gtz ecosan program recycling oriented wastewater management and sanitation systems

ecosan ecological sanitation

Ecological Sanitation: Selected projects from Sub-Saharan Africa, Asia and Europe

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gtz ecosan program recycling oriented wastewater management and sanitation systems

commissioned by Federal Ministry for Economic Cooperation and Development

ecological sanitation…

- … is not a specific technology, but a new philosophy of dealing with what is presently regarded as waste and wastewater for disposal
- … applies the basic natural principal of closing the loop by using modern and safe sanitation and reuse technologies
- … opens up a wider range of sanitation options than those currently considered.

Geographical Distribution of selected Projects

Example Projects

- Rwanda, UDDTs for Schools

Project Overview

Objective:

- Improve health and sanitary situation of school kids and families

Focus group:

- ca. 2000 school kids in 4 primary schools (districts Ngororero and Huye)

Technical and Financial Support:

- Sector project “Disease control and Health Promotion” (GTZ)
- Cooperation Allemande en Santé au Rwanda (GTZ & DED):

  in cooperation with

  - School of Public Health, Rwanda (ESP, Ecole Santé Publique)
  - Population Service International, Rwanda (PSI)
  - Cristoffel Blindenmission, Rwanda (CBM)
  - Fond d‘Eau et Assainissement, Rwanda (FEA)

Initial Situation

Source: Friederike Amani Paul and Karolin Hadja Herzog

Former latrines at Kiziguro

Source: Friederike Amani Paul and Karolin Hadja Herzog

Source for drinking water supply

- Lacking access to drinking water
- Inappropriate and unhygienic sanitation (latrines, handwashing facilities)

Solutions proposed

- Disinfection of drinking water
- Rainwater harvesting
- Installation of UDDTs
- Installation of hand washing facilities
- Distribution of de-worming tablets

Water Storage tank and UDDTs at Kiziguro

Source: Friederike Amani Paul and Karolin Hadja Herzog

UDDTs at Kiruhura Primary School

Source: Friederike Amani Paul and Karolin Hadja Herzog

Presented Example Projects

- Rwanda, UDDTs for Schools
- Kenya, Ecosan Promotion Project

Project Overview

- Implementation Period: Nov. 2006 – October 2009
- Total Budget: 3.25 Mio. € (by EU, SIDA and GTZ)
- Core Indicator: 10.000 HH or 50.000 Beneficiaries reached
- Key Stakeholders: Kenyan Ministries of Water & Irrigation, of Public Health & Sanitation, of Education and of Agriculture, many local NGOs, UNICEF, UN-Habitat

Project Components of Ecosan Promotion Project (EPP)

- Urine Diversion Dehydration Toilets on household and school (staff) levels
- Low Flush Toilets connected to Biogas-Digesters & constructed wetlands for Institutions (Schools, Prisons, Hospitals,..)
- Bio-Latrine-Centres for Public Places and Informal Settlements

EPP – Implemented Technologies

Different styles of implemented UDDTs

Squatting pan inside the toilets

CONSTRUCTION OF BIOGAS PLANTS FOR WASTEWATER TREATMENT AND ENERGY

EcoSan on Institution Levels

- Low-Flush Toilets connected to Biogas digester (124 m3)
- Final Treatment in constructed Wetlands
- Excavation works, construction of the digester doom
- Estimated savings of fuel wood one 3.5 t truck per week (60 %)

(Gachoire Girl's High School Pilot Project, Kagwe / Kiambu)

Presented Example Projects

- Rwanda, UDDTs for Schools
- Kenya, Ecosan Promotion Project
- Biogas for a better Life – Case Study of Burkina Faso

Biogas for a better life (supported by SNV, DGIS, UEMOA and GTZ)

- is an African initiative, launched by SNV and other partners, which will offer investment and business opportunities
- relies on Nepalese Model case: successful Nepalese biogas programme (20.000 biogas systems per year, supported by SNV and KfW)

