



**Burkina Faso
Ministry of Agriculture**

**JST-JICA Research Project
(2010-2015)**



Presented by Dr. Mariam SOU/DAKOURE et al.

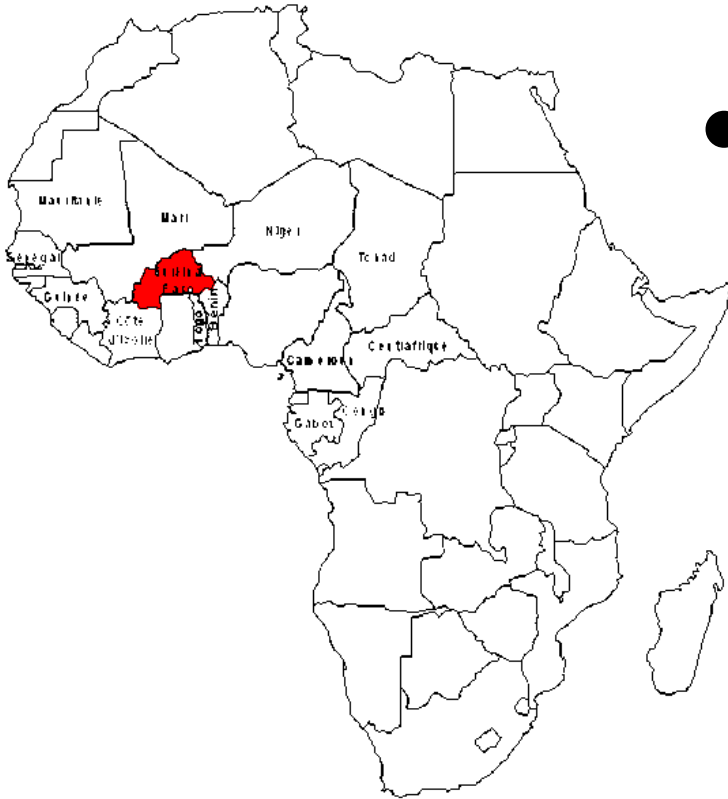
Improving Sustainable Water and Sanitation systems in Sahel Region in Africa: Case of Burkina Faso - Sustainable Agro-Sanitation Model in Burkina Faso -

Laboratory of Water Health Ecosystem and Sanitation, 2iE, Burkina Faso



Laboratory on Engineering for Sustainable Sanitation, Hokkaido University

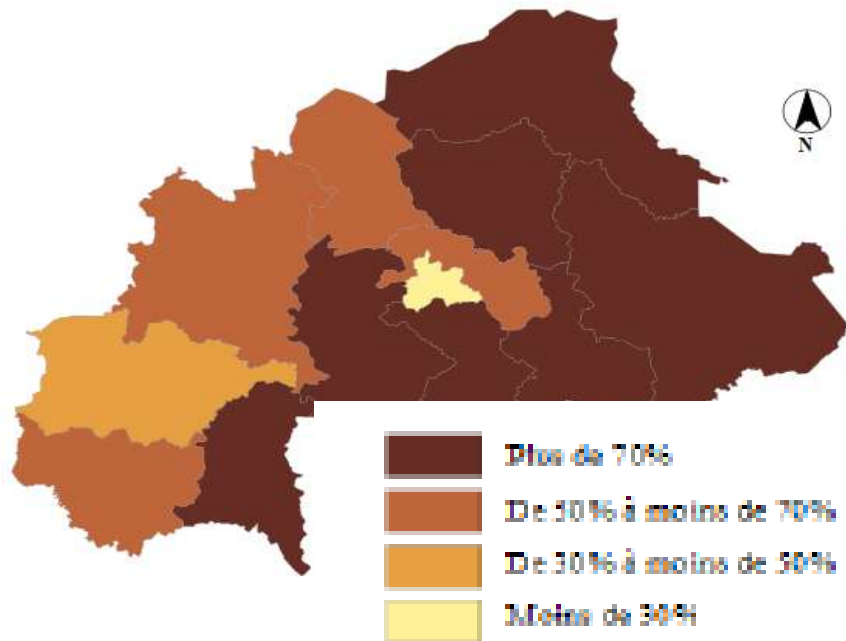
Burkina Faso



● **GDP : 1.1 US\$/day/Capita**

Very poor sanitation level

Sanitation access 2010 national survey



Open defecation rate per region (national survey, 2010)

