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Abstract
The use of mobile EcoSan toilets and urinals in Burkina Faso has been an important tool for CREPA in disseminating the EcoSan concept. Four major advantages can be distinguished:

1. *Sensitization on the EcoSan concept*: 35000 persons have used CREPA's mobile units during more than 20 events since 2007. Combining explanations on the EcoSan concept with the use of a "dry" urinal or a toilet is more effective than just information.
2. *Job creation for caretakers*: The young caretakers of the mobile units have formed an association and have managed seven events on their own without the help from CREPA. They have earned on average 240 $ per event in rent for the units.
3. *Collection of large quantities of EcoSan fertilizer:* The mobile EcoSan units have been a way to provide the urine needed for participative experimentation in the urban EcoSan project in Ouagadougou and the rural EcoSan project in Koupela. The experimentation helps to create demand before the construction of toilets.
4. *Provide the foundation for local initiatives:* Using mobile toilets and training the urban farmers on reuse can be a way to introduce EcoSan in a community. However the first intervention needs to be followed up with more training and also funding to meet the demand created.

Introduction
There are many small scale EcoSan projects in West Africa, but for the general public EcoSan is still largely an unknown concept. There is a need to raise awareness beyond the pilot project sites and better than just information is to give people the possibility to see and use dry toilets. Mobile UDDTs (Urine Diverting Dry Toilets) and urinals have been useful in the work to spread knowledge on EcoSan while at the same time enabling the collection of large quantities of EcoSan fertilizer and provide job opportunities.

In 2007 CREPA Headquarters (Regional Center for low cost Water and Sanitation) in Burkina Faso constructed a number of mobile urinals and UDDTs that have since been used during more than twenty events with a total of 35000 users.

This paper describes the mobile EcoSan units and how they are used in Burkina Faso. The benefits are illustrated by two case studies:

- The business potential with mobile toilets and urinals based on an average event in Burkina Faso.
- Mobile toilets and the potential to trigger local EcoSan initiatives – the case of Fada N'Gourma

Mobile EcoSan units in Burkina Faso

CREPA started to work with mobile EcoSan units in 2007 in response to a demand from the Ministry of Environment to support the city of Ouagadougou with waste management in public places during the biennial international film festival FESPACO. Four sites in the center of town were identified for the use of mobile toilets, urinals as well as solid waste bins during the festival. The installations, 9 men's urinals, 6 women's urinals and 6 latrines were managed by a team of nine young caretakers and accompanied by seven students who informed the visitors about EcoSan. This was a big event with more than 15000 users of the toilets during eight days in Februray/March 2007.

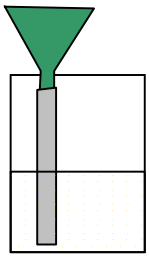
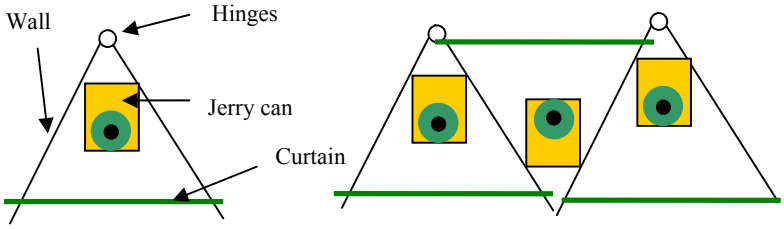
The mobile units

Men's urinals

Men's urinals can be very cheap, using a jerry can and a funnel. The first version used cabins with three walls and a curtain, and a light bulb was placed in the funnel to prevent odors and nitrogen loss. Later the cabins were simplified by using two walls placed in an angle. The light bulb caused some splashing and was replaced by a pipe at the end of the funnel. A urinal was also made in fiber glass for "VIP"-events.



First generation: Jerry can with light bulb and cabin with three walls + curtain. A sheet of plastic with sand was placed under the jerry cans to absorb "splashes". The sand was then changed every day.

