had gardens. The game reserves visited both had flush toilets.

Overall there was a very positive attitude towards dry toilets, as can be seen in table 3. The residents liked the fact that the toilets could be placed near the housing, since currently they fear wild animals when practising open defecation.

Table 3: Reactions and attitudes concerning composting dry toilets.

Date	Farms	Reactions to dry toilets
Nov 14th	Mosslands	Satisfied with pit toilets
Nov 15th	Hope Fountain	Would like toilets near the new houses
Nov 15th	Narraway	Hesitating, would like work and water first
Nov 15th	Broughton	Positive and asking for the toilets to come soon
Nov 16th	Salem	Would like dry toilets
Nov 16th	Don Bradfield	Very positive towards dry toilets
Nov 16th	Homeleigh	Would like dry toilets
Nov 16th	New rest	Hesitating
Nov 17th	Devonshire	Would like dry toilets with information on how they work
Nov 17th	“Pineapple farm”	Positive towards dry toilets, ready to manage them. Says open defecation pollutes their drinking water
Nov 17th	Aloe ridge	Had heard about dry toilets and asking for the toilets to come soon
Nov 22nd	Outspan	Positive, would like movable ones
Nov 22nd	Fort Brown	Very positive, had heard about dry toilets, would like movable ones
Nov 22nd	Douglas Heights	Had heard about dry toilets
Nov 23rd	Waterfall	Would like dry toilets
Nov 23rd	Thorn Kloof	Would like dry toilets
	Schools	
Nov 14th	Hendrick Kanise School	
Nov 16th	Kwamhala Primary School	Feels that pit toilets work well
Nov 17th	Broughton Primary School	Feels that pit toilets work well, but they have no doors
Nov 23rd	Carlisle Bridge Primary School	Feels that pit toilets work well, but flies are a problem

The results of the field visits and the research were presented on the 8th of December, 2011, before the municipal delegate. The presentation included a summary of the needs for improved sanitation services in the rural areas of Makana. In addition, different dry toilets were presented and emphasis was put on the essential points of a successful sanitation project, which are education and participation.

7 Discussion

Poor sanitation and open defecation are still widely spread, and there are currently many plans and projects for dealing with this problem and delivering proper sanitation to all. Poor public health leads to diseases, and in the worst cases deaths, due to infections spreading and contaminated drinking water. Hand washing is a crucial part in eradicating this problem.

In Makana, open defecation is common in the rural areas. At such places any type of sanitation solution is more than necessary, with education about personal hygiene included. Without education about hygiene and use any sanitation project will fail, however good it otherwise is. Mere improvements in sanitation facilities do not always enhance the conditions, therefore hygiene education is equally important. The development of both facilities and education simultaneously gives the best results.

Most of the visited farms had heard about composting toilets prior to our visit, since there is a farm in Makana with composting dry toilets, Colingham Farm. This makes implementing composting dry toilets easier since this sanitation solution already has a good image in the area. At all of the sites that showed interest, the residents wanted the toilets as soon as possible, because it would be such an improvement to the current sanitation conditions.

A thing that was brought to our attention at the sites, was information; many asked to get to know more about the composting process and how it can be utilized. There was a clear interest in getting more information about how dry sanitation solutions work and how they are managed.

At the places where open defecation is practised, it would be crucial to implement any type of sanitation solution, such as VIP toilets or, if included with proper education, composting dry toilets. There is also a need for more pit toilets at the sites where these are used, since too many people share the ones available, which fills them up quickly. One could also consider bringing in composting toilets instead of pit latrines, for a more sustainable solution.

All of the visited schools had pit toilets, which worked well, but they would benefit from composting dry toilets in order to construct vegetable gardens for their kitchens. The schools that already had gardens welcomed the idea of getting fertilizers “for free” from the composting toilets. This would also help the schools in a financial way, when they could grow their own vegetables.

As a result of the feasibility study it was concluded that dry toilets would be suitable for the rural areas of Makana, with the focus on creating a project that is sustainable in the long term. This includes education about hygiene and the proper use of dry toilets. A successful sanitation project also considers the different parts of a sanitation project, such as planning together with the end-user, implementing, and how it will be managed in the future.