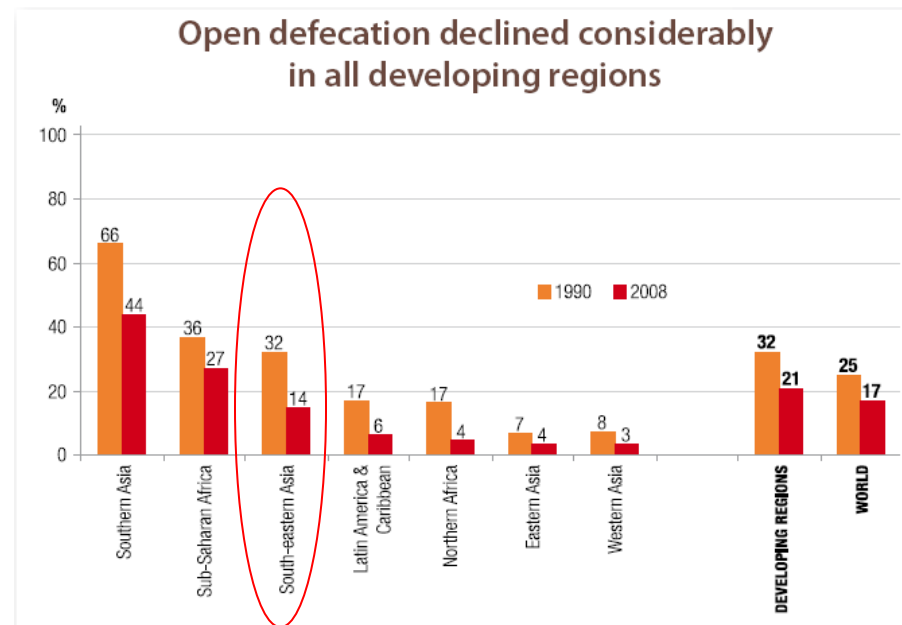
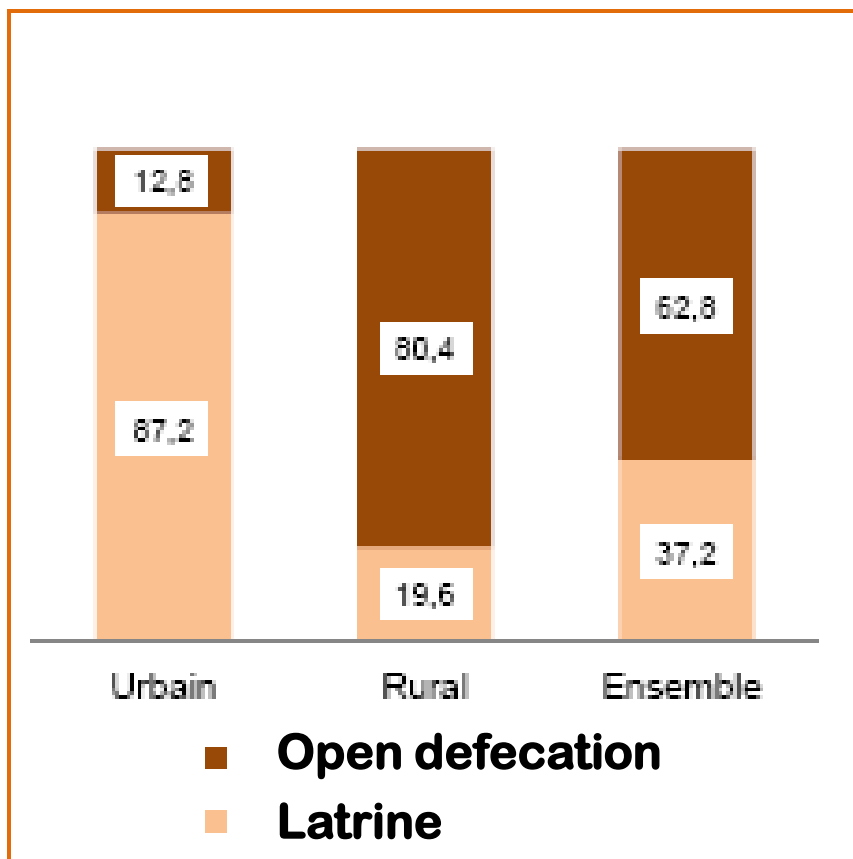
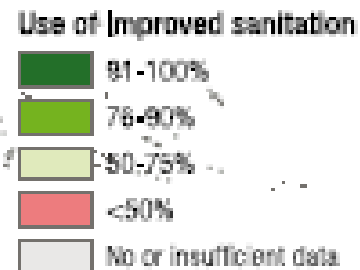


Figure 25 Regional changes in open defecation rates, 1990-2008

The use of sanitation facilities (latrine) mainly concern urban areas



(National survey, 2010)



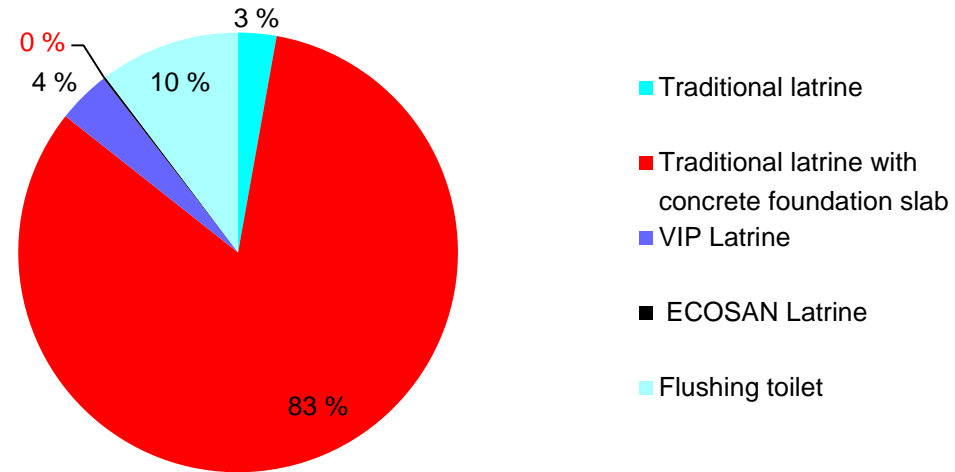
(WHO/UNICEF, 2010)

