



Overview of Sanitation Technologies

By

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Capacity Building workshop for Adamawa State Sanitation Task Group

Monday 23 - Wednesday, November 25, 2015

Outline

- Video- Lagos state Sewerage and Sanitation Strategy
- Elements of Sanitation System
- Choosing a Latrine Design
- Ecological Sanitation
- Shit Flow Diagrams (SFD)
- Video- Lagos State Wastewater management policy

SUSTAINABLE SEWAGE & SANITATION STRATEGY

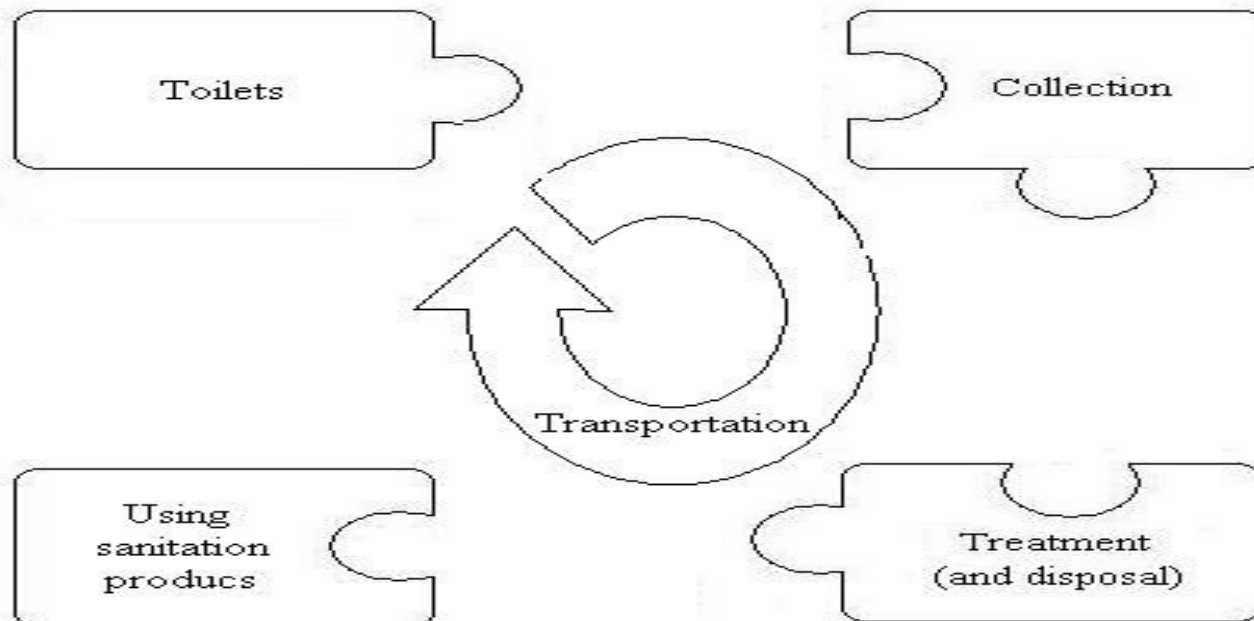
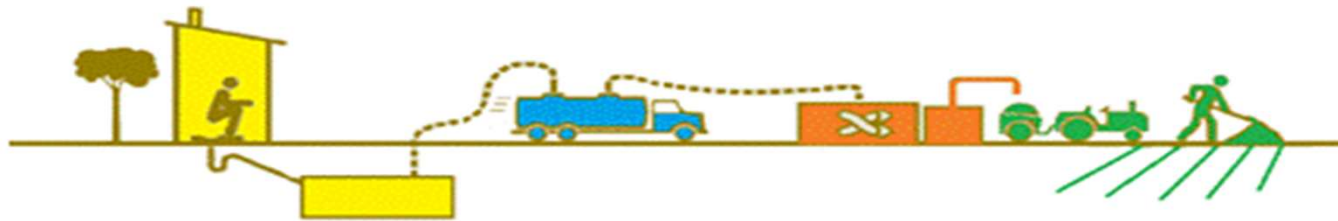
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The elements of a sanitation system