7.1 Problems

During the feasibility study a few problems occurred, most prominent was problems with language and communication. At the site visits we had a council member along with us as an interpreter, that we communicated with in English. This was a weakness since English is not our mother tongue, neither that of the interpreter. Because of this we kept our questions as simple as possible. At some sites we were not able to gather all the wanted information, due to issues with time or language.

Upon arriving in Makana we started with the site visits with very little preparation, which was not very good, because it resulted in not being able to ask or inform at the first few sites regarding the same matter as at the latter sites.

The geographical spread of the visited sites could have been more even, and some areas in the western part of Makana Municipality were left out. This is partly due to the fact that the western area has many game reserves. The visits were determined by the council member who accompanied us.

7.2 Recommendations

When considering the current situation, any type of sanitation solution would seem like an improvement. One woman at the site visits expressed it well, when she said that the toilets would make them into ladies. This shows how important proper sanitation is to human dignity.

One solution to the lack of sanitation, among others, is dry toilets. Furthermore, composting dry toilets give the benefit of fertilizers and soil improvements to the users. This is a good solution in places with a shortage of fertilizers. Dry toilets have no problems with flies, there is less odour, they can be constructed on any type of soil and near buildings. Still, one needs to bear in mind that composting toilets are more complex to maintain, and there needs to be an understanding of how the composting process should be handled. In some places ventilated improved pit latrines could be a good solution, even though it is not always considered to be a sufficient improvement to sanitation.

In Makana one could consider the possibility to combine dry toilets with agriculture on a small local scale. Since there is not much soil or fertilizers naturally available, the end product from dry sanitation could be used for this purpose. This of course requires more knowledge and effort from the local people, but is a great reward, and gives a sense of accomplishment if carried out successfully.

To take sanitation and health education to the schools is a rewarding option, since children who are educated on the importance of good personal hygiene and proper sanitation, carry the message beyond the borders of the school, and it easily spreads in the community and improves public health. Behaviour that is learned in school can lead to positive habits for their entire life. Teachers have the opportunity to function as role models for the children and also for the community. School children can also influence the behaviour of family members, such as adults and siblings. Not to forget, it is more cost-effective to work with programmes directed to children than to adults.

Furthermore, the schools can utilize the handled end product as a fertilizer and soil improvement in their gardens. If this is done the waste treatment should be managed properly in order not to spread diseases. If urine is collected separately, it is simple to use as fertilizer, since it is generally free from bacteria (Nyirenda M., 2012).

Addressing the issue of participation and education, participatory methods are usually more effective than meetings of a lecture type. When participating, local people have the opportunity to discuss, and practical matters that may not be considered by outsiders, may emerge. Music, drawing and various performances like plays, theatre and dance, are natural ways to involve people and a good way to point out the importance of hygiene and sanitation. When educating people in sanitation and hygiene issues, one can be very creative (Huuhtanen S. & Laukkanen A., 2009).

Community participation is a key for the sustainability of any choice of sanitation. The term *free basic sanitation* is a bit controversial, as experience has shown that sanitation is a service which requires the engagement of the consumer, and most benefits are best achieved if the consumer makes a contribution to the service. However, free basic sanitation means that the consumers get the service without making contributions in cash and by getting a complete solution (SALGA, 2009).

Learning in group is the most efficient, because it provides opportunities to change existing behaviour permanently. Concept based learning is very important for the learning process. When people are made responsible for finding solutions on their own, they start to demand information, which is a more sustainable way of learning than preaching the information from a higher institution. Information exchange and discussion open ways of learning and give the people the opportunity to change their current situation. Active information searching and creative learning are keys to sustainable learning.

When improving hygiene through education one needs to put emphasis on the following points:

- correct use and maintenance of sanitation facilities
- adequate handling of excrement and urine

- hand washing after defecation, including small children
- hand washing before touching food and water
- proper storage and usage of water and food (Huuhtanen S. & Laukkanen A., 2009)

When it comes to sanitation services infrastructure maintenance is often overlooked due to lack of skills or funds. This then results in non-sustainable schemes that may cause serious health and environmental risks. Proper maintenance includes the following:

- Preventative maintenance, which means putting in place inspection, monitoring and maintenance schedules.
- Standardization, which may significantly bring sustainability to the project through standardized technology, spare parts for replacement.
- Access to skills. Skills for maintenance should be available within the local communities. This could be done through targeted training programmes (SALGA, 2009).