1 toilet for 16 inhabitants (estimated ratio in 2010)

**Traditional latrine
(with concrete foundation slab)**



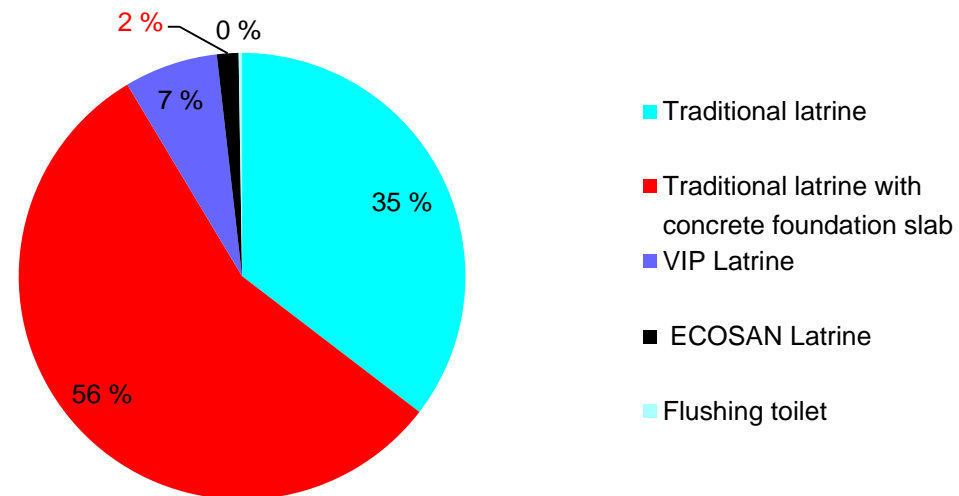
Sanitation facilities in urban areas - Burkina Faso



Traditional latrine

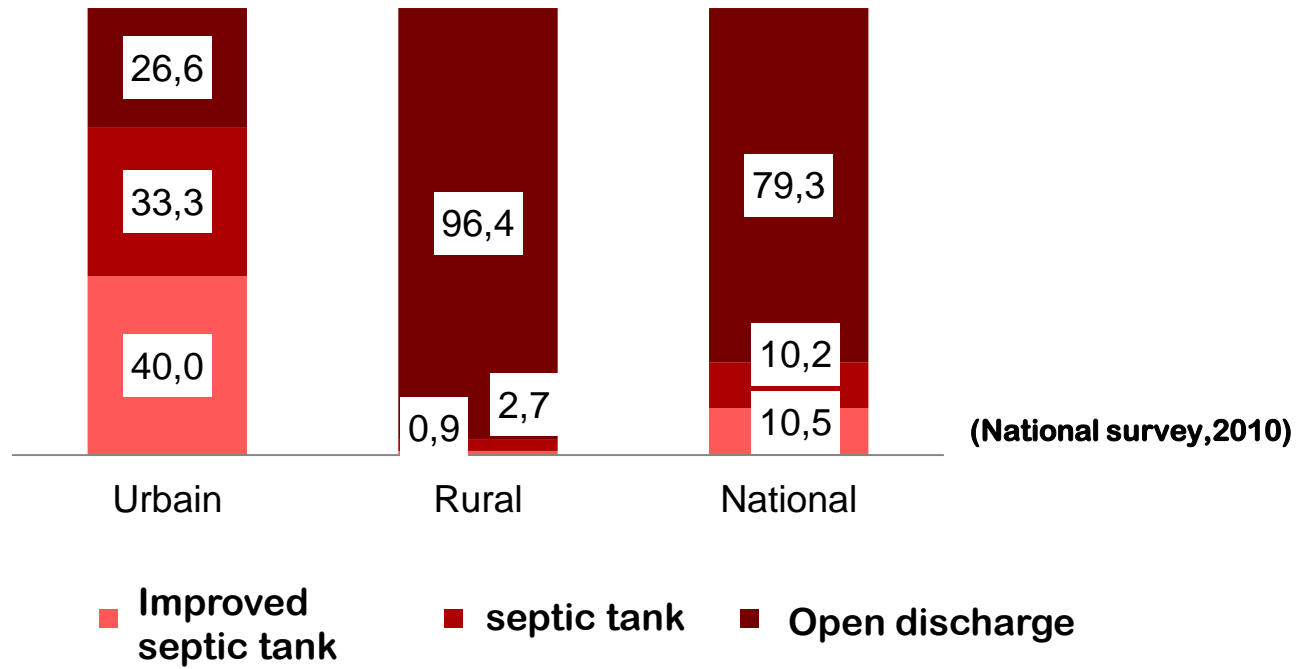


Sanitation facilities in rural areas - Burkina Faso



(National survey, 2010)

