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DES283

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## Design for Diversity

### Abstract

Murang'a County, Kenya is located in East Africa. The Indian Ocean coast provides access for trade. Murang'a County is one of five counties in the Central region of the Republic of Kenya. Kenya is a predominantly Christian country (Rena). The government in Murang'a County is run by an executive assembly, and the governor is assisted by a team of ministerial members called the County Executive Committee (Political History of Murang'a). There is only one public university in Murang'a County called the Murang'a University of Technology that was established in 2011 (Ominde). Hydroelectricity is the main power source in Kenya, however, access to that energy is very limited in rural areas considering the majority of electricity is consumed by major cities. The hydroelectric plants are located along the Tana and Turkwel river (Emerging Issues). The residents in the rural areas of Murang'a County don't have access to clean drinking water, and usually have to walk up to three hours to collect contaminated water.

The purpose of this project was to identify and research a rural country, identify something they need, and develop a solution that would help. For my project I chose Murang'a County, Kenya that has a majority of the population living in rural areas.

The residents in Murang'a County already have many natural resources and minerals that help them in their daily lives. The natural resources include: fisheries, water, forests, wetlands, and biodiversity (Emerging Issues). The minerals include: limestone, gemstones, salt, zinc, gypsum, and diatomite (Emerging Issues). The residents in rural areas live in two-room dwellings, which are two rooms divided into a living space and one bedroom that's shared (Ominde). There is no bathroom inside the house, which means everyone in the community must share a communal bathroom. Since this is a rural area there is no electricity coming into the homes. The exterior of the homes are made of brick, have wood siding, and an iron roof (Ominde). I found in my research that these residents don't have access to clean water. To fix that issue, the three concepts I came up with were public water points, building a local well, and building a footbridge.

The first concept I came up with is a public water point. A public water point allows for local water points to be placed in rural communities. The actual standpipe is connected to a main line, beneath the ground, that comes from the Tana Hydroelectric Power Station (Gachane). The second concept is building a local well. This well would be placed two miles away from the households to cut down the walking distance. The water would come from the Tana River (Welcome to Wasreb - Water Services for All). The final concept is building a footbridge. The footbridge would be made of wood and would be placed over a river that leads to an existing well. The bridge would reduce the

amount of drownings, and the residents would be safe traveling to existing wells (Gachane). For all the concepts, irrigation schemes are managed by community members, and they would get support from the Murang'a Water and Sanitation Company.

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Access to Clean Water

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# Design for Diversity

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Fall 2020  
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# Murang'a County Background Information

- Situated in East Africa
- Indian Ocean coast provides traders access to transport goods for many centuries
  - Arabian and Asian traders
- Murang'a County is one of the five counties in the Central region of the Republic of Kenya
  - Bordered by the North of Nyeri, the South of Kiambu, the West of Nyandarua, and the East of Kirinyaga
- Minerals
  - Limestone
  - Gemstones
  - Salt
  - Zinc
  - Gypsum
  - Diatomite
- Kenya produces mainly hydroelectricity
  - Access to that energy is very limited in rural areas since a majority of electricity is consumed by the major cities
  - Hydroelectricity plants are located on the Tana and Turkwel rivers
  - Severe droughts have caused numerous blackouts
- Brick is the main building material for homes across Kenya
  - Made up of water, soil, and cement
- Natural Resources Available
  - Fisheries
  - Water
  - Forests
  - Wetlands
  - Biodiversity
    - A variety of life in the world or in a particular habitat or ecosystem

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# Programmatic Concepts

# Access to Clean Water

## Public Water Points

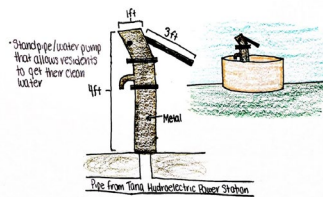
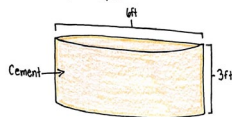
### Public Water Points

Solution: Access to clean water



- measures the amount of water that passes through the pipe
- not needed only recommended

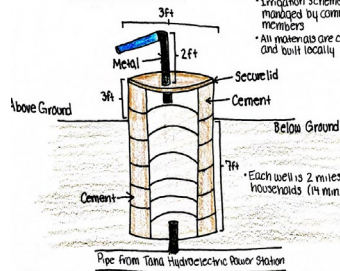
- Secured structure that allows the water to stay in a confined space