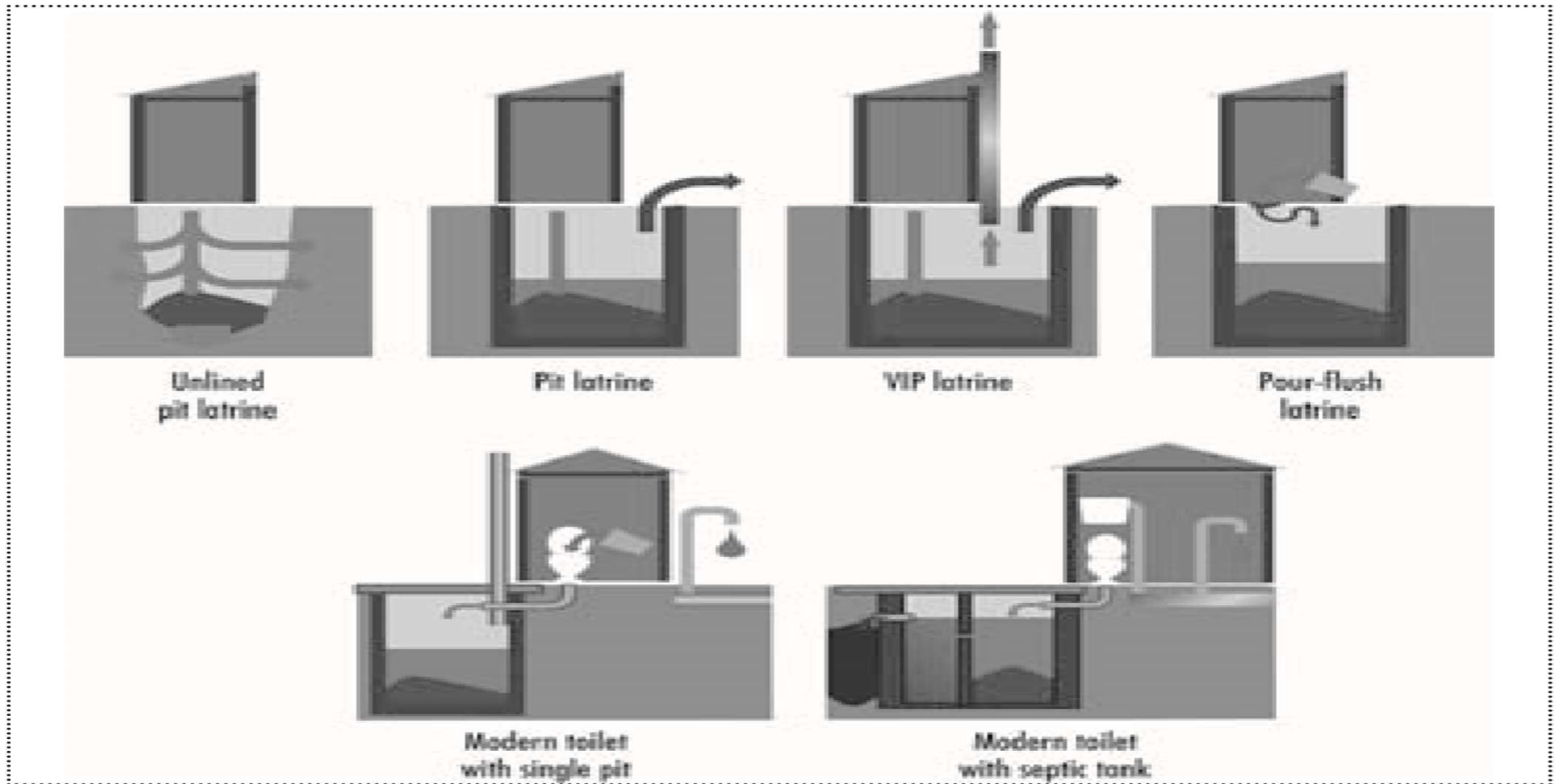
Five elements need to be considered separately:

1. The toilet– there is a wide range of latrines, water closets, urine-diversion toilets, etc, that may be considered, depending on local circumstances
2. The collection system – septic tanks, pits, vaults, drums, may be appropriate in different environments;
3. Transportation – large or small sewer systems, motorised, mechanical or manual haulage may need to be considered;
4. Treatment– systems vary from sophisticated wastewater treatment plants and sludge digestion to simple composting systems and soil filtration;
5. Use of sanitation products– urine, composted excreta and biogas are all important resources.