80% of greywater is directly discharged in environment



Burkina Faso

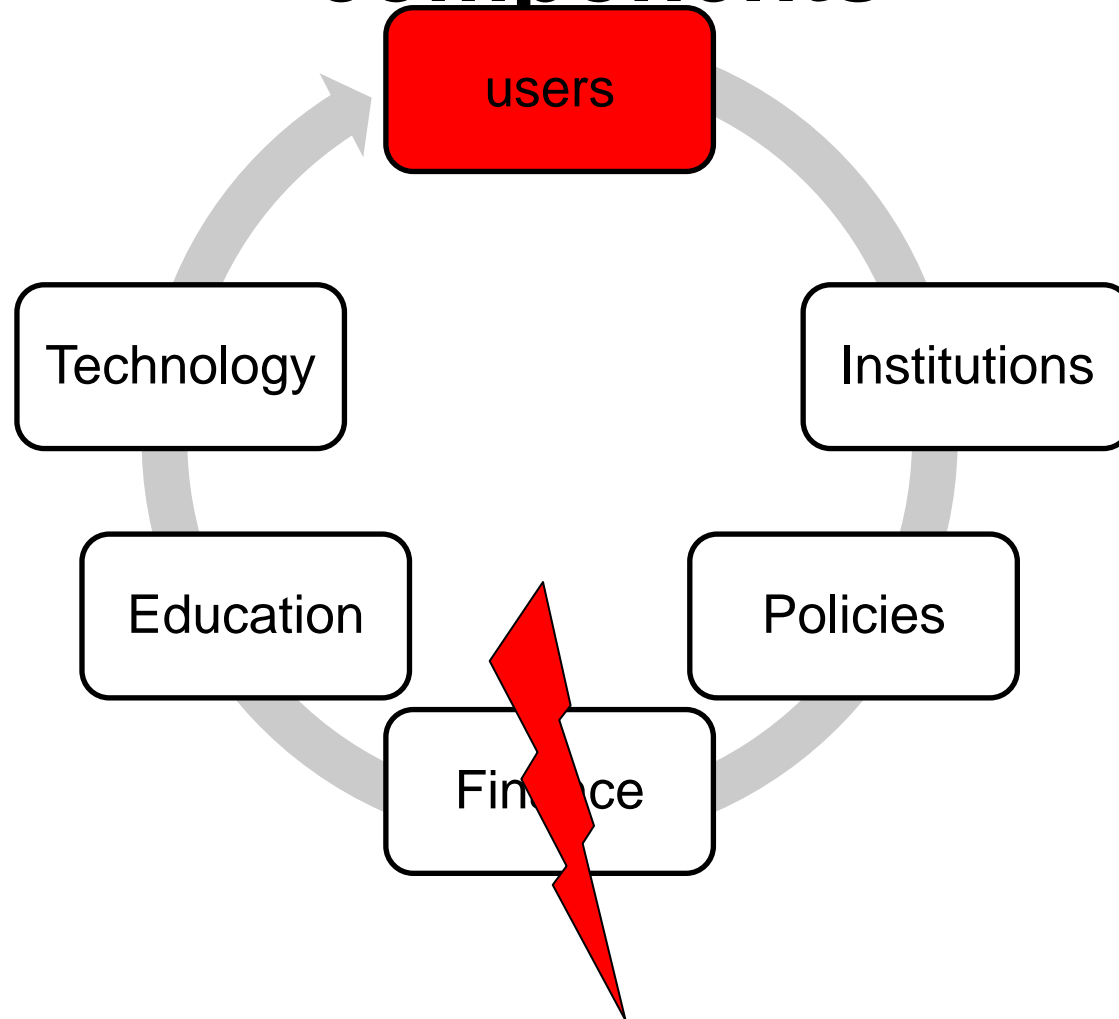


● **GDP : 1.1 US\$/day/Capita**

Very poor sanitation level

● **Under-five mortality rate:
176 /1000 live birth (WHO,
2010).**

Sanitation system in 6 components



How to improve sanitation in low income country?

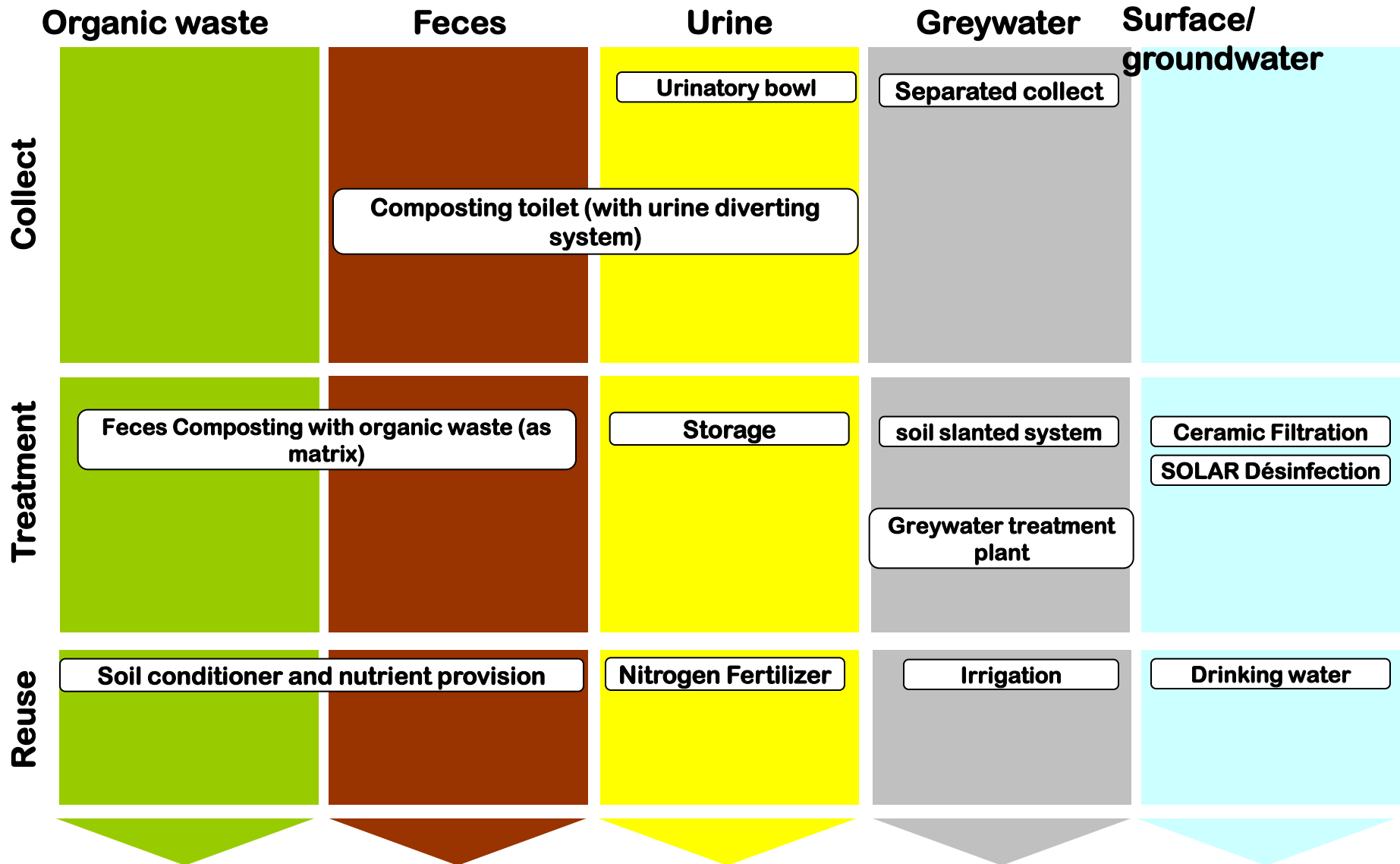
A contribution from Ameli-EAUR Project in Rural and urban areas of Burkina Faso



