

## ENTRY PROJECT – KIGALI VISIBLE SHOWCASE FOR TRANS-SECTORAL PLANNING

RP Stakeholder Conference Kigali 9<sup>th</sup> November 2016











### Entry project components



Maile Street and a street of the second

"Initiator water kiosk" Linking resource flows Structural improvement, solar panel, fruit trees, in Nyarugenge "Sponge School Concept" open space improvement Slow, spread, infiltrate, collect, cycle "Decentral grey water treatment" Water reuse for gardening and cleaning, cycle, infiltrate "Green buildings" Green supply and disposal infrastructre, **Building material** "Linking the Agri. Coop." calculator Waste collection, "Multi-level waste flow" composting, food sale, water treatment Plastic waste selling point, bio char production, composting training grown food for Visualization by TU Berlin



households



#### GREYWATER



- Wastewater from washing clothes, bathing and cleaning (cooking, washing dishes)
- Greywater contains laundry detergents, soap, (fats, oils) other particles as well as bacteria, parasites and viruses washed from the body and clothes.
- Direct evacuation on the ground causes a loss of the soil's capability to infiltrate water, (...) which causes standing waters, soil erosion and flooding" (Ilberg 2012). Standing water again smells and acts as breeding sites for mosquitoes.
- Greywater evacuation into pit latrines, causes environmental damage and is a threat to public health because of the infiltration of faeces into the ground and thereby caused ground water contamination. (Ilberg 2012).



#### Situation in Agatare cell

- No Sewage System
- Constructed + Unconstructed stormwater drainages directing to wetland
  → soak into agricultural area → floods agricultural area
  → use for agricultural irrigation
- Quality + Quantity + Paths + Sinks of domestic greywater discharge are unknown

#### **Objective of RP EP**

Assess the potential of DGWTS as option for UPGRADING as decentral

ightarrow HH based system privately operated ightarrow Cell based system centrally operated





### Plan of the site



Canisius Gakwaya Community Representative

Venant Mutungana Community Option.



### Technical setup – Modular system with 6 cleaning steps





5 Absorption by Vetiver grass6 Filtration & Transformation (bacteria) in sand filter

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Multiplication and a state

#### 6/6/16 Installation of 1st test system



#### 26/8/16 Expand 1st test system



03/17 Last chemical analysis

#### 15/8/16 Monitoring of 1st test system



#### 8/9/16 Installation of 2nd test system



7/10/16 Start monthly chemical analysis



### Overview and trends after 2 of 6 month

Decentral Greywater Treatment System		comment	
Material and labor	190,000 RWF (230 US\$)	50% driven by black tanks – <b>reduction</b> <b>potential</b>	
Space required	2-3 m <sup>2</sup>		

Greywater input per month	2000 L/month (100%)	HH size 10-13
Absorbed by Vetiver approx.	- 500L / month (25%)	
Maintenance grease trap	- 100L/month (4%)	concentrated greywater
Recovered output per month	1400L/month (70%)	
Maintenance filter approx.	200L/2.4 month (~ 80L/month 4%)	concentrated greywater external (carwash)

Hutch Least and a line

## Results of 1st Chemical Analysis by KIST Lab

Limits of discharged Parameter domestic wastewater		Gakwaya HH 1 <sup>st</sup> Analysis 7.10.16			Mutangana HH 1 <sup>st</sup> Analysis 7.10.16			
	WHO REMA*	RSB	In	Out	% change	In	Out	% change
TSS mg/l	≤50	≤50	393	3	99.2	507	4	99.2
Total Nitrogen mg/l	≤30		18.27	2.31	87.4	23.13	2.73	88.2
Total phosphorus mg/l	≤5		1.87	0.88	52.9	2.07	0.9	56.5
COD mg/l	≤400	≤250	1560	48.1	96.9	1845	131	92.9
Coli forms Cfu/100ml	≤400		2100	4	99.8	76000	91	99.9

\*REMA - 2015 - Integrated study of wastewater treatment systems in Rwanda

 $\rightarrow$  Safe use for irrigation, for cleaning floors/shoes/cars/moto etc.

ightarrow Allowed to be discharged



### Results of GW discharge point mapping (GIS)



"303 greywater discharge points were identified"









Results of HH survey on paths + sinks of greywater in Agatare

# Where do you empty your greywater and how is this GW sink constructed?





Results of HH survey on paths + sinks of greywater in Agatare

### Where do you discharge your GW pit/septic tank when it is full?





### Results of HH survey on paths + sinks of greywater in Agatare Which negative impacts caused by GW have you observed?

Answers	Number of HH who answered
bad smell	256
neighbouring disputes	212
pollution	186
diseases	65
compound gets dirty because of GW	42
Malaria	36
erosion	27
low hygiene	15
compound is muddy	14
damages to buildings	12
no negative impact	10
attracts insects	5
costs for discharge	3
presence of blackwater in drainage	3
worse accessibility	3
uncovered drainage increases risk of accidents	2
destroys growing vegetables	1
higher effort for domestic work	1
groundwater pollution	1
existence of informal drainages within compound	1



Results of HH survey on paths + sinks of greywater in Agatare

# Would you use a greywater recycling system if available?





Results of GW discharge sampling and flow measurement in drainages in Agatare (coming soon)







