



The grey and black water separation as solution for water scarcity and sanitation in MSBs in Arba Minch, Ethiopia



Capacity-Linked water and sanitation for Africa's peri-urban and Rural Areas



<http://clara.boku.ac.at>

**IWA-DCE**

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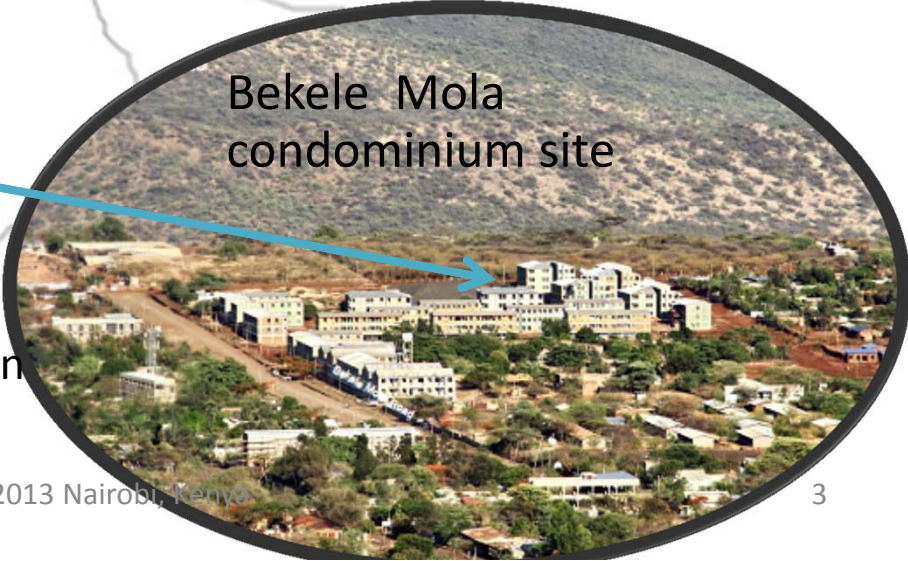
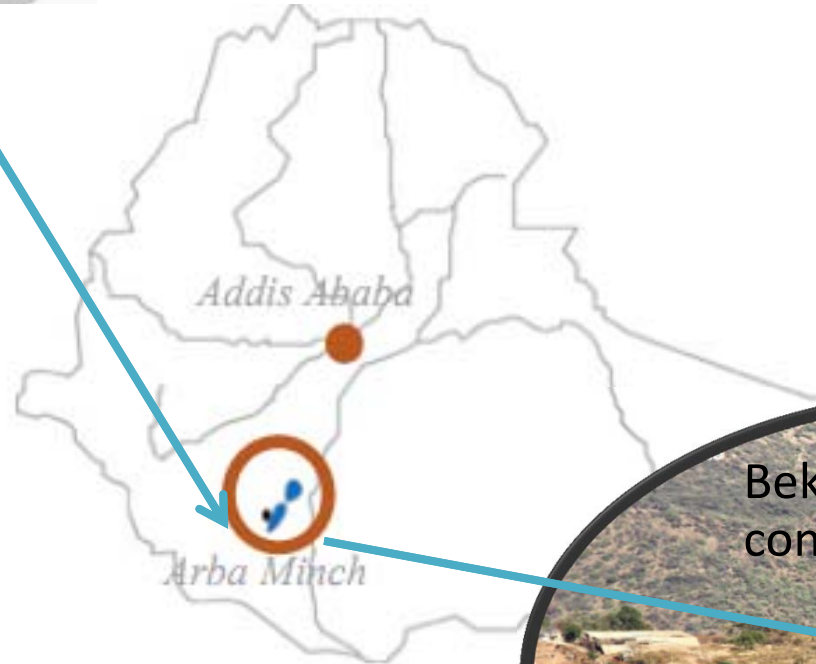
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# Study Area



ADD-AMH 505 km  
Pop<sub>n</sub> = 100 000, Peri-Urban



# Background

- Increasing population number, increasing demand for housing
- More than 5'000 inhabitants out of 100'000 in Arba Minch are currently living in multi storey buildings.
- Hence, such condominium houses are playing an important role in the settling development of the city.