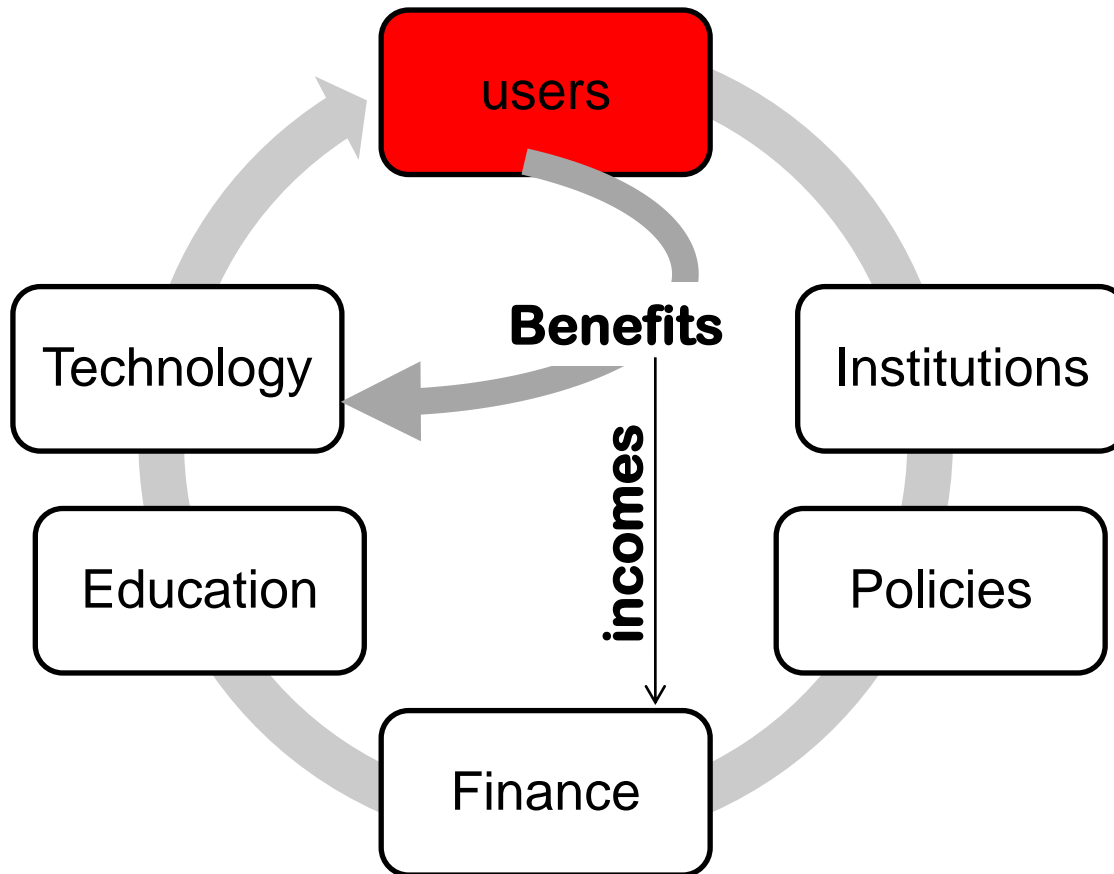
International collaboration research



Ameli-EAUR based on the concept **DO NOT MIX/DO NOT COLLECT**
 targets main components of ecological sanitation



We want to create value from sanitation
by thinking model adapted to Burkina Faso
social and economic realities ...