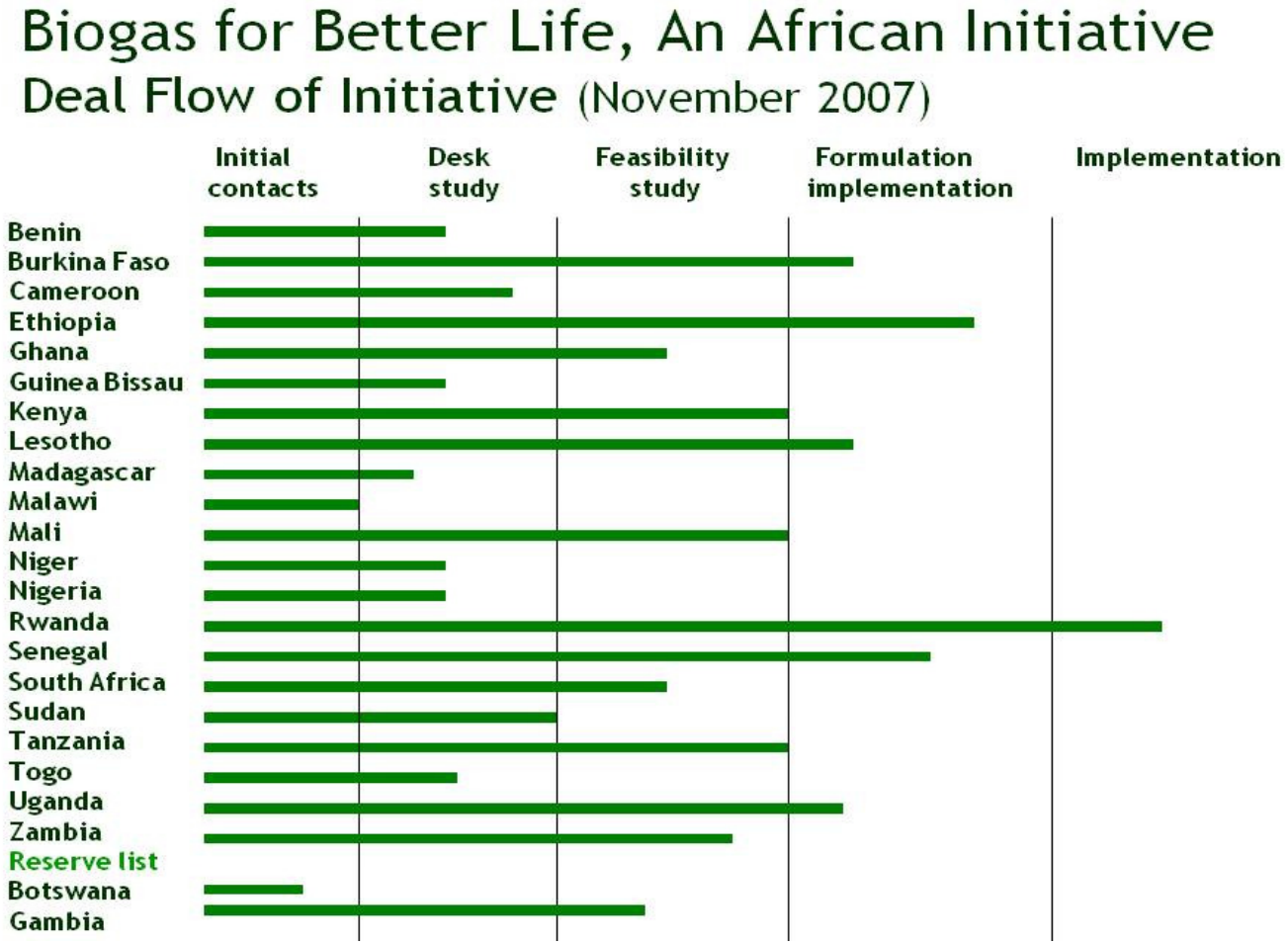
Aim: 2 million domestic biogas installations sold and 95% in daily operation within 10 years.

Specific achievements to reach by 2020

- 2 million biogas plants installed and being used
- 800 private biogas companies established and operational
- 200 biogas appliances manufacturing workshops developed and operational
- Comprehensive quality standards and quality control systems developed
- Minimum 90% of constructed plants are operational
- 1 million toilets constructed (motivated for construction) and connected with biogas plants
- 80% of bio-slurry is utilized as organic compost fertilizer
- Biogas programme fully developed as a first CDM project in Africa
- Biogas programme fully ISO certified for quality and environmental performance
- 1,500 micro finance organizations mobilized on biogas lending
- 10 million persons directly benefiting from the programme
- Over 140,000 persons get employment in the programme

Status of the Initiative

Feasibility studies initiated or completed in 13 African countries (e.g. Rwanda, Kenia, Ethiopia, Tanzania, Burkina Faso) conducted by Dutch and Gernam DC



Feasibility study in Burkina Faso – Initial situation

- **30 years experiences from experimentation, research, demonstration biogas projects**
- **Experiences with multiple technologies**
- **Problems occured:**
  - » High construction and material costs (metal cover and gas holder)
  - » Low technical construction quality (cracks and water leakages)
  - » Lack of local capacities for maintenance
  - » Low quality and efficiency of biogas stoves
- **Despite difficulties, many biogas installations (estimated 30 out of 60) have been operated for several years (up to 12 years), because of:**
  - » Lack of alternative for rural energy
  - » Modernity (gas stoves, electricity production)
  - » Use of pre-composted straw stalks for biogas production
  - » Simple process design
- **No household experience gained, mainly biogas for schools, hospitals, military compounds**