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## Site plan & Problems



0 12.5 25 50 75 Meters

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## **Control –** Erosion control and pathway improvement – *SLOW SPREAD INFILTRATE* **Collect –** Rain water harvesting upgrading and extension – *STORE* **Use and reuse –** Handwash station and greywater treatment filter garden – *CYCLE*

Sponge School Concept

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#### **Control** – Erosion control and pathway improvement – **SLOW SPREAD INFILTRATE**



Vetiveria zizanioides & fruit trees



#### **Control** – Erosion control and pathway improvement – **SLOW SPREAD INFILTRATE**



#### before

after



#### **Control** – Erosion control and pathway improvement – **SLOW SPREAD INFILTRATE**





**Collect** – Rain water harvesting upgrading and extension – **STORE** 





Use and reuse – Handwash station and greywater treatment filter garden – CYCLE





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12-13/11/15 Sector workshop with BPS – Status qu	10	
WATER WATCH WAR (1950***) - MATACK MARK - Company Market - Company - Company	<b>*</b>	1/3/16 Training by RP for RECOR on Vetiver grass
AND TO DECAMPLE D'ANDER 28 PTIS - VARIABLE TORM CBUDGE / 3 SEPTIC MAILS TORC 20 000 AP FER TRUE / VARIAS TORC 20 000 AP FER TRUE / VARIAS TORC 20 000 AP FER TRUE / VARIAS		
5/3/16 Start of implementation of the SSC - Vetiver		
	•	22/3/16 Implementation of the SSC - RWH
4/16 Implementation of the SSC – Pathway		
		26/6/16 Vetiver maintenance with BPS envir. club
29/6/16 Evaluation of SSC implementation	+	
1 What implemented 3 States 2 Structures 2 What is at 2 3 What is a structure of a structure of a structure 1 Forther's Steps 3 Structure of a structure of	+	6-11 /16 continuous improvement

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## School involvement

#### **Maintenance training RWH**

- → Maintenance booklet in English & Kinyarwanda
- ightarrow Supervision of including the maintenance in the caretaker/staff responsibility

#### **Maintenance training VETIVER**

- ightarrow Maintenance booklet in English & Kinyarwanda
- → Environmental club/ Patron classes/ supervision of including the maintenance in the caretaker responsibility



Agricultural Cooperative

Nyamirambo Women's Center Umutima







## 3\_Linking the agricultural cooperative







- 1. Workshop series on:
  - Current situation with regard to water, waste, production, sale
  - Problems and challenges
  - Improvement options and networking
  - Empowerment and training

#### 2. Improvement strategy and business model:

- Water management, seed production, composting/fertilizer, diversification of customers and selling point, based on consolidation of **data basis**:
- Data collection of hydrological situation
- Mapping of agricultural fields and practices
- Collecting information on waste, compost, fertilizers

#### 3. Decentral fertilizer loop

- First feasibility check
- Identification of different stakeholder interests
- Data check on waste quantities in Agatare Cell
- Possibility check with Coped and the cooperative

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### **Cooperative's practices**



path Cows' tables Milk collection Grass cutting Grass collection Rabbit breeding Organic waste collection Main entrance Young cows' table :Water bassin Dung collection drainage Dung collection bassin : dung ready to be dried Dried dung rest to compost (betwen 2-4 weeks) :Final compost after 1 month CURRENT COPERATIVE'S WETLAND LAND USE MAP





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### **Cooperative's practices**

## Presentation by cooperative and discussion of:

- Organizational structure (30 members + weekly workers, 10 members for different tasks)
- Budget system and income (300,000 RWF benefit per season)
- Seasons and planting rhythm / production cycle
- Drainage system (traditional, 4h for watering 5ha)
- Distribution and sale locations (Nyamirambo, Kimisagara, Gikondo, Nyagobogo, city market)

#### Main constraints:

- 1. Too much water from flooding
- 2. Lack of water in dry seasons
- 3. Lack of good seeds
- 4. Demand of fertilizer
- 5. Accumulation of solid waste / high demand of capacity for collecting waste
- 6. Pesticides (Organic vs. chemical)

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### **Improvement options**

Main Objective 1	Main Objective 2			
Increase of income	Improvement of compost situation			
What prevents them?				
Inefficiency: Not enough irrigation equipment, 4 hours for irrigation, payment of workers for irrigation	Lack of material for increase of biomass for compost production			
Improvement approach				
Start with one improvement (e.g. pump) that creates extra benefit which allows to buy better equipment for next improvement	Composting training to improve knowledge of biomass production			
Sale's concept: Product choice based on market research: – Which vegetables grow best / fastest? – Which sell best? – Which can create a competition benefit? Certification for local markets				

**Inputs on:** Food cycles (TUB), Organic Farming (GAKO), marketing strategies (ROAM), Agroforestry and permaculture (Recor), fruit tree planting potential (BTU CS), biochar production (ATV)

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## Decentral organic fertilizer loop







## 4\_Multi-level waste flow



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06/16 Contact to UAS Aachen

3/7/16 Workshop with Cooperative and Coped, Presentation of bio char production in Addis Abeba

08-11/2016 Preparation of implementation of a test component

11/2016 Implementation of a test component at Coped site by UAS Aachen and ATV







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## Plastic waste reference selling point







## 5\_Green buildings

 $\rightarrow$  Presented in the afternoon

THANKS FOR YOUR INTEREST! ANY QUESTIONS?