...by showing the clear benefit to users

- **Recognize gray water, black water and urine as potential benefits for users**
- **Treat to improve their value**
- **Use them as an agricultural resources**
- **Recognize the Sanitation System as an “agro-sanitation asset” which provide income to users**

Ameli-EAUR project approach (1/4)

(1) Analyse user's value chain

(2) Include sanitation units into user's value chain

→ motivate them to manage it by themselves



Picture M. SOU/DAKOURE

Ameli-EAUR project approach (2/4)

(1) Analyze user's value chain

(2) Include sanitation units into user's value chain → motivate them to manage it by themselves

**(3) Design the linkage to agricultural activities
→ create value from sanitation**

(4) Analyze market of vegetables

→ maximize and stabilize user's income

(5) Estimate the income by sanitation units

→ show direct merits to users

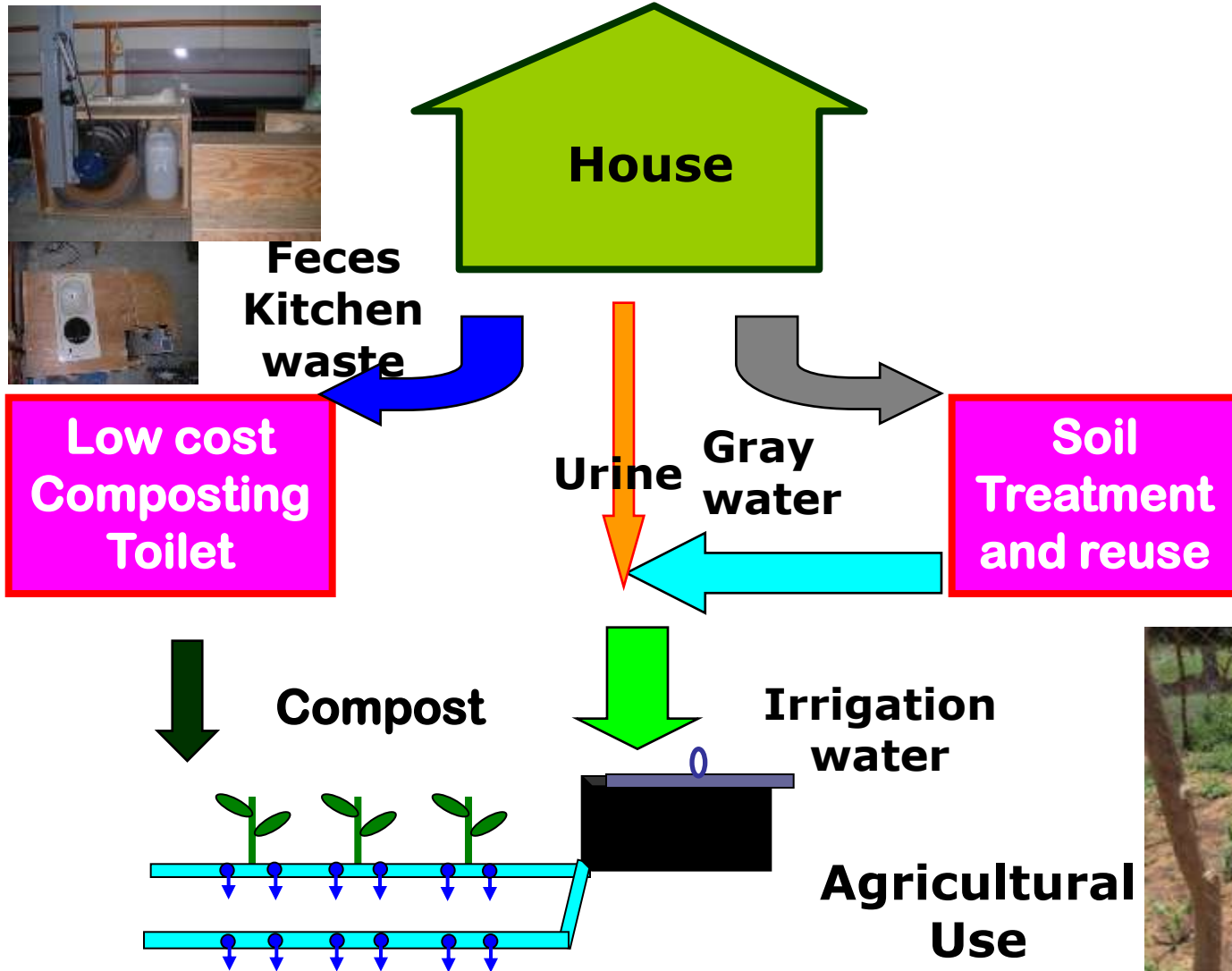
(6) Make a financial plan

→ realize and drive this model

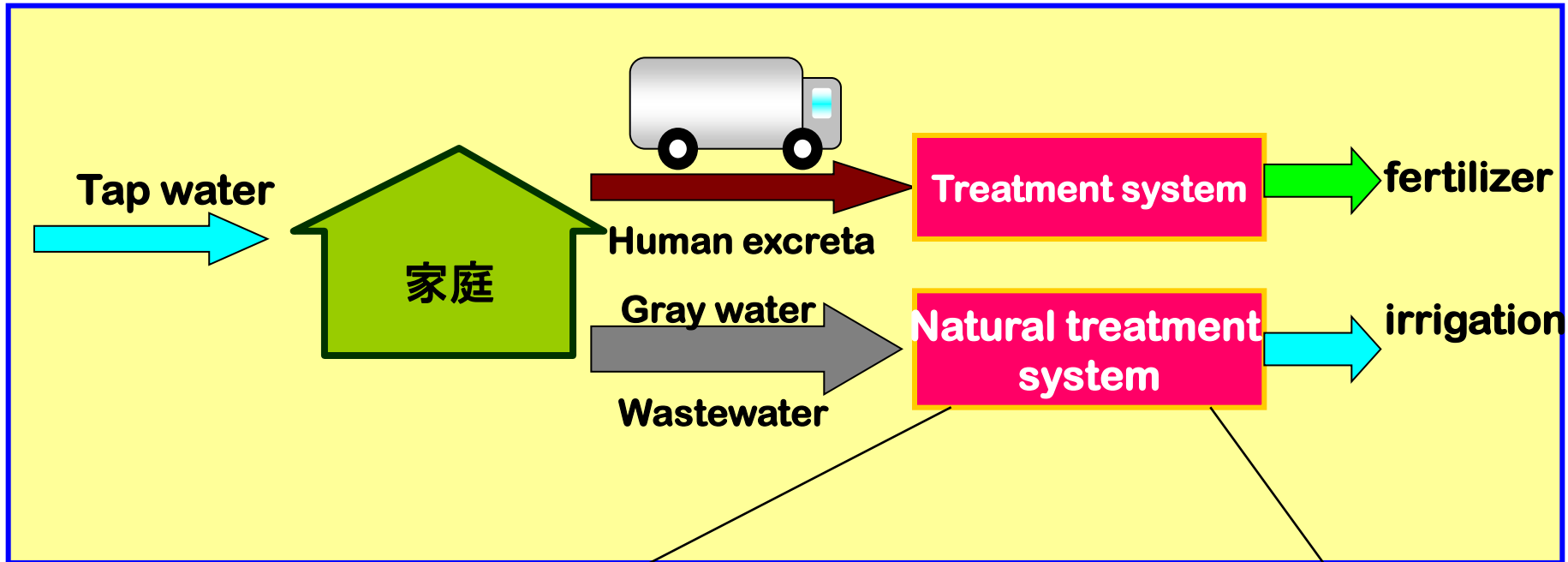
(7) Design sanitation units

→ adapt technology to this business model

Model for rural area



Model for urban area



2iE wastewater treatment plant

Greywater treatment plant
in construction at 2iE

Ameli-EAUR project approach (3/4)

(1) Analyze user's value chain

(2) Include sanitation units into user's value chain → motivate them to manage it by themselves

**(3) Design the linkage to agricultural activities
→ create value from sanitation**

(4) Analyze market of vegetables

→ maximize and stabilize user's income

(5) Estimate the income by sanitation units

→ show direct merits to users

(6) Make a financial plan

→ realize and drive this model

(7) Design sanitation units

→ adapt technology to this business model