Concerning sanitation projects the issue of ownership and responsibility is to be made very clear. This is important to avoid resentment and to clarify who is responsible for tasks, such as repairs and waste treatment. One model of how to accomplish this, is by setting up a training program for the local users giving them the essential knowledge of how to maintain the toilets and thereafter they become responsible on-site. This task could be given to several persons. In addition, there should also be one or several persons responsible off-site, persons who have a bigger picture of the sanitation project, e.g., at the municipal office.

Some research indicates that the risk for groundwater pollution from on-site sanitation systems has been overstated. Very few soils have problems that cannot be solved by lining a pit. Years ago this was suggested to be a reason to install water-borne systems. Even if excavation of rock would be necessary, constructing a ventilated improved pit latrine would be more practical and also cheaper than water-borne systems. When it comes to soil, enriched with composted toilet waste, it is preferable to plant vegetables that grow above ground, such as tomatoes, pumpkins, cabbage and corn. This because the soil has a high pH value, which is not suitable for all plants (DWAF, 2001; Huuhtanen S. & Laukkanen A.,

2009).

Since the rural areas of Makana are vast and often hard to reach, the sanitation solution cannot be too technical, since support for this cannot be given. In areas with clay soils, which occur in Grahamstown, one cannot use VIP toilets, since that type of soil poses the risk of poor drainage. Instead one could use composting toilets that have a container above ground. Ventilated improved pit latrines could be advisable in areas with proper soil conditions, it would be an improvement from open defecation.

Health education alone does not change the behaviour of people, what is required is the conviction that improved sanitation brings a better standard of living and health. In the case of Makana I would say that most of the people in the rural areas have a good understanding of how sanitation would bring them dignity and an improved living. This is what good sanitation is about: to decrease illness and improve public health.

8 Svensk sammanfattning av examensarbetet

Inledning

Målet med detta examensarbete är att fungera som ett hjälpmedel för kommunen Makana i deras arbete med att utveckla saniteten på landsbygden, med fokus på torrdass. Detta examensarbete ska försöka svara på frågan om vilken typ av sanitetslösning som skulle lämpa sig för landsbygden i Makana och presenterar därför två typer av lämpliga toaletter. Det gäller att hitta en sanitär lösning som fungerar bra, är billig och så enkel som möjligt, både i genomförandefasen och vid användning.

Rekommendationerna i detta arbete baserar sig på en förstudie som utfördes i november till december 2011 av Henna Timonen och Sofie Lundin från Yrkeshögskolan Novia, Raseborg, Finland. Information samlades in genom intervjuer och besök av platser. Resultaten från besöken presenteras i detta arbete.

Sanitetsproblemen i världen kan inte lösas genom att bygga vattentoaletter och avloppssystem. Byggnads- och underhållskostnader skulle bli för höga och dessutom kan en sådan infrastruktur inte garantera en ren miljö. Den mängd vatten som skulle behövas för en sådan lösning finns inte i många delar av världen.

Lagstiftningen i Sydafrika (Act 108 of 1996) säger att alla har rätt till en grundläggande nivå av sanitet. Regeringen i Sydafrika har därför satt som mål att leverera hållbara, säkra och hälsosamma sanitära tjänster till alla sina medborgare fram till år 2014, detta inkluderar att få bort så kallade hinktoaletter. För att nå detta mål finns det ett behov av hållbara, långsiktiga tjänster som inte utgör någon risk för människors hälsa eller för miljön. Sedan år 1994 har nästan 3 miljoner hushåll i Sydafrika försetts med toaletter, men många är ännu utan sanitetslösning, särskilt på landsbygden (SALGA, 2009).

Bakgrund

Makana och Raseborg

Raseborgs och Makanas kommunala partnerskap är ett samarbetsprojekt mellan staden Raseborg i Finland och kommunen Makana i Sydafrika. Det är en del av Nord-Syd-programmet som administreras av Kommunförbundet i Finland. Projektet är finansierat av det finska utrikesministeriet. Projektet inleddes med planering 1.7.2010. Själva genomförandefasen är från 1.1.2011 till 31.12.2012 och är uppdelad i två perioder: 1.1.2011-30.6.2012 och 1.7.2012-31.12.2013.