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- The water supply scheme in place can hardly cope with the water demand under normal conditions in these MSBs.
- In the frame of CLARA project (<http://clara.boku.ac.at/>); measures to reduce water consumption at the MSBs and resources-oriented solutions have been researched.
- The development and implementation of solutions for MSB and O & M of the existing facilities shall have highest priority to reduce health risks for the increasing population



# Objective



To study the grey and black water separation as solution for water scarcity and sanitation in MSBs



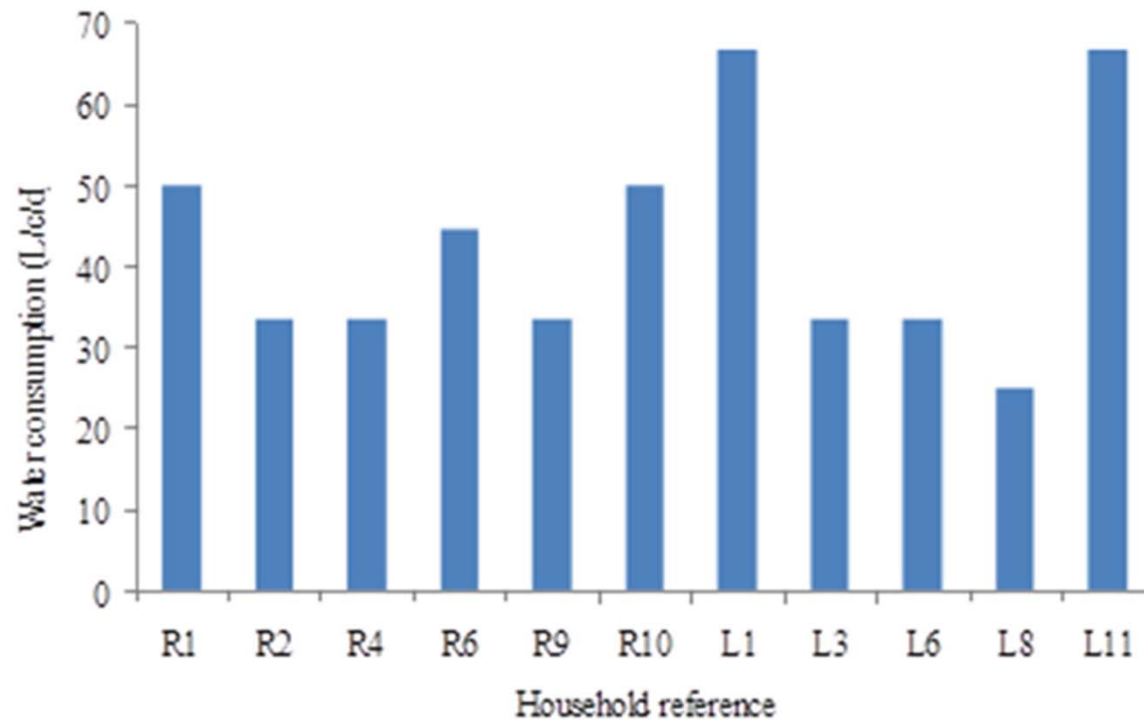
# Methods



- Interview and field observation.
- Secondary data
- NPV analysis to check the costs of the alternatives



# Water Supply, Sanitation & Space Assessment







# Cont'd...



- Average water consumption 50 L/C/d.
- Waste generation rate ( 0.8 – 0.9)% of water consumption
- Grey water is assumed to be 70 % of the wastewater & 30 % is black water

Waste water	45L/C/day	5.8 m <sup>3</sup> /day
Grey water	32 L/C/day	4.2 m <sup>3</sup> /day
Black water	13 L/C/day	1.6 m <sup>3</sup> /day