Income estimation

Assumed as maximum income (well plant growth and sale high price)

	estimated yield		filling rate		wholesale price	income	seed cost
	kg / 20 m ²	plant/20 m ²	%	L/20 m ²	(farmer to broker)	FCFA/20 m ²	FCFA
Tomato	160		60	224	20,000FCFA/200L	22400	700-1250/10g
Onion	96		60	134.4	20,000FCFA/40L	67200	6500/100g
Carrot		600			10,000FCFA/10 m ²	20000	500/10g
Cabbage		100			100FCFA/plant	10000	1250/5g

	income / year	cost / year	net income / year
FCFA	119600	9950	109650
Yen	23920	1990	21930

Ameli-EAUR project approach (4/4)

- (1) Analyze user's value chain**
- (2) Include sanitation units into user's value chain → motivate them to manage it by themselves**
- (3) Design the linkage to agricultural activities**
 - create value from sanitation**
- (4) Analyze market of vegetables**
 - maximize and stabilize user's income**
- (5) Estimate the income by sanitation units**
 - show direct merits to users**
- (6) Make a financial plan**
 - realize and drive this model**

(7) Design sanitation units

- Allow users acceptability**
- adapt technology to this business model**

Ameli-EAUR Project team

Compostant toilet

**Grey Water
In rural et semi-
urban areas**

**Ceramic filter and
solar disinfection**

**Grey Water
in Urban areas**

**Valorization/reuse of Compost, Urine, and
GreyWater**

Social and economic aspects

Composting toilet group

Group 1 : Composting toilet

Prof. Maïga (2iE)
Dr. Ito (HU)

- Ing. Seyram Sossou(2iE)
- Mrs Darimani Hamidatou (PhD student)

Compostant toilet

Grey Water
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Valorization/reuse of Compost, Urine, and
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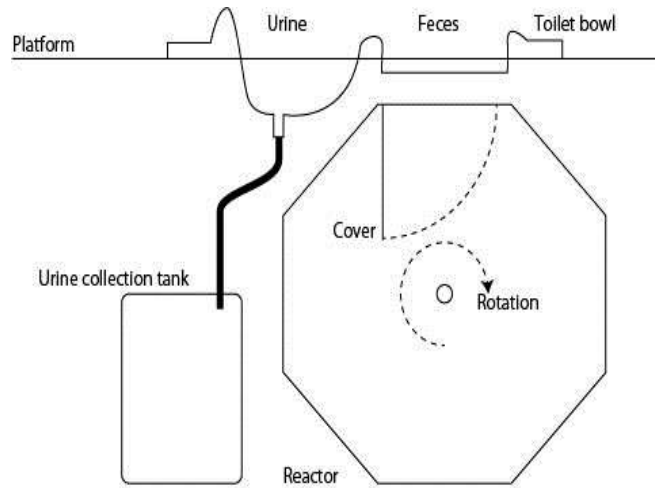
Social and economic aspects