Elements (functional units) of a sanitation system © WASTE, 2004



Sanitation technologies



23-25 November 2019 Source: Programme Solidarite Eau, 2011 Financing Sanitation in Sub Saharan Africa pp9
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Sanitation Technologies

Sanplat Latrines



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Pour Flush Latrines

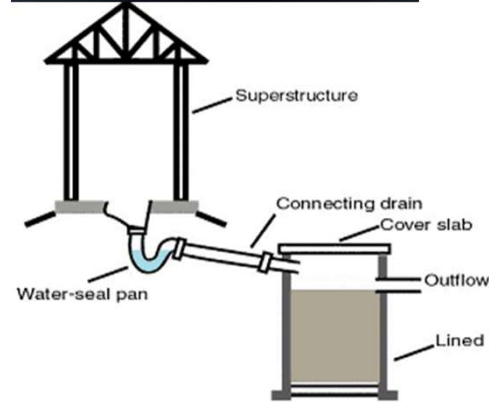
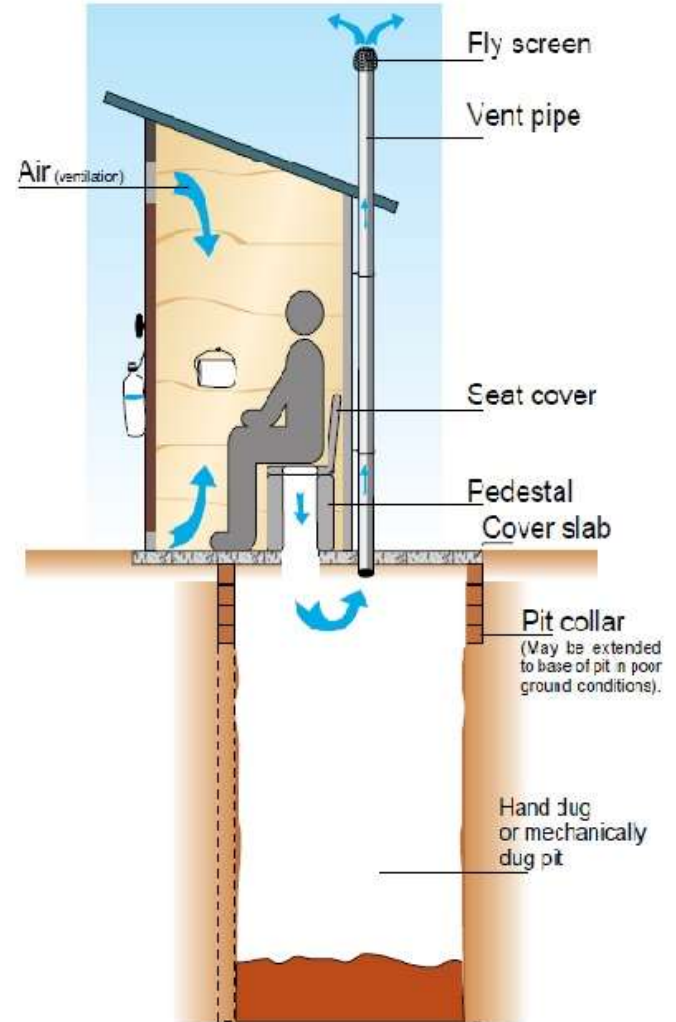


Figure 9: Pour flush latrine pan.

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Ventilated Improved Pit Latrines



Choosing a latrine design

1. Background information on users e.g. population profile, age and gender distribution, cultural background
2. Availability of water and wish to use it on sanitation (culture/ religion)
3. Availability of sewerage system; is waste water treatment organized; routes and waste water pools of possible sewerage systems
4. Ground analysis (soil type, hardness, permeability); is it hard to dig the ground; availability of digging workers and equipment; is there a need for supporting structure for pits (e.g.sandy soils)
5. Deepness of ground water and bedrock
6. Closeness to wells and/ or surface water sources, water storages and water supply sites

Choosing a latrine design

7. Availability of economical resources for improvement of sanitation, who is reliable for building and maintenance, are there regulations on sanitation, if yes, what kind
8. Availability of knowledge to build latrines and improve hygiene
9. Culture of handling latrine waste -Is latrine waste experienced as dangerous or in other ways hard to handle
10. Possibilities to separation and usage of urine
11. Soil type of cultivated land; availability of artificial fertilizers
12. Way of defecation (squat, sitting)
13. Usage of separate urinal
14. Availability of separate seat and possibilities to manufacture seats locally