## Building a Local Well

### Building a Local Well

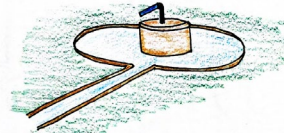
Solution: Access to clean water



- Irrigation schemes are managed by community members
- All materials are collected and built locally

- Each well is 2 miles from households (14 min walk)

- Communities are supported by water companies and the department of water



## Building a Footbridge

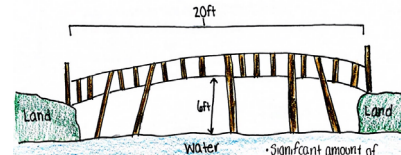
### Building a Footbridge

Solution: Access to clean water

#### Wooden Bridge

- Lack of roads

- Materials found and built locally



- Since 2006 residents lost 5 people to drowning
- 3 of them were children

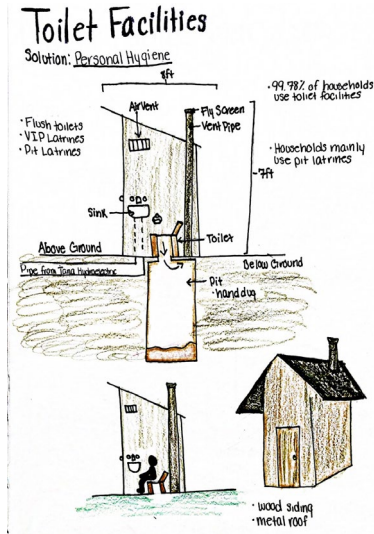
- Significant amount of drownings without a bridge



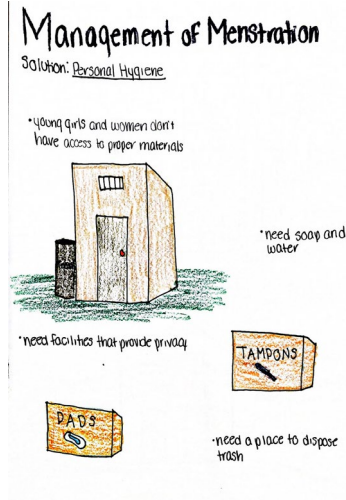


# Personal Hygiene

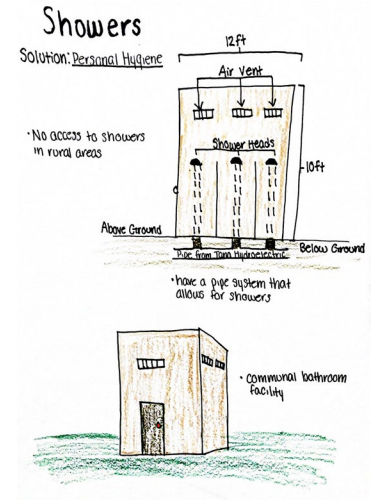
## Toilet Facilities



## Management of Menstruation



## Showers



# Public Water Points

## Public Water Points

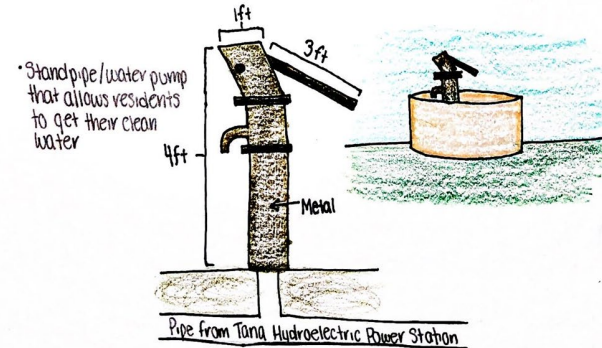
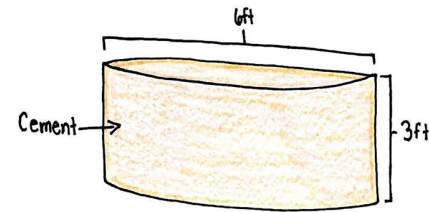
Solution: Access to clean water



Water Meter

- measures the amount of water that passes through the pipe
- **not needed only recommended**