Projektets första fas arbetade med frågor inom kommunal service samt utbildning och kultur. Den andra fasen arbetar med att främja tolerans och skapa aktiv kommunikation.

Sanitet

Definition

Termen sanitet omfattar anläggningar och tjänster som krävs för att garantera en lämplig hantering av mänskligt avfall i och runt hushåll. I begreppet sanitet ingår inte insamling och behandling av avloppsvatten (DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

Syftet med sanitet är att öka människors hälsa och bibehålla en ren miljö. Tillhandahållande av rent vatten, utbildning om byggande och underhåll av avloppssystem, personlig tvätt och toalett ingår i sanitet. Dessutom är utbildning rörande hälsa en viktig del av sanitet för att lära användarna om hälsoproblem, hur sjukdomar sprids och om personlig hygien.

Sanitet handlar inte bara om folkhälsan utan även om människor och deras personliga värdighet samt om infrastruktur och miljöledning. Den sydafrikanska regeringen anser grundläggande sanitet vara en mänsklig rättighet och betonar vikten av att engagera människor i att välja, planera och genomföra sanitära förbättringar som uppfyller deras behov (de Ruyter van Steveninck E.D. & Schwartz K., 2004; DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

Sjukdomar och bakterier

Bristande tillgång till rent dricksvatten och otillräcklig sanitet kan orsaka en hel del sjukdomar och även dödsfall. De vanligaste hälsoproblemen på grund av dålig sanitet är:

- diarré och dysenteri
- tyfus
- bilharzia
- malaria
- kolera
- maskar
- ögoninfektioner och hudsjukdomar
- ökad risk för personer med nedsatt immunförsvar på grund av HIV/aids.

Det enklaste sättet att förebygga sjukdomar är genom att värna om god personlig hygien och genom utbildning om hur sjukdomar såsom diarré sprids. Över 2 miljoner människor dör årligen bara av diarré, de flesta under fem års ålder (WHO/UNICEF, 2012; DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009).

Sjukdomar och infektioner sprids genom händer,flugor, vatten, jord och mat som har förorenats. Detta inkluderar direkt kontakt till människans exkret, vattenburna patogener eller förorenat dricksvatten. Andra vägar för spridning av sjukdomar är genom grönsaker, skaldjur eller andra livsmedelsprodukter som blivit utsatta för förorenat vatten eller jord, kontakt med värdjur för parasiter och sjukdomsframkallande bakterier eller genom kontakt med infekterade individer (DWAF, 2001; Huuhtanen S. & Laukkanen A., 2009; Winblad U. & Simpson-Hébert M., 2004).

Torrdass

Definitionen av torrdass är behandling av mänskligt avfall utan att använda vatten som en bärare. Om slutprodukten används som gödningsmedel kallas det även för ekologisk sanitet. Ekologisk sanitet bygger på principerna om att förebygga föroreningar, desinficera avfallet och använda slutprodukterna för jordbruksändamål, som gödningsmedel eller

jordförbättringsmedel (Hamer N., 2005 ; Huuhtanen S. & Laukkanen A., 2009).

En latringrop är den enklaste och mest använda typen av latrin i världen idag. Det finns många olika typer av latringropar från enkla till mer avancerade modeller. Den allmänna idén är en grop grävd på ett djup av minst 2 meter med ca 1 meter i diameter. Ett lock med hål är konstruerad för att sitta på huk över. Gropen används tills den är full, då en ny grop grävs. Avföringen kan grävas ut och användas som jordberikande material, men detta är ganska ovanligt, avföringen blir oftast kvar outnyttjad (Scott E., 2002; Huuhtanen S. & Laukkanen A., 2009).

Ventilerad förbättrad latringrop

En ventilerad förbättrad latringrop (VIP) liknar en latringrop, men är förbättrad genom ett ventilationsrör för att eliminera flugor och lukt. Obehaglig lukt bärs uppåt av skorstenseffekten, vilket uppnås genom tillräcklig ventilation genom att konstruera öppningar ovanför och under dörren eller genom att bygga en spiralformad vägg utan dörr. Flugor dras till lukt från toaletter, men i en VIP-toalett attraheras de till toppen av ventilationsröret snarare än till latrinhållet. Det finns en fast skärm över röret för att förhindra flugor från att komma in, vilket eliminerar flugproblemet. Gropen bör byggas minst två meter över grundvatten för att förhindra att patogener sprids. Gropen används tills den är fylld (Huuhtanen S. & Laukkanen A., 2009; SALGA, 2009).