Choosing a latrine design

15. Climate: are there a lot of rains in the area and occurrence of extensive surface water runoffs
16. The quality and distances to existing sanitation facilities, other sites for excretion
17. Refuse tips for solid wastes

Toilet type	Condition/ Situation										
	Urban &/or peri-urban	Water logged areas	Shallow groundwater	Permeable soil with deep ground water	Impermeable soil	Shallow bed rock	Areas with limited space	Water scarcity	Close to natural water sources	Water use for anal cleansing after defecation	Other materials (e.g. paper) use for anal cleansing after defecation
Water seal toilet (direct/offset pit)				x			x			x	
Ventilated improved pit toilet	x			x	x	x	x				
Septic tank & soak away pit, water seal toilet	x			x			x			x	
Septic tank & drain field, water seal toilet	x			x	x	x				x	
Small bore sewer system with household toilets and common treatment / pit	x					x	x			x	
Direct / offset pit pour-flush water seal built up toilets	x	x	x	x	x	x				x	
Ventilated improved pit, built up toilet		x	x	x	x	x				x	x
Eco san toilet (UDDT is one of them)	x	x	x	x	x	x	x	x	x	x	x

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Source: Helvitas, 2005

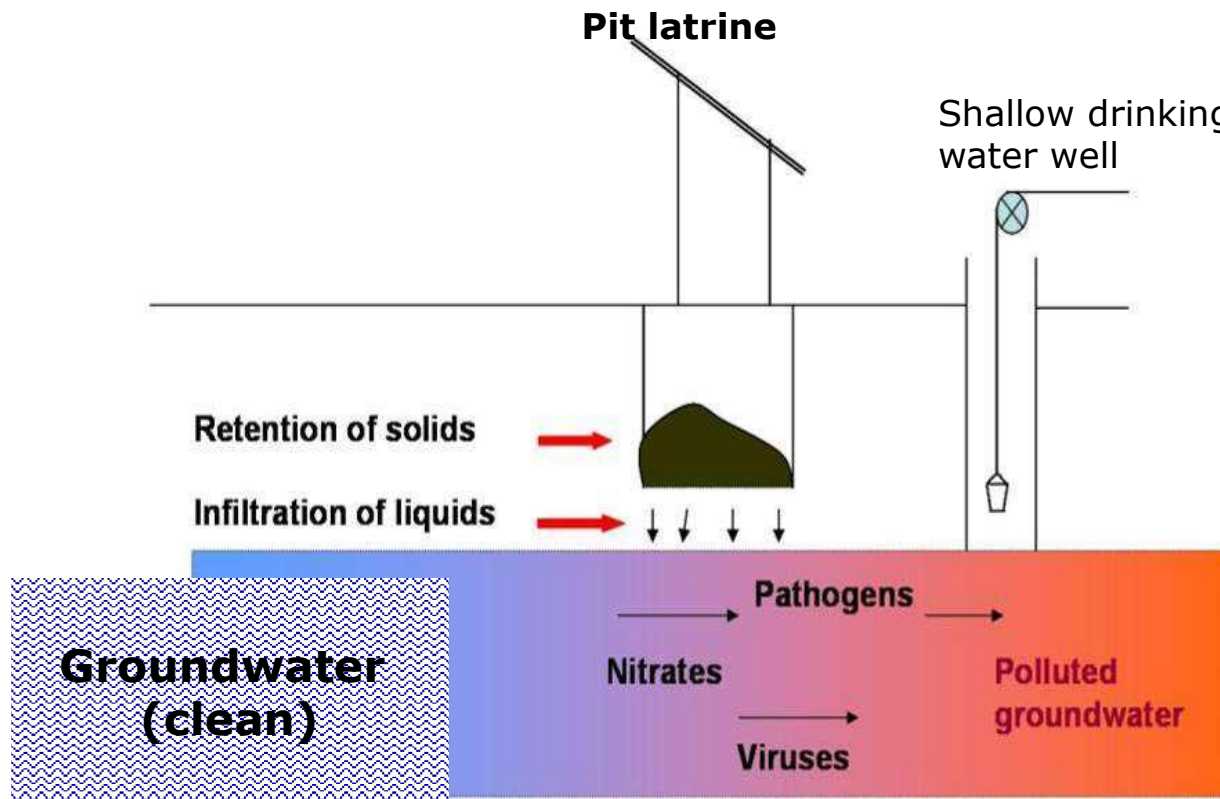
Choosing a latrine design

Some of the limitations of conventional sanitation technologies listed by Chariar et al, 2011, are as follows:

- *Massive infrastructure required for centralized sewerage systems.*
- *Contamination of the environment and water bodies.*
- *Elimination of organic matter and nutrients at sewage treatment plants requires*
- *enormous amounts of energy and chemicals.*
- *Use of freshwater to transport human excreta in sewers results in high drinking water demand.*
- *Valuable nutrients present in human excreta are misplaced in the water bodies and environment as conventional sanitation technologies fail to recover useful products*

Choosing a latrine design

Pit latrines in urban areas usually pollute the groundwater



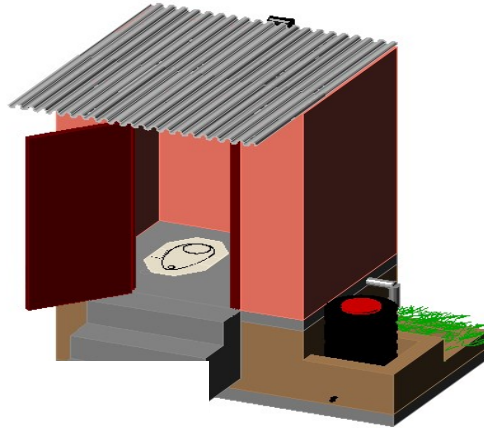
Ecological Sanitation (ECOSAN) toilets

- Ecological Sanitation (ECOSAN) toilets are waterless, dehydration / evaporation system

The three main pillars of ECOSAN toilets are:

- *Collection: If feasible and appropriate, separate collection of (most) waste components, with minimal dilution water.*
- *Treatment: Treatment that will allow safe reuse (safe for public health and for environment); pathogen destruction is a key requirement.*
- *Utilization: Beneficial reuse which recycles nutrients and organic matter to the soil (or aquaculture).*

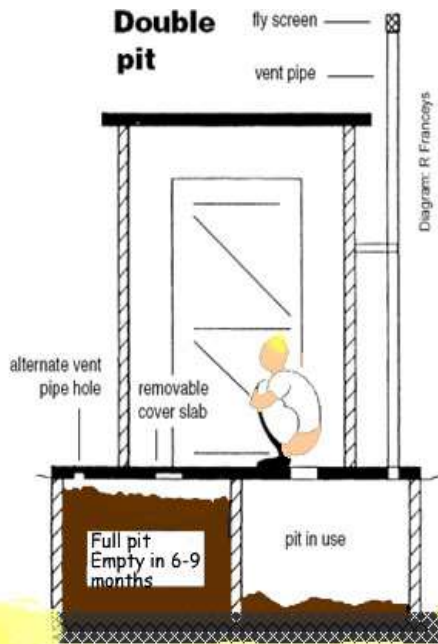
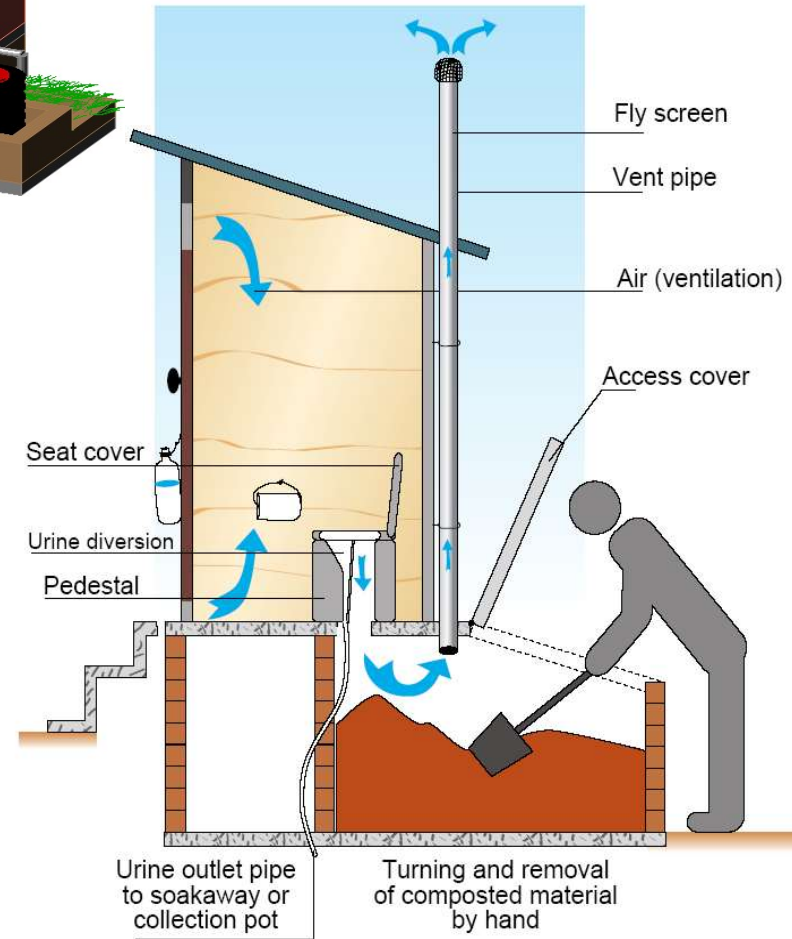
Ecological Sanitation: Urine Diversio



