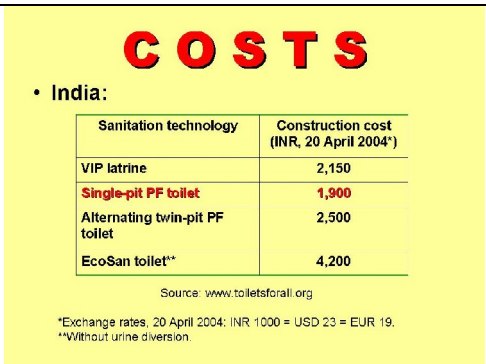
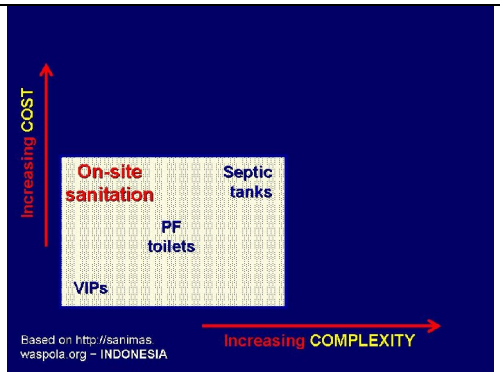
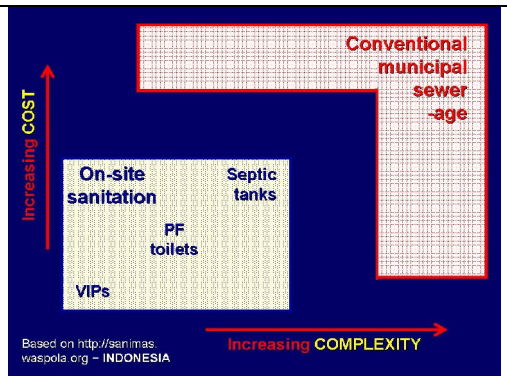
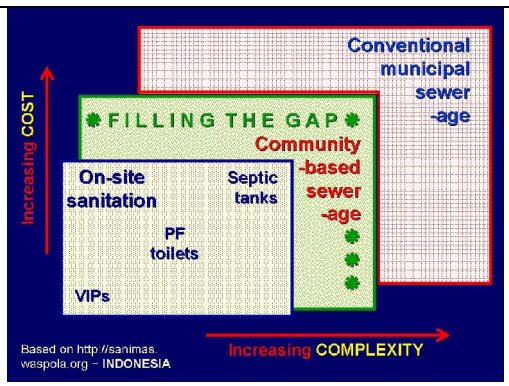
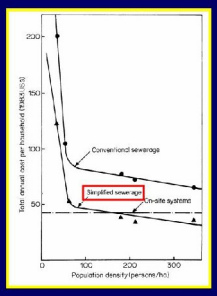
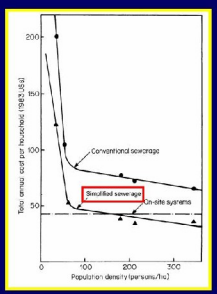
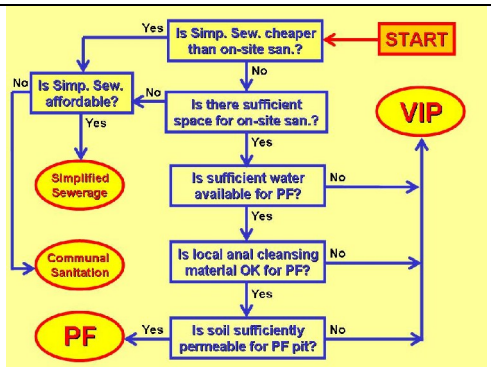
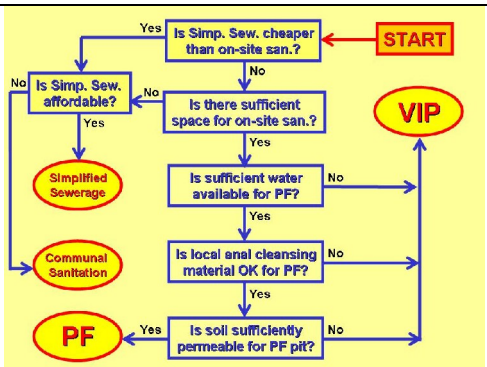
SANITATION TECHNOLOGY SELECTION