Research topics

Parasites inactivation rate in compost

- Assessing inactivation rate
- Design and building of composting toilet for pilot families

Feces based compost production and reuse



Low cost composting toilet



Greywater group

Group 2 : Greywater treatment
Prof. Takahashi
Dr. Maïga (2iE)
Dr. Ushijima (HU)

- Mr Moyenga (2iE)

Compostant toilet

Grey Water
In rural et semi-
urban areas

Ceramic filter and
solar disinfection

Grey Water
in Urban areas

Valorization/reuse of Compost, Urine, and
GreyWater

Social and economic aspects

Research topics

1. Greywater characteriization
 - Surfactants contents
 - Pathogens
2. Design and construction of on site treatment plant (rural model et urban model)
3. Assess treatment efficiency

Greywater treatment and reuse

Rural model



Urban model



Reuse group

Reuse group

**Dr. Sou (2iE)
Dr. Hijikata (HU)**

**-Mr Sawadogo (2iE)
- Mr Sangaré (PhD student)**

Compostant toilet

**Grey Water
In rural et semi-
urban areas**

**Ceramic filter and
solar disinfection**

**Grey Water
in Urban areas**

**Valorization/reuse of Compost, Urine, and
GreyWater**

Social and economic aspects

- 1. Treat urine before using**
- 2. Assess environmental and sanitary effects of urine, compost and greywater reuse in agriculture**
 - Pathogens**
 - Pharmaceutical**
 - Heavy metals**
 - Salts**
 - Detergents**

Urine treatment and reuse

Stock in an intermediate tank to be easily conditioned in PET bottles og 1.5L

Exposed on toilet roof (at least 5 days)

Collect from shower room urinary boil



Stocked for futher reuse as fertilizer

Agronomic tests on pilote families and at 2iE experimental site



**Group 5 : ceramic filter
combined solar disinfection**

**Mr. Konaté (2iE)
Dr. Takizawa (TU)**

**POCERAM
Ouagadougou University**

Compostant toilet

Grey Water
In rural et semi-
urban areas

Ceramic filter and
solar disinfection

Grey Water
in Urban areas

Valorization/reuse of Compost, Urine, and
GreyWater

Social and economic aspects

Activity in 2012

Drinking water treatment by ceramic filter using locally clay

- Determine which locally available clay is best suited for making ceramic filters,
- work with local company (POCERAM)

Test ceramic filter combined with solar disinfection (made in japan)

- Test with different type of water in Burkina Faso to assess filter porosity, filtration rate, and bacterial quality of water

Social group

Group 6 : Social and economic aspects

Prof. Nabeshima (HU)
Dr. Bologo/Traoré (2iE)
Dr. Ken Ushijima (HU)

- Prof Hakoyama (KU)
- Mr Dicko (2iE)

Compostant toilet

Grey Water
In rural et semi-
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Ceramic filter and
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Grey Water
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Valorization/reuse of Compost, Urine, and
GreyWater

Social and economic aspects

-
1. Social target : Adapt technology to users
 2. Economic target : design a business model and adapt the technology to it

Inform



Discuss



Train



Thank you for your attention

More information in "Friends of SATREPS"
<https://fos.jst.go.jp/community/122>

The screenshot shows the 'Friends of SATREPS' website interface. At the top, there is a navigation bar with links for 'お問い合わせ / 各種ご連絡', 'ログアウト', and the JST logo. Below this is a search bar and a language selector set to '日本語 (日本)'. A secondary navigation bar contains links for 'マイホーム', 'メンバー検索', 'コミュニティ検索', 'アルバム', '日記', 'アンケート', '設定変更', and '五人を招待する'. The main content area is divided into three columns. The left column features a featured community post titled 'アフリカサヘルの水・衛生システム Water and Sanitation System for Sahel, Africa (58)', including a photo and a list of members with their names and profile pictures. The middle column displays the details for this community, including its name, category, creation date (2011年6月13日), and a list of administrators and moderators. The right column contains promotional boxes for 'コミュニティを作成', 'メール配信依頼はこちら', 'すぐわかる使い方が이드', and 'おすすめのコミュニティ/Recommended communities'.

コミュニティ名	アフリカサヘルの水・衛生システム Water and Sanitation System for Sahel, Africa
コミュニティカテゴリ	Ato connect friends with project (SATREPSプロジェクト外とフレンドを繋ぐための)
開設日	2011年6月13日
管理者	Ken UESHIMA 牛島 健
副管理者	Ai HOSOKAWA 細川 愛 Russet Ito 伊藤 竜生
メンバー数	58
トピック公開範囲	全員に公開
トピック作成権限	コミュニティ管理者のみ作成可能
コミュニティアルバム公開範囲	全員に公開
コミュニティアルバム作成	コミュニティ参加者が作成可能