Dry-Compost Toilet

Use no water

Doesn't pollute the groundwater



Ground water

Well

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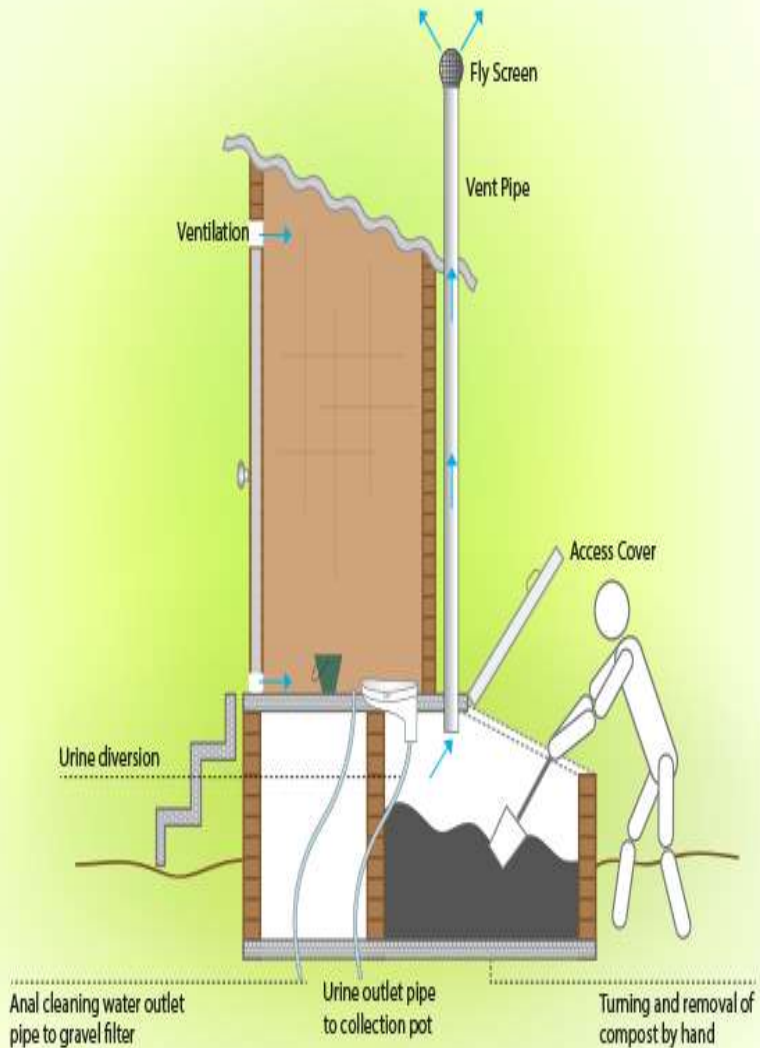
Pilot Urine Diversion toilets in Osun State, Nigeria



