Rural Coastal Sewerage Concept in Papua New Guinea

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Introduction

About 1/3 of the communities which is about 1.5 million of population in Papua New Guinea are located on the coastal periphery of the mainland and the islands of PNG. In most cases, there are no proper sanitation facilities for the disposal of human feaces identified in those regions. A sample of 25% of such communities identified by ADRA in its program strategic locations of Morobe Province defecates in the nearby bushes, rivers or sea-side due to inappropriate and or lack of latrine facilities and also poor hygiene practices. The pit latrines are not suitable because of high water table and sand-soil strata that permit diffusion of ground water and erosion of pit walls, which affect the durability of the pit latrine system and its contentment.

Consideration for the design of coastal rural sewerage system in Morobe Province

The type of sanitation facility to be modified and implemented for the coastal rural communities in Morobe Province should embark on environmental impacts, hence, that the latrine or sewerage system be geographically suitable and quantifiable to the rural population settling along sea-side and also on high water table areas who are experiencing high water log and other weathering situations all year around. A pre-intervention analysis of two appropriate and simple rural sewerage system will be look at to improve this situation in the coastal rural population of Morobe Province.

a) Improved Version – Asian Water Closet

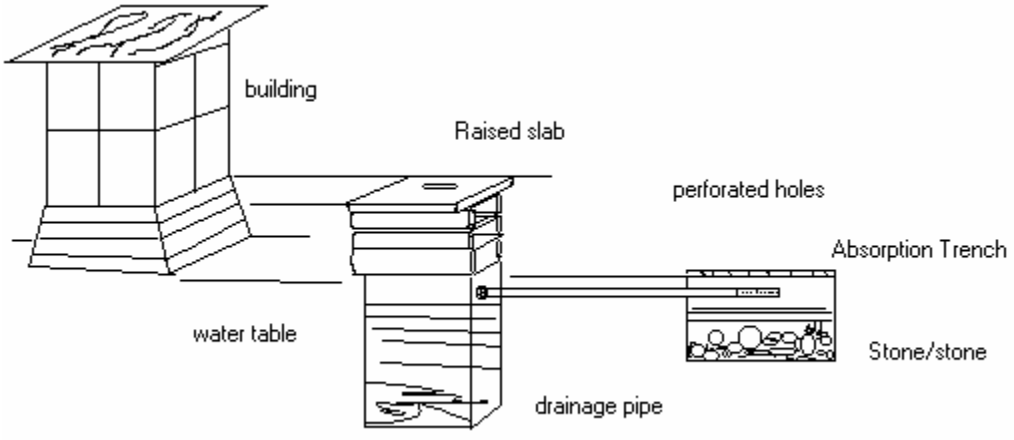

Figure 1: A design of the IV-Asian Water Closet

Figure 2
Pre-intervention Matrix for IV-Asian Water Closet

Features	Specification	Reliability	Risk Factors
Building Structure -Timber for the walls and raised platform can be collected from the bush free of charge - Roof, walls and raised platform can also be constructed using the local bush materials	Roof materials can be of sago leaves or kunai grass Walling and framing can be made from bamboo or local bush timbers	All households can afford one A four wall cabin, which gives the patron privacy and shelter	Local bush materials can be easily burned by bush fire Moderately reliable to strong winds and thunder storms
Slab Can be constructed at a cost of a cement bag and a quarter of a reinforcement mesh wire The raised basement for the slab can be an empty 44 gallon drum or other similar hard fix materials and should be placed at 0.3m around the pit hole	Slab dimension can be 1.2m x 1.2m x 0.06m Reinforcement G5 weld mesh of 1.1m x1.1m has a strong interior bonding capacity to cement and sand mix Tongue and grove timbers or hard facia - board timbers can make a strong wooden slab	An household can afford to meet the cost of a cement bag 4 x Households can share the cost of a G5 mesh wire for a piece each Concrete slab are proven to be more permanent and can be reused afterwards	Moderately reliable to strong winds and thunder storms
Pit Empty 44 gallon drums can be inserted as a wall lining for the pit and as chambers for the water table	3 x empty 44 gallon drums can be cut with 5 openings tied to the tip of each other and have an enclosed end raised 50m – 80m above ground level	Communities who cannot afford to find empty 44 gallon drums can either use local bush timbers, bamboos or such reinforcement to make a wall lining to the pit	Heavy rain and flood can soak down the soil wall Earthquake can also destroy the soil strata
	Pit dimension should be 0.3m square less than the slab size	Water in the pit helps the decomposition of feacal matters and other organic substances	
Absorption Trench	Trench dimension may be 1.5m x 1.5m x 1.5m	Increase in water table will be drained to the absorption trench. The absorption trench may have a sealed off lid from tin sheet or other hard local materials	
		Excessive wastewater in the absorption trench is filtered into the soil through the sand/pebbles and stones.	
Drainage Pipe The inlet should have a strainer and the outlet with a perforated holes on the sides with an UPVC End Cap	UPVC DWV 100mm x 6.5m Fly Strainer with a screw clamp Perforated Holes with UPVC 100mm DWV End Cap	Hard and permanent and can be used again	