1.		This presentation is on how one might select the most appropriate sanitation technology in any given situation.
2.		The basic selection criterion has to be **cost** as we are making the selection for poor communities. Other criteria are: **technical appropriateness** − this is obviously important: for example, shallow, unpickable rock would limit our choice; and we would also consider here any groundwater considerations (does it need to be protected?). **Social acceptability and desirability** are clearly important too: we wouldn't want to design a system that the intended users wouldn't accept or indeed want. The local **institution**, whether it's a water and sewerage authority or an environmental health department of the local council, has to agree to the choice and, very importantly, has to be able to do any operation and maintenance, or at least offer advice to householders if **O&M** is to be left to the householders. If we're going to select an on-site system, a VIP latrine or pour-flush toilet for example, then **pit emptying** has to be considered *now* and not in ten years time when the pits are full.
3.		Back to costs: these costs are from India, and they raise the question: Why would a poor rural Indian family choose anything other than a single-pit pour-flush toilet?

4.	**COSTS** • South Africa: Sanitation technology / Construction cost (ZAR, 2002*) Single-pit VIP latrine: 600–3000 Single-pit PF toilet: 2000–3000 Simplified sewerage: 2500–3000 EcoSan toilet** : 3000–4000 Source: South African Dept of Water Affairs & Forestry *Average exchange rates, 2002: ZAR 1000 = USD 87 = EUR 100. **With urine diversion.	These costs from South Africa pose two similar questions: Why would a rural family choose anything other than a single-pit VIP latrine, and Why would a periurban community choose anything other than simplified sewerage?
5.		This chart from an Indonesian NGO, supported by AusAID, considers sanitation options in relation to both costs and complexity, both technical and institutional complexity. On-site systems are the lowest cost and are the least complex, with a gradation from VIP latrines, through pour-flush toilets, to septic tanks.
6.		At the other end of the scale is conventional municipal sewerage, very expensive and relatively complex. But there's a gap in between on-site systems and conventional sewerage, …
7.		and this gap is filled by what's called here "community-based sewerage".

8.	**"Community-based sewerage"** For example: **"Slum networking"** in India, and: • the systems installed in Orangi, Karachi, Pakistan – known as the **'Orangi Pilot Project'** or **OPP** • those in Malang, Indonesia – ie, **sewerage systems installed by the community (often with an NGO) independently of the local Sewerage Authority** ❑ They tend not to be 'proper' simplified sewerage, but only due to an ignorance of it – however, it would be better if they were!	Community-based sewerage is most common in Asia − for example, "slum networking" in India and the sewer systems installed in Orangi in Karachi, Pakistan, known as the Orangi Pilot Project and now replicated elsewhere in the country. Indonesia too has examples of community-based sewerage. Basically, it's a sewerage system installed by the community, usually with the help of an NGO, *independently* of the local sewerage authority; the community does this because the sewerage authority hasn't done anything for it and is unlikely to in the near future. It's not quite the same as Brazilian simplified sewerage, but almost; and really all new schemes should follow the Brazilian model more closely.
9.	**Community labour for sewer installation − Bolivia** 	One way of reducing the costs of simplified or community-based sewerage is to get the intended users to contribute their labour to excavate the sewer trenches. This might not always be feasible, but it's certainly worth considering and discussing with the community.
10.	 **Simplified sewerage can be cheaper than on-site sanitation systems**	It's important to remember this slide's message: simplified sewerage, depending on the local population density, can be cheaper than on-site systems. This is important because too many people, who should perhaps know better, believe that sewerage is always more expensive than on-site systems.
11.	 **Simplified sewerage can be cheaper than on-site sanitation systems** **….and latrine pits & septic tanks need emptying – often institutionally problematic**	And it's important to remember, and to take into account, that latrine pits will need to be emptied, and this can often be very problematic, especially for the local institution that should be planning for this and overseeing it when it happens.