Target groups = potential clients and users

- **Agriculture & Livestock:**
  - » Small-scale Farmers
- **Food processing industry**
  - » SMEs & SMIs
  - » Large food industry
- **Sanitation**
  - **Waste water and excreta management**
    - » Peri-urban and rural households
    - » Institutions
    - » Municipalities
  - **Solid waste management**
    - » Municipalities

Biogas Potential – small-scale farmers

- **Intensive Livestock:** **90,000**
  (5% of all rural households - 69% in survey areas)
  - Dairy production
  - Meat production

- **Infrastructure:** **18,000**
  (1% of all rural households)
  - Semi-permanent productive stabulation (69 % in survey area)
  - Composting pits (31% in survey area)
  - Toilet / latrine (6% of all rural households - 24% in survey area)

- **Water availability:** **18,000**
  (1% of all rural households – 53% in survey area)
  - Water supply for animals and compost pits
  - Collection / utilisation of domestic waste water (11% in survey area)
  - Paddock: concrete floor to collect animal manure

Potential for NBDP : at least 18,000 rural households

Biogas Potential – Sanitation

- **Replace septic tanks and pits by biodigesters to produce at least 20 % of the required energy for cooking (household level)**

- **National Plan for Sanitation to achieve MDG on sanitation:**
  - About 400.000 toilets or latrines in rural and peri-urban areas, of which 10% will be equipped with manual flush

    ⇒ 40.000 septic tanks mandatory planned

  - Conservative Estimation: 50% of 40.000 =

    20.000 rural and peri-urban households represents a potential market for NBDP

Presented Example Projects

- Rwanda, UDDTs for Schools
- Kenya, Ecosan Promotion Project
- Biogas for a better Life – Case Study of Burkina Faso
- India, Navsarjan Vocational Centre in Gujarat

Navsarjan Vocational Training Institute in Gujarat, India

Navsarjan Vocational Training Institute: System Components



- Sanitation complex comprises 24 toilets (12 male / 12 female)
- Constructed as a circle with a biogas plant in the centre
- Biodigester receives also manure from buffalos
- Energy recovery in form of biogas and used for cooking purposes
- Sludge used for seedling production after secondary treatment in drying beds

Navsarjan Vocational Training Institute: System components

- Hand washing facilities
- Existing toilet centre converted into urinal centre
- Urine collected in subsurface tank and reused in gardens
- Water from dishwashing stand collected and reused in the garden

Navsarjan Vocational Training Institute: System components

- Greywater pre-treated in settling tanks
- Greywater reused for subsurface irrigation of flowerbeds after treatment in greywater gardens

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- Philippines, ecosan in allotment gardens of Cagayan d'Oro

Ecosan for Allotment gardens in Cagayan d'Oro, Philippines

Ecosan for Allotment gardens in Cagayan d'Oro, Philippines

- 5 self-sustaining gardens in different urban areas of the city using vacant private lands
- 55 urban poor families (some are garbage pickers)
- Gardeners cultivate several crops (*brassica*, *solanaceous*, *cucurbits*, *poaceae*, others)
- compost heaps in the gardens contain the biowaste converted into organic fertilizer thus contributing to integrated solid waste management
- 25% of the vegetables produced are consumed by the family, 7% are given away to family and friends, 68% are sold to walk-in buyers which augmented the income by 20%

Ecosan for Allotment gardens in Cagayan d'Oro, Philippines

- UDDT toilets were established in each of the gardens
- 92% of the gardeners responded positively on the use of treated human urine and faeces as organic fertilizers for the crops