Även om VIP-latrin är en förbättring jämfört med obefintliga sanitetslösningar, finns ändå frågan om långsiktig hållbarhet. Fulla latrin är inte bara oanvändbara, men utgör också ett hot för folkhälsan. Många av de VIP-latrin som byggdes i Sydafrika sedan 1994 är nu fulla eller närapå fulla och står utan någon underhållsplanering eller finansiell plan för att hantera problemet. Tömningsintervall för latrin beror på volymen av gropen och vilka andra material som har lagts med. Användarutbildning är därför viktigt för att maximera livslängden på latrin (SALGA, 2009; Hamer N., 2005).

Komposterande torrdass

Komposterande toaletter bryter ner avföring med hjälp av bakterier och mikrober. Något annat organiskt material läggs med för att hjälpa komposteringsprocessen. Temperatur,

luftflöde och fukthalt måste regleras för att upprätthålla rätt aeroba förutsättningar för kompostering. Urin kan dräneras bort, förångas eller samlas in separat (Huuhtanen S. & Laukkanen A., 2009; Scott E., 2002).

Det finns olika typer av komposterande torrtoaletter, vad de alla har gemensamt är att slutmaterialet kan användas som gödningsmedel. Om toaletten också separerar urin från avföring kan urinen även användas som ett gödningsmedel. Forskning har visat att urin från människor mycket väl kan användas som gödningsmedel eller som ett komplement till konventionella gödningsmedel (Srinivasamurthy C. A., 2012).

Den enklaste modellen av en komposterande torrtoalett är en latrin som är konstruerad ovanför en grop med cirka en meters djup. För att förhindra vatten från att komma in i gropen, måste den konstrueras i ett tillräckligt högt läge. En torrtoalett kan också byggas på en kulle med avfallsbehållaren över marken. När gropen är fylld ska den täckas med markmaterial, cirka 30 cm. Detta avfall kan sedan grävas upp efter ett år och används som gödningsmedel. Frukträd kan även planteras på toppen av det komposterade materialet.

Negativa aspekter av komposterande toaletter är att någon form av organiskt material, såsom hackat gräs eller träflis, behöver blandas med i avfallet för att säkerställa tillräckligt med syre för tillräcklig kompostering. Hantering kan anses komplicerat och materialet kan vara delvis smittsamt under vissa stadier av hanteringen. Korrekt användning och tillräcklig lagringstid krävs för att bli av med skadliga patogener.

Komposteringsprocessen

I komposteringsprocessen bryter mikroorganismer ner organiskt material och producerar koldioxid, ammoniak, vatten, värme och humus. Denna process förstör många patogener, förutsatt att den uppnår tillräckligt hög temperatur. När komposteringen är total, blir avfallet mer enhetlig och får en mörkbrun till svart färg. Partiklarna minskar i storlek och blir jordliknande, vilket kan ta 6 till 18 månader, beroende på förhållandena.

För en lyckad komposteringsprocess behövs god luftning, vilket kan uppnås genom rätt fukthalt och genom att vända avfallshögen. Vändning reglerar även temperaturen. Fukt behövs för att stödja aktiviteten hos mikroorganismerna. Man kan tömma toalettbehållaren

och ha en sekundär komposteringshög för att uppnå full nedbrytning.

Om man kan nå temperaturer så högt som 50-60 ° C, så dör alla patogener och maskäggn inom några dagar, men temperaturer så höga uppnås sällan. Komposteringsprocessen stannar vid temperaturer under 5 ° C och är långsam under 20 ° C. Patogener förstörs normalt vid 55 ° C.

Metoder

Förstudien

Syftet med förstudien var att samla information om den aktuella situationen och att kartlägga behoven på landsbygden i Makana kommun, Sydafrika. Detta gjordes i november till december 2011 av Henna Timonen och Sofie Lundin från Yrkeshögskolan Novia, Raseborg, Finland. Eftersom vatten är en bristvara i Makana var fokus för förstudien torrdass som en metod för att samla in avföring och urin. Under vistelsen i Makana besöktes 16 gårdar, 2 viltreservat och 4 grundskolor. Med oss under besöken hade vi en rådsmedlem från Makana kommun som guide och tolk.