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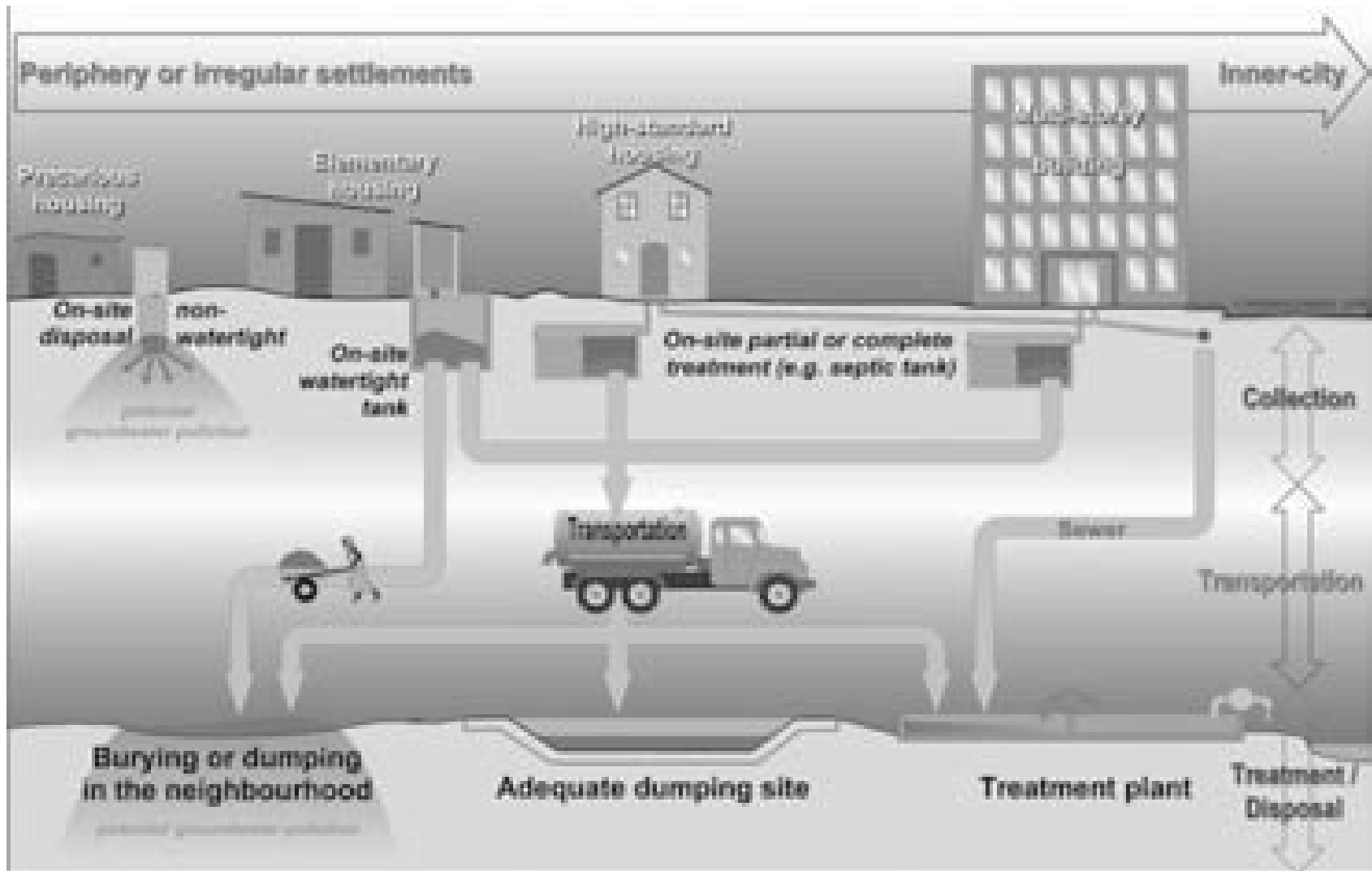
Capacity Building Works

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Wet weight 70 - 140
 Dry weight 35
 Nitrogen 1.5
 Phosphorus 0.5
 Potassium 1.0
 Organic carbon 21.4
 A host of pathogens !