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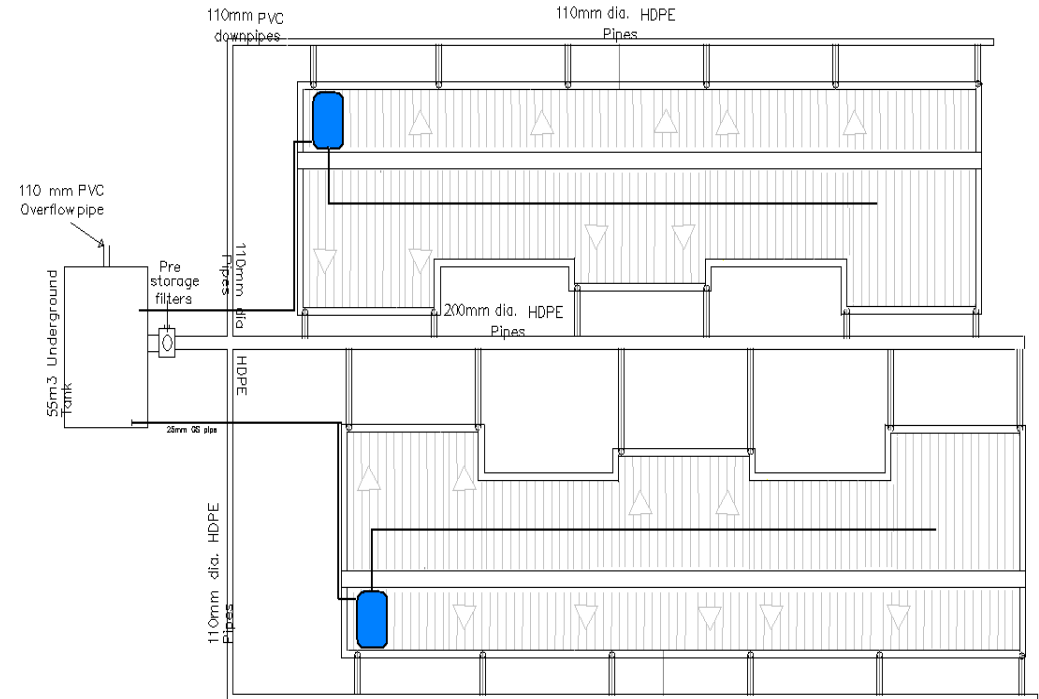
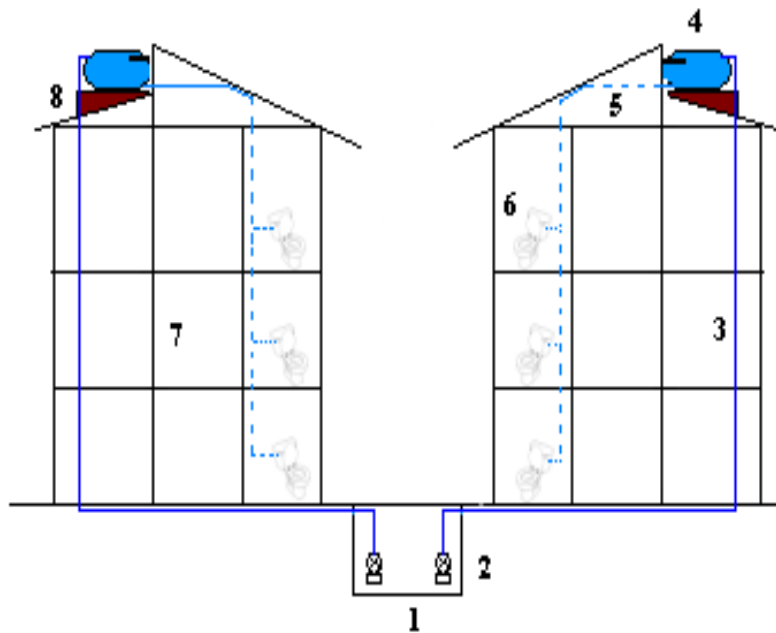


- The grey water treated by wetland is intended to be used as auxiliary to the municipal water supply to satisfy the requirements of toilet flushing and outdoor space irrigation.
- The water demand for toilet flushing is about 10 L/c/d and 2 L/c/d is used for anal and urine cleansing.
- The total flushing water demands for the building per day and per year are given as about 1.3 m<sup>3</sup> and 475 m<sup>3</sup>, respectively.
- The GWT system could cover the total of the water flushing toilet demand





## Option - A



## Option - B

Manual – cheaper option



## Cont'd...



- The total capital investment for the 2 options installation is about 17 468 and 13 863 Euro respectively. Thus, the installation cost per households is approximately **672** and **533** Euro
- This amount is relatively high compared to the medium standards of leaving in Arba Minch.
- More than 62% of the town inhabitants' monthly income is less than 70 Euro (CLARA Arba Minch Team, 2013).
- Option B is manual due to this it is low cost. However, this option is promoting the contact with the treated grey water.
- The benefit using grey water for flushing toilet and outdoor space irrigation should be well investigated for study area in future.



# Summery & conclusion



- The separation of grey water, treatment and reuse seems to be attractive from a resources orientated solution point of view.
- Implementation of flushing toilets with TGW involved could **cover 100%** of water flushing toilet demand. The use of potable water for non-potable-water needs inside the selected pilot could be reduced by 1.3 m<sup>3</sup>/day.



## Cont'd...



- The investment and operating cost of both options (A and B) is relatively high.
- However, emphasis should be given that the ultimate usage of the recovered water can reduce water scarcity in MSBs and for improving health
- Resource-oriented water use in MSBs should be promoted & supported by public investment.
- the Integrated water use concept should be included from the beginning of the planning of new MSB structures; to adapted technological solutions finally an appropriate local operation and maintenance scheme should be set.



# Thank you for your attention!

## Acknowledgements

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CLARA team