- Secured structure that allows the water to stay in a confined space



- Standpipe/water pump that allows residents to get their clean water



# Background Information

- Started December 7th, 2016
- Murang'a County and Sanitation Company (MUWASCO) started the project to get clean water to rural areas
  - “Social Connection Policy”
  - Allows people with low incomes afford to water connections
- Poor rural areas have scarce amounts of clean drinking water
  - Residents get their water from shallow wells, unprotected springs, and rivers
  - Contamination due to runoff
- A 9.13 mile pipe will be laid and at both ends there will be public water points
  - Pipe will be going through a Kabuta area community
- Ended December 31st, 2017



Project is starting by digging a path for the pipe to be laid



# Sustainability

## Water Quality

- MUWASCO has a water quality officer
  - Weekly monitoring is conducted to ensure the water is bacteria free

## Financial

- Connections are made through MUWASCO's social connection policy
  - Allows people to pay back over time

## Environmental

- Through Corporate Social Responsibility (CSR) activities, trees are planted to promote and protect water sources
  - Tree planting is sponsored through MUWASCO

## Technological

- Project will use locally available materials
  - Quality checks will be made to ensure they meet the set specifications

## Social

- Health and sanitation status will improve
  - Elimination of water borne diseases
  - Education will improve because young children will spend less time collecting water and more time studying





Young school children are collecting water from an unprotected spring



# Project Partners

- Water for Life Foundation
  - Funding Partner
  - Located in the Netherlands
  - Aims to improve the supply of drinking water and sanitation for people who don't have the means to access it
- Vitens Evides International
  - Reporting Organization
  - Located in the Netherlands
- Deploys Dutch experts to developing countries
- Supplies clean drinking water (tap) to countries that need it

## **Goals Include:**

- More water for more people in more places
- Healthier and better water quality
- Less water related diseases
- Structural help with a permanent effect



Project Partners





# Provided for the Project

## Project Funding

- Water for Life provided 150,000 EUR
  - 150,000 EUR = 176,983.50 USD
- Water for Life created a 6.2 mile main pipeline through the Kabuta area
  - Provided contractors that put the main pipe in place
  - Before the main line can be commissioned a pressure test must be performed
  - Successful pressure tests are required in the contract before signing off on the certificate of completion

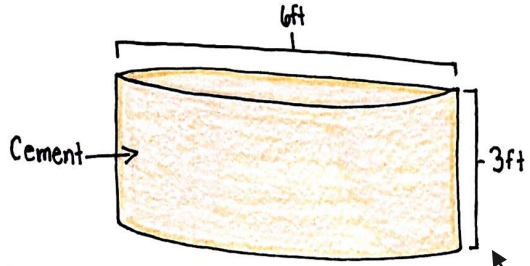


The contractor is putting the main line in place



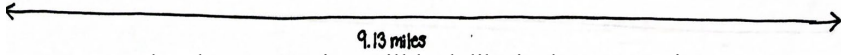
Kabuta Area Homes

- Secured structure that allows the water to stay in a confined space



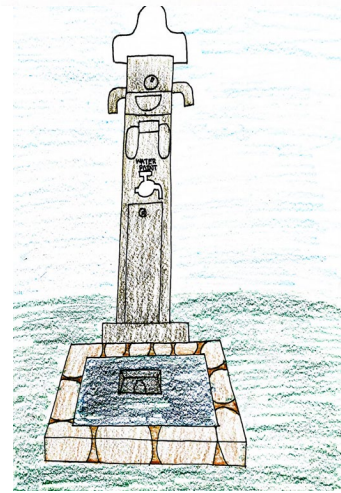
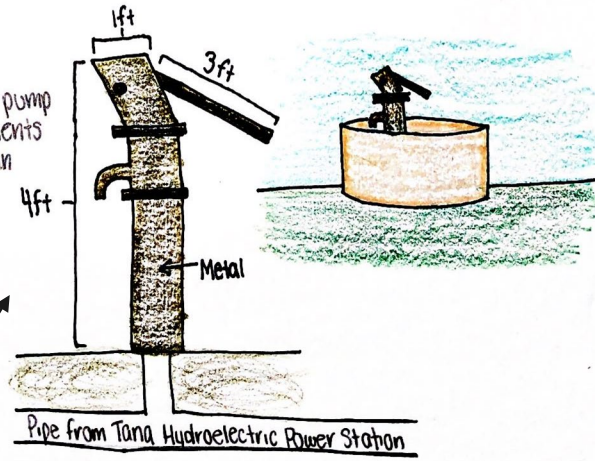
KABUTA AREA

Enlarged



What the water points will look like in the community

- Stand pipe/water pump that allows residents to get their clean water



What the water points will look like at each end of the community



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