12.	**PERIURBAN SANITATION** • ~230,000 people *per day* require sanitation in periurban areas – if WHO/UNICEF target of Sanitation for All by 31 Dec. 2025 is to be met • Simplified sewerage likely to be the *only* way to achieve this – in most periurban situations • Better if done by local sewerage authorities working *with* local communities • Educate design engineers in these authorities • Change national sewerage design codes to allow simp. sewerage, esp. 100-mm min. dia. sewers	Periurban sanitation is going to remain very important for many years to come as almost all population growth in the world over the next 30 years or so is going to be in periurban areas of cities and towns in developing countries. If we're to meet the WHO/UNICEF target of Sanitation for All by the end of 2025, them nearly a quarter of a million people will have to receive improved sanitation every day during 2001−2025. My view is that the only way we have any hope of achieving this is by adopting simplified sewerage on a massive scale. Local sewerage authorities will have to work with local communities; their design engineers will need to be trained in simplified sewerage design; and national sewerage design codes will have to be changed to allow simplified sewerage, especially the use of a minimum sewer diameter of 100 mm.
13.	**Sanitation Technology Selection for Urban Areas** Are there existing septic tanks? ➢ No: go to Selection Algorithm → → → → ➢ Yes: is the soil able to accept the (predicted future) volume of septic tank effluent? • Yes: no improvement needed! • No: can water-saving plumbing fixtures be installed to reduce the wastewater flow? If Yes, install them! If No, then choose settled sewerage.	So, how in practice do we select a sanitation technology? Well, probably the best way is the ask a series of questions. And the first question is: Are there existing septic tanks? In fact asking this question means that we're not, at least, initially considering the poor; septic tanks are likely only to be found in middle- and high-income areas. The questions and answers on the slide indicate that, if there are septic tanks, then we do nothing, or install water-saving plumbing fixtures, or go for settled sewerage. If there aren't any septic tanks we go to this algorithm:
14.		And the first question we have to ask is: Is simplified sewerage cheaper than on-site sanitation? If it is, we ask: Is it affordable? And if it is, then we choose simplified sewerage. If it's not affordable, and therefore the more expensive on-site systems are also unaffordable, then the only periurban option is communal sanitation − for example, community-managed toilet and laundry blocks. But if on-site sanitation is shown to be cheaper than simplified sewerage, and this

	 [Slide repeated for visual convenience]	has to be done quite rigorously and openly, and not a decision based on the improperly informed opinion of a so-called expert, then we have to choose between pour-flush toilets and VIP latrines, and the algorithm on the slide asks a series of appropriate questions leading to either PF toilets or VIP latrines. Of course, the algorithm has to be adapted to the local situation. If PF toilets and VIP latrines are unaffordable, then the choice is communal sanitation; and there might be local variations: VIV latrines or ventilated improved vault toilets, as used in eThekwini in South Africa, for example; or so-called "dwarf" septic tanks, as used in parts of India and Brazil. The main advantage of a selection algorithm like this one is that it makes us ask questions which we may not have thought about or might forget to ask.
15.	The sanitation system chosen should be all of the following: ▪ socioculturally acceptable, ▪ financially affordable, ▪ technically appropriate, and ▪ institutionally feasible.	Whatever sanitation technology is chosen, it has to be all of these; otherwise it would be basically an inappropriate choice. Sanitation planners and design engineers have to work closely with the communities they're planning and designing sanitation systems for. If they don't, then they're unlikely to come up with the 'best' solution. They should really work through the algorithm with the community, and the community will then feel 'part' of the design and that the system chosen is not something foisted on them by planners and engineers.