

ACTS ecosan Pilot Project - Public Toilet Centre, Bangalore



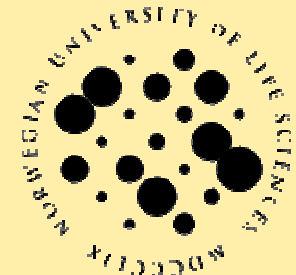
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