Second generation: The light bulb is replaced with a pipe at the end of the jerry can, to avoid splashing, but still minimize nitrogen losses and odor. The cabins are now made with two walls attached with hinges. Four walls make up three cabins.



The low end of the curtain is filled with sand to make is more wind resistant. The curtain is attached to a piece of wood with some nails that enables a good fit around to the walls.

A urinal in fiber glass

Women's urinal

The women's urinal is based on the pour flush pan. An elevated platform allows for the squatting position. The platform is made of wood and the pan of fiber glass. The cabins for the urinals and toilets are quite simple, with detachable walls made of a wooden frame, straw-mat and tissue. Toilet paper is put in a bin in the cabin, while cleansing water is allowed to go into the urine pan. The users are encouraged to use small quantities of water. A plastic carpet is put on the wooden platform to facilitate the maintenance. In Sahel the rains are rare, so the cabins don't have a roof.


Where it is possible to dig the platform can be lower and the jerry can dug down (left photo). On hard surfaces the platform has to be > 60 cm to allow for the jerry can to fit in below the platform (right photo).
Dimensions of the platform:
Width = 80 cm, Length = 100 cm

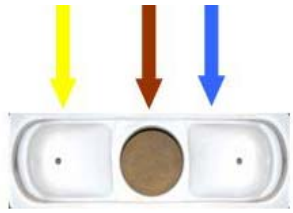


The urine pan is made of fiber glass, based on the same mold as the pour flush pan. The first version was later improved by making one single hole instead of many small holes at the exit. The fibers in the model with many small holes absorbed urine and started to smell very bad. This is avoided in the new model which has smooth surfaces at the exit (right photo).

Toilets

The squatting pan is has three outlets - for urine, feces and anal wash water. The urine and wash water are collected in 20 liter jerry cans under the platform. A 20-liter bucket collects the fecal matter. The bucket is lined with two 50-litre plastic bags to keep liquid from "breaking through" and facilitate transport. Ash is added after each use to absorb humidity, prevent odors and enhance hygiénisation. With enough dry matter added (like ash, soil or sawdust) a vent pipe is not judged necessary. Once full, the bucket is changed and the plastic bag is closed. An opening on the side of the platform gives access to the bucket and the jerry cans.

Access to jerry cans and the bucket under the platform



Dimensions of the toilet cabin:
Width: 90 cm
Length: 120 cm
Height of platform: 60 cm
Height of walls (no roof): 180 cm
Distance of squatting pan from door: 30 cm
Height of platform opening: 50 cm
Width of platform opening: 60 cm

The walls are detachable from the platform to facilitate transport.

The door is a bit heavy, so sometimes the walls need extra support.

A simple hand washing device using a bucket and a small pierced metal can attached to an iron bar. The can is dipped in the bucket and then suspended on the outside.

Storage and reuse

EcoSan is not complete without hygiénisation and productive reuse.

- Urine is stored for at least one month in jerry cans or in 1 m^3 tanks before reuse. The urine from the events has been used for the training of farmers in different projects.
- The buckets with feces have been emptied in trenches and covered with straw and dried out before put in rice bags for further storage for at least 6 months, protected against rain.
- The jerry cans with anal wash water are either emptied in a septic tank or in a trench around a tree.

During the FESPACO event in 2007, the quantity of fertilizer obtained was 4500 liters of urine and 150 kg of dried feces from 15000 users. This gives an average of around 0,25 liters of urine and 0,01 kg of feces per person. The fertilizer value in Burkina of one liter of urine is around 5 CFA (1 cent US) and one kg of feces is around 50 CFA (10 cents US) ((Dagerskog, 2007). The fertilizer value provided per user per visit is then less than 2 CFA (0,5 cents US). The urine and

feces from FESPACO was used in participative experimentation with 70 urban farmers in the Ouagadougou EcoSan_UE project, before any UD-toilets had been built in the project. Once the toilets started to be constructed the farmers were already convinced on the reuse which avoided blockage in the chain from the household toilets to the urban farmers.