b) Improved Version – Water Seal Latrine

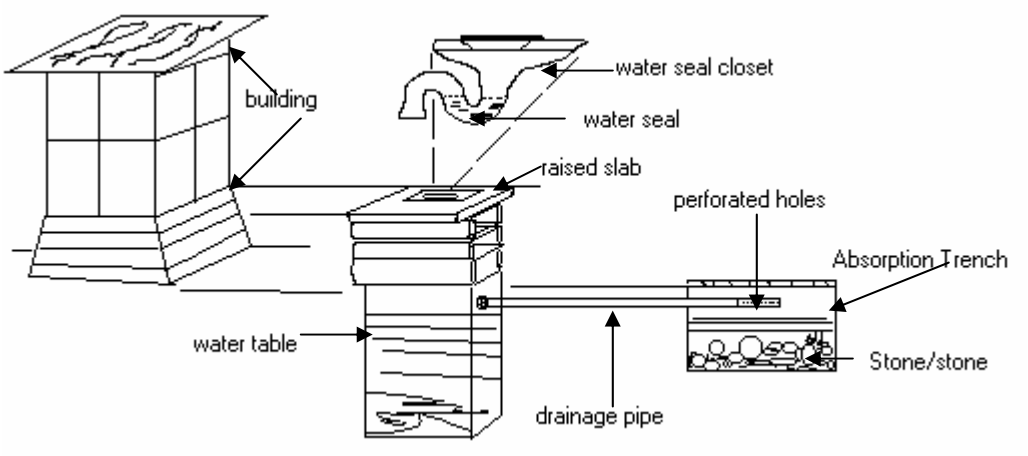

Figure 3: A design of the IV- Water Seal Latrine

Figure 4: Pre-intervention Matrix for IV-Water Seal Latrine			
Features	**Specification**	**Reliability**	**Risk Factors**
Building Structure -Timber for the walls and raised platform can be collected from the bush free of charge - Roof, walls and raised platform can also be constructed using the local bush materials	Roof materials can be of sago leaves or kunai grass Walling and framing can be made from bamboo or local bush timbers	All households can afford one A four wall cabin, which gives the patron privacy and shelter	Local bush materials can be easily burned by bush fire Moderately reliable to strong winds and thunder storms
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	Pit dimension should be 0.3m square less than the slab size	Water in the pit helps the decomposition of feacal matters and other organic substances	
Absorption Trench	Trench dimension may be	Increase in water table will	

Figure 4: Pre-intervention Matrix for IV-Water Seal Latrine			
Features	**Specification**	**Reliability**	**Risk Factors**
	1.5m x 1.5m x 1.5m	be drained to the absorption trench. The absorption trench may have a sealed off lid from tin sheet or other hard local materials	
Drainage Pipe The inlet should have a strainer and the outlet with a perforated holes on the sides with an UPVC End Cap	UPVC DWV 100mm x 6.5m Fly Strainer with a screw clamp Perforated Holes with UPVC 100mm DWV End Cap	Hard and permanent and can be used again	
Water Seal Closet	Can be fabricated from concrete using appropriate clay and waste paper mold portraying the shape of the water seal closet Needs chicken wire reinforcement in the concrete layer. A quarter of a cement bag and 0.3m square chicken wire is enough to do one Enough supply of water is needed to keep the system in operation. Water can be collected from water Taps, springs, creeks or seawater to pour flush the human faeces in the closet.	Very simple technology and can be afforded by many Easily Maintained	

Community Structure and Social Issues

Households clustering together in a village community shift the focus of an individual sewerage system to a communal system where similar principles tabled in Fig 2 and Fig 4 of both VI-Asian Water Closet and VI-Water Seal Latrine applies respectively. As such women and children must be given the privilege to decide on the relevancy and suitability of each system before making it become part of the community. Cultural and traditional values should also be considered on a sanitary merit to avoid culture - clash in the societies.

Population and beneficiary

The people who should be benefiting from this approach are the rural population settling along the coastal periphery of the PNG mainland and its islands (See Annex 1). Local authorities, planners and NGOs and funding agencies who are interested to carry out or fund water and sanitation programs in rural coastal communities can consider this approach in their program.

Communities who have excess to sufficient water for domestication will be benefiting a lot because the system needs water to operate, hence, for communities who live near the sea, rivers or any water points. ADRA PNG is currently working closely with the 50 000 rural population in Morobe Province by providing safe drinking water and sanitation facilities and will be implementing this concept in its second phase of program which begins in 2006. Post intervention of this concept will also apply to the successfully completed 88 water projects in Morobe Province.

ANNEX. 1

The Map of PNG showing potential coastal areas around the land mass and island areas needing funding to implement the rural coastal sewerage program concept.