Vi intervjuade invånarna om deras vatten och sanitet för att kartlägga deras behov, sedan sammanfattades det hela i en rapport och en presentation inför kommunfullmäktige i Makana. Under besöken informerades invånarna om torrdass och de blev tillfrågade om en sådan lösning skulle intressera dem.

Resultat

På 12 platser saknas sanitetslösning överhuvudtaget och behoven görs ute i det fria, vilket är de flesta av platserna. Vid en gård nämndes att avfallet förorenar vattent, då vattent som används kommer i kontakt med avföring.

Vid 8 av de besökta platserna fanns latringropar. Klagomål framfördes om att groparna fylls upp och att de svämvar över efter häftiga regn. På andra platser fanns problem med flugor i latrinerna. Det påpekades också att latrinerna gör barnen sjuka.

Alla de besökta skolorna hade latringropar, som fungerade bra. När de tillfrågades om möjligheten att använda komposterat material i trädgårdsland så var alla skolor intresserade. Några hade redan trädgårdsland. De besökta viltreservaten hade båda vattentoaletter.

Överlag fanns det en mycket positiv inställning till torrtoaletter. Invånarna tyckte om att torrdass kan placeras nära byggnader.

Diskussion

Dåliga sanitära förhållanden och praxisen att göra sina behov ute i det fria är fortfarande utbrett. Dålig hälsa leder till sjukdomar och i värsta fall dödsfall, detta på grund av infektioner sprids och genom förorenat dricksvatten. Handtvätt är en viktig del i att utrota detta problem.

I Makana saknas sanitetslösning helt på de flesta platser ute i landsbygden. På sådana platser är någon typ av sanitetslösning mer än nödvändigt, med utbildning om personlig hygien. Utan utbildning om hygien kommer sanitetsprojekt att misslyckas hur bra projektet i övrigt än är. Utveckling av både sanitetsanläggningar och utbildning samtidigt ger det bästa resultatet.

En sak som kom till vår kännedom på platserna var frågan om information, många ville få veta mer om komposteringsprocessen och hur den kan utnyttjas. Det fanns ett klart intresse av att få mer information om hur torrdass fungerar och hur de hanteras.

På de platser där sanitetslösning helt saknas, skulle det vara viktigt att genomföra någon typ av sanitär lösning, exempelvis VIP-latriner eller om det ingår med ordentlig utbildning; komposterande torrdass. Det finns också ett behov av mer latringropar på de platser där dessa används, eftersom alltför många människor delar på de tillgängliga latrinerna, vilket fyller upp dem snabbt. Man kan också överväga att ta in komposterande toaletter i stället för latringropar, för en mer hållbar lösning.

Alla de besökta skolorna hade latringropar, som fungerade bra, men de skulle ha nytta av komposterande torrtoaletter för att bygga trädgårdsland för deras kökverksamhet. De

skolor som redan hade trädgårdsland välkomnade tanken på att få gödselmedel "gratis" från komposterande toaletter. Detta skulle också hjälpa skolorna finansiellt, då de kan odla sina egna grönsaker.

Som ett resultat av förstudien drogs slutsatsen att torrdass skulle vara lämpliga för landsbygden i Makana, med fokus på att skapa ett projekt som är hållbart på lång sikt. Detta inkluderar utbildning om hygien och korrekt användning av torrdassen.

Problem

Under förstudien uppstod några problem, mest problem gällande språk och kommunikation. Vid besöken hade vi en ledamot tillsammans med oss som tolk som vi kommunicerade med på engelska. Detta visade sig vara en svaghet eftersom engelska inte är vårt modersmål. På grund av detta höll vi våra frågor så enkla som möjligt. På vissa platser kunde vi inte samla all önskad information, på grund av problem med tid eller kommunikation. Vid ankomsten i Makana vi började vi med besöken med mycket lite förberedelser, vilket inte var bra eftersom det resulterade i att vi inte kunde intervju eller informera likadant på alla platser.

Den geografiska spridningen av de besökta platserna kunde ha varit jämnare, vissa områden i den västra delen av Makana kommun utelämnades. Detta beror delvis på att det västra området har många viltreservat.