Case study 1: The business potential with mobile EcoSan units

Since FESPACO the mobile units have been used at more than 20 events, such as fairs, conferences, festivals and launch-events. In the beginning CREPA either took rent for the toilets or provided them for free, and paid the caretakers for the management. The caretakers then formed an association called APLE, or (Association pour la Promotion des Latrines Ecologiques) to be able to respond to demands from event organizers.

Thus far APLE has managed seven events without passing through CREPA. The event organizers have been charged a rent for the units, and the users have free access (or leave a voluntary contribution), while the care takers manage the units and inform the users. The seven events had an average length of 4 days and the association earned 240$ per event in rent and had an average of 1500 users. The urine and feces has either been transported to CREPA or to one the EcoSan-stations in Ouagadougou. APLE is neither paid nor charged for the storage and subsequent valorization of the EcoSan fertilizer.

For most events it has been enough with three men's urinals, two women's urinals and one toilet. Considering these six units, CREPAs investment costs have been:

Item	**Quantity**	**Unit cost ($)**	**Total cost ($)**
Men's Urinal	3	30	90
Women's Urinal	2	120	240
UD-Toilet	1	160	160
Jerry cans	100	1,5	150
Hand washing device	1	4	4
Water container	1	12	12
Gloves	3	5	15
TOTAL			**671**

The costs and benefits for the average event give:

	Item	**Total value ($)**
Costs	Transport of toilets, urinals and jerry cans	40
	Consumables (toilet paper, plastic bags, soap etc)	10
	Repairing costs	20
	Costs for three caretakers (10 $ per day)	120
	Total Costs	**190**
Income	Rent	240
	Total Income	**240**
Result		**+ 50**

APLE can then pay off the investment costs to CREPA with 50 $ per event. The long term goal is that APLE will own the mobile units and be more active in promotion. One way to be present at more events would be to provide the mobile units, but instead of charging a rent from the event organizer, the users would pay a fee. The maximum fee (realistically) one can charge in

Burkina Faso is 50 CFA (10 cents US) per visit. For 1500 users this means 75000 CFA or 150 $. This would mean a net loss of 40 $ per event.
However, different scenarios could make this option worth while for APLE:

- If the event organizers take on the transport costs
- If CREPA would sponsor APLE for such events because of the exposure of the EcoSan concept
- If APLE would include vegetable farming in their activities and start making productive use of the Ecosan fertilizers collected instead of giving them away

Case study 2: Mobile toilets and the potential to trigger local EcoSan initiatives – the case of Fada N'Gourma

In 2008 the city of Fada N'Gourma (40 000 inhabitants) hosted of the festivities and the parade of the National Independence Day (11 December) and the mobile EcoSan units were used in public places during several days. Before the event, ten urban farmers in Fada N'Gourma were identified and engaged in participative experimentation using urine instead of urea on seven different crops. The experimentation and training would prepare them to make use of the urine from the event, instead of transporting it all the way to Ouagadougou. Another objective was also to see if this approach could trigger local EcoSan initiatives.

Participative experimentation is an efficient way to introduce new farming practices, such as the use of urine as a fertilizer. In Fada the urban farmers chose the crops and provided the test plots, while CREPA provided the fertilizers (NPK, urea and urine), pesticides, gloves, scales, hoes, seeds, water cans for the urine and the training. This cost was 400$ for the equipment and 400$ for the agronomist doing the training. After the start of the training the farmers also accepted to receive the excreta collected during the events in Fada (1000 liters of urine and 150 kg of feces) which was stored for hygienisation.

The yields for the crops that are harvested in one occasion were measured (see table below). For crops that are continually harvested (tomato, pepper, egg plant, cucumber) the farmers did not manage to properly evaluate the harvest.

Crop	Yield NPK+ Urine (ton/ha)	Yield NPK + Urea (ton/ha)
Cabbage	68	41
Potato	66	33
Onion	41	35

The urine fertilized plots had significantly higher yields compared to urea. This can partly be explained with the quite high dose which was based on a nitrogen concentration of 3 gN/l. It is likely that the urine was stronger than this. A commented field visit was organized with the mayor, technical services, some local associations and the radio in Fada to see the effect of urine on the crops.