Presented Example Projects

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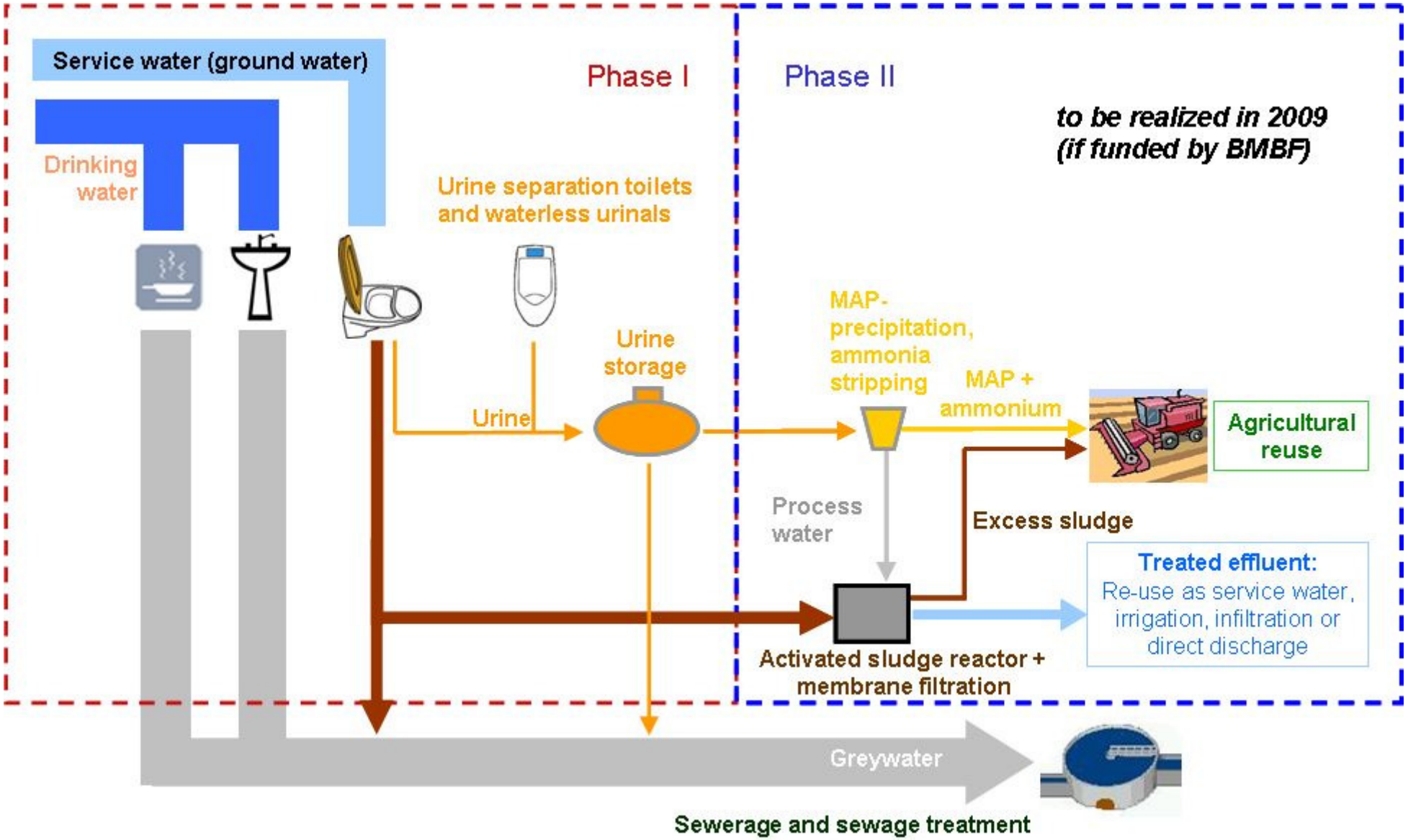
- India, Navsarjan Vocational Centre in Gujarat
- Philippines, ecosan in allotment gardens of Cagayan d'Oro
- Germany, ecosan project in GTZ House 1

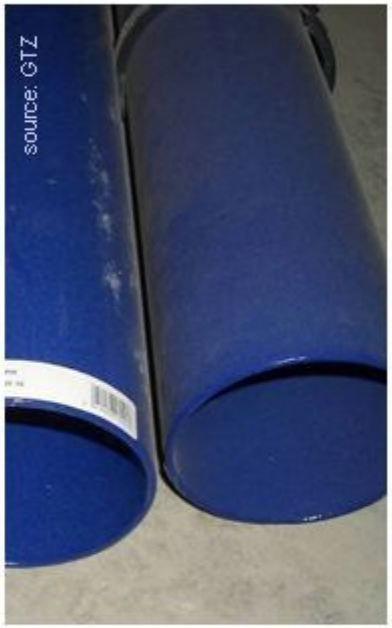
Ecosan Project at GTZ HQ



Technical components installed

42 low flush urine separation toilets (1 L per urine flush, 6 L per faeces flush)

25 waterless urinals (Keramag - Centaurus)



urine pipes 50, 80 and 100 mm made of cast iron with an enamel coating

urine storage tanks (4 x 2500 L)

docking station for vacuum tanker

Software and promotion

- user information on the toilets
- ecosan Information Poster at the canteen
- guided tours to the urine storage and show room
- demonstration garden
- promotion event on the world water day
- online survey

Tours and "show room"

- regular tours for visitors and student groups
- show room of different technologies

Demonstration garden

- application of urine to: tomato, lettuce, basilica, paprika, roses
- clearly shows the benefit of using urine as a fertilizer
- people can see and understand
- fruits taste even better (?!)
- change from the “toilet guys” to the “tomato guys”

Planned future work

- **More promotion and awareness raising: posters in toilets, FAQs on website, more user online surveys and feedback**
- **Investigating use of different systems (UD toilet without flush ?)**
- **More lobby work to get funding for Phase 2 off the ground (reuse of urine in agriculture)**
- **Promoting installation of waterless urinals in gtz offices around the world**

for further information: www.gtz.de/ecosan and www.susana.org