Rekommendationer

En lösning på bristen på sanitet, bland andra, är torrtoaletter. Dessutom ger komposterande torrdass fördelen med gödningsmedel och markförbättringsmaterial. Detta är en bra lösning på platser med brist på gödningsmedel. Torrtoaletter har inga problem med flugor eller lukt och de kan konstrueras på alla typer av jord och nära byggnader. Ändå måste man komma ihåg att komposterande toaletter är mer komplicerade att upprätthålla och det måste finnas en förståelse för hur komposteringsprocessen ska hanteras. På vissa ställen kan VIP latriner vara en bra lösning, även om det inte alltid anses vara en tillräckligt stor sanitetsförbättring.

I Makana kunde man överväga möjligheten att kombinera torrtoaletter med jordbruk på en lokal nivå. Eftersom det inte finns mycket jord eller gödsel naturligt tillgängligt, kunde slutprodukten från torrtoas användas för detta ändamål. Det kräver naturligtvis mer kunskap och ansträngning från den lokala befolkningen, men ger en större belöning och en känsla av prestation om det utförs framgångsrikt.

Att ta sanitets -och hälsoundervisning till skolorna är ett givande alternativ, eftersom barn utbildas om vikten av god personlig hygien och ordentlig sanitet, och för budskapet bortom gränserna i skolan och det sprider sig lätt ut i samhället och förbättrar folkhälsan. Beteende som lärs i skolan kan leda till livslånga positiva vanor. Lärarna har möjlighet att fungera som förebilder för barnen och även för samhället. Skolbarn kan också påverka beteendet hos familjemedlemmar, såsom vuxna och syskon.

Vidare är det mer kostnadseffektivt att arbeta med program riktade till barn än till vuxna. Dessutom kan skolorna använda slutprodukten som gödningsmedel i sina trädgårdsland. Om detta görs bör avfallet hanteras på rätt sätt för att inte sprida sjukdomar. Om urin samlas in separat, är det enkelt att använda som gödningsmedel, eftersom den är i allmänhet fri från bakterier.

Då det kommer till deltagande och utbildning, är deltagande metoder oftast effektivare än möten och föreläsningar. Musik, konst och olika uppträdanden som pjäser, teater och dans, är naturliga sätt att engagera människor och ett bra sätt att påpeka vikten av hygien och sanitet.

Lärande i grupp är mest effektivt, det ger möjligheter att förändra det befintliga beteende permanent. När människor ställs ansvariga för att hitta lösningar på egen hand, börjar de kräva information, som är ett mer hållbart sätt att lära än att predika informationen från en högre instans. Informationsutbyte och diskussion öppnar upp sätt att lära och ger människor möjlighet att förändra sin nuvarande situation. Aktiv informationssökning och kreativt lärande är nyckeln till ett hållbar lärande.

När det gäller sanitära projekt behöver frågan om ägarskap och ansvar vara mycket tydlig. Det är viktigt att undvika förbittring genom att klargöra vem som är ansvarig för uppgifter såsom reparationer och avfallshantering. En modell för hur man kan uppnå detta är genom

att inrätta ett utbildningsprogram för lokala användare som ger dem grundläggande kunskaper om hur man upprätthåller toaletter och därefter blir de ansvariga. Denna uppgift kan ges till flera personer. Dessutom bör det också finnas en eller flera personer som är ansvariga på högre instans, som har en större bild av sanitet projektet, till exempel i kommunen.

Eftersom landsbygden i Makana är vid och ofta svårtillgänglig, kan sanitetslösningen inte vara alltför teknisk, eftersom support för detta inte kan ges. I områden med lerjordar, som förekommer i Grahamstown, kan man inte använda VIP toaletter, eftersom denna typ av jord utgör en risk för dålig dränering. Istället kan man använda komposterande toaletter som har en behållare ovan jord. VIP latriner kan vara passliga i områden med lämpliga markförhållanden, vilket skulle det vara en förbättring från att göra sina behov ute i det fria.

Enbart hälsoutbildning ändrar inte människors beteende, vad som krävs är övertygelsen om att förbättrad sanitet ger en bättre levnadsstandard och hälsa. I fallet med Makana jag skulle säga att de flesta människor på landsbygden har en god förståelse för hur sanitet skulle ge dem värdighet och en förbättrad livsstil. Detta är vad bra sanitet handlar om; att förbättra folkhälsan.

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