Five months later (June 2009) a follow up visit with meetings with farmers and the local authorieis was made. The farmers had used up the urine from the event and the feces were hygienized. Impression by the farmers:

Advantages:

- They all agreed that urine is a very efficient fertilizer
- They experienced less attacks on the plots with urine

Disadvantages:

- The bad odor of urine while spreading
- The risk that the women who come to buy their harvest and bring to the market would refuse to buy urine fertilized crops. Some of the women happened to come by when they were applying urine and said they would refuse to buy that crop. But once they saw the quality of the fruits harvested they had bought them anyway.

Sanfou Idrissa, the president of the farmer collective, claim that once the test was finished some of the test farmers suspected that CREPA probably had added fertilizers in the urine. This set off a heated discussion amongst the farmers and the only solution was to collect their own urine and test as fertilizer. This experience confirmed the results and settled the debate. However there is still only quite a modest urine collection going on by some of the farmers. The farmers want more information on the use of urine on cereals and ideas on how to get enough urine for a large surface. It was concluded that a study visit to Koupela (100 km from Fada) where a large EcoSan project is implemented would be very beneficial for the farmers.

Impressions from of Mr Lompo, responsible for waste management in Fada:
"After the broadcast on the local radio several I have received many questions about EcoSan. People want to know if we have tested the crops for pathogens, other people want dry toilets and other farmers want to be trained. Unfortunately I don't feel I have the competence to answer many of the questions. But this experience has made me curious and I want to know more. I hope to be able to participate in CREPA's two week EcoSan course in July 2009.

For EcoSan to be a reality in Fada, these new kinds of toilets have to be integrated in our strategic sanitation plan. For this to happen, the municipality needs to be convinced and we need to organize workshops with the municipal counselors and the agents of ONEA (National Water and Sanitation Authority).

I think there is a big potential now for EcoSan in Fada. The end users, the urban farmers, are ready. To set up a system we need many jerry cans and also a collection service. The formula I think would work in Fada is that the household take the cost for latrines, with some subsidy from ONEA, the municipality takes on the costs for the urine jerry cans and the urban farmers do the collection, and make a profit from the reuse."

The mobile toilets and the reuse experimentation have created an interest in Fada for ecological sanitation, both at the municipal level and at the farmer level. However, the different actors need more training and knowledge to take the next steps.


Mobile women's urinal in Fada


Training on urine application


Commented field visit with authorities in Fada

Urine collection at the home of Dassouri Labidi who participated in the reuse training

Sanfou Idrissa, the president of the urban farmers in Fada, show the hygienized feces

Conclusion

The mobile EcoSan units have been an important tool for CREPA's dissemination of the EcoSan approach in Burkina Faso. Four major advantages can be distinguished:

- ***They have been an efficient means to sensitize the public on EcoSan.*** A way to improve even further the understanding of the concept would be to expose pots with plants that have received different doses of urine in connection to the latrines and urinals.
- ***They have created job opportunity for the young care takers***. The association could have more assignments if a more pro-active marketing was used, and different cost-options for event organizers were provided.
- ***They make possible the collection of large quantities of urine for demonstration fields***. Participative experimentation with urine is the recent strategy to initiate EcoSan projects and create demand for the dry toilets, but in the beginning of an EcoSan project when demand is supposed to be created there is often no urine available. The mobile EcoSan units have been a way to provide the urine needed for demonstrations in the urban EcoSan project in Ouagadougou and the rural EcoSan project in Koupela.
- ***The use of toilets together with farmer training provides a foundation for local initiatives.*** The experience in Fada N'Gourma shows that this approach was not enough to trigger local initiatives at a larger scale. The first intervention needs to be followed up with more training and also probably pilot funding to assist interested actors. Simple guides would also be useful to facilitate local initiatives, with FAQ on EcoSan, and information on construction of latrines and the reuse of urine and feces,.

The experience in Burkina Faso has inspired CREPA Niger, CREPA Côte d'Ivoire and CREPA Guinea to develop the same type of mobile units.

References

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