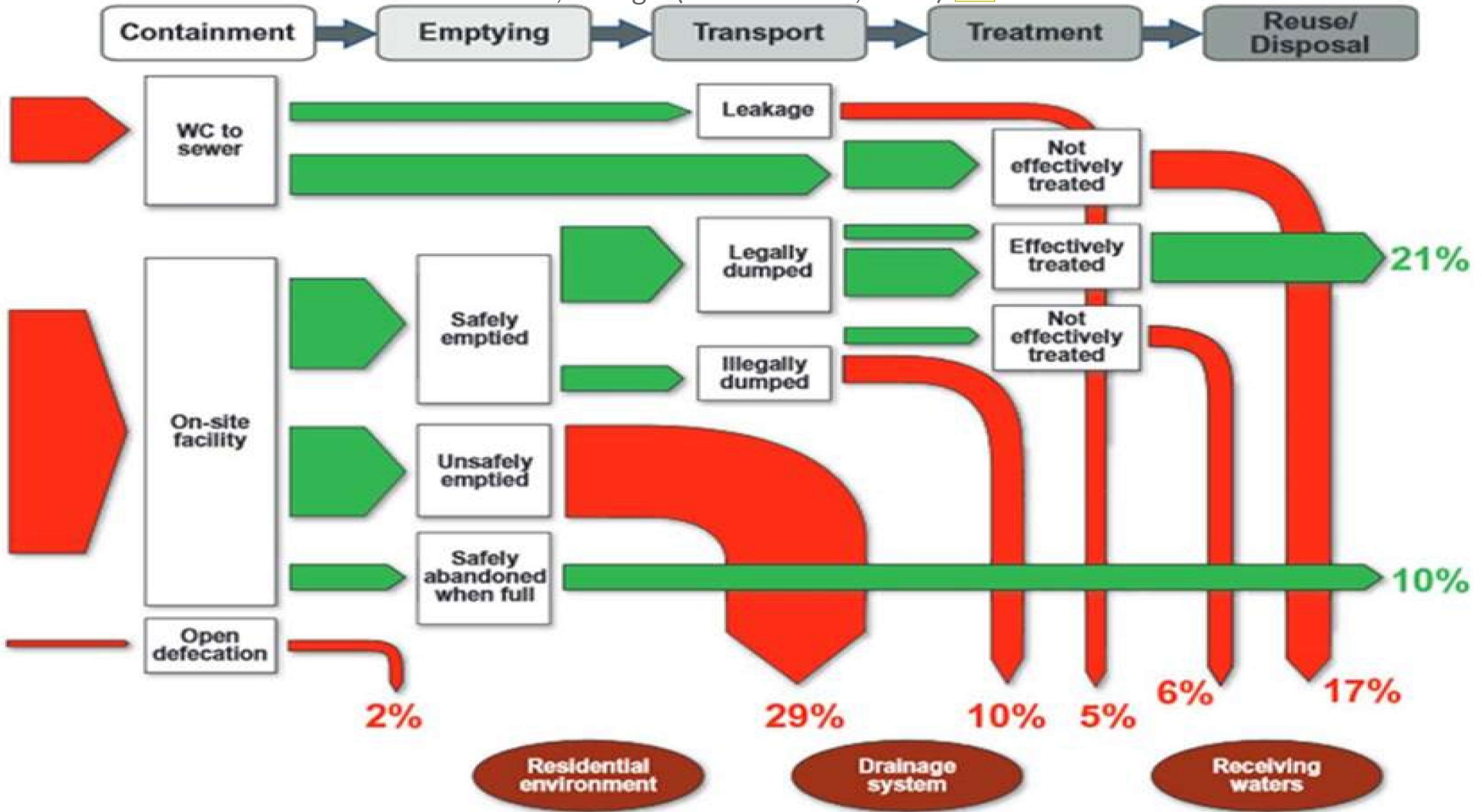




Shit Flow Diagrams (SFD)

- “Shit-flow-diagram” promotes better understanding of excreta management and summarises what happens to excreta in cities.
- SFD is a diagnostic, advocacy and decision-support tool that can be easily understood by non-technical key stakeholders in a city and by the civil society.
- Shifts focus on more effective and inclusive urban sanitation and more efficient investments

SFD for Dakar, Senegal (Blackett et al., 2014) BB1



BB1 An Shit Flow Diagrams SFD presents a clear picture of how wastewater and faecal sludge management services are delivered in a city and the resulting challenges; these can then be linked to aspects of service delivery where improvements are needed. Primarily it provides technical and non-technical stakeholders with an easy-understood advocacy tool that can be used to support decision-making on urban sanitation planning and programming.

Importantly, an SFD does not provide a 'shortcut' around integrated sanitation planning, promotion, investment, design, construction, operation and maintenance; these remain as very necessary components for implementing successful urban sanitation .<http://sfd.susana.org/about/the-sfd/sfd-package>

Babatope Babalobi, 17/11/2015

Lagos State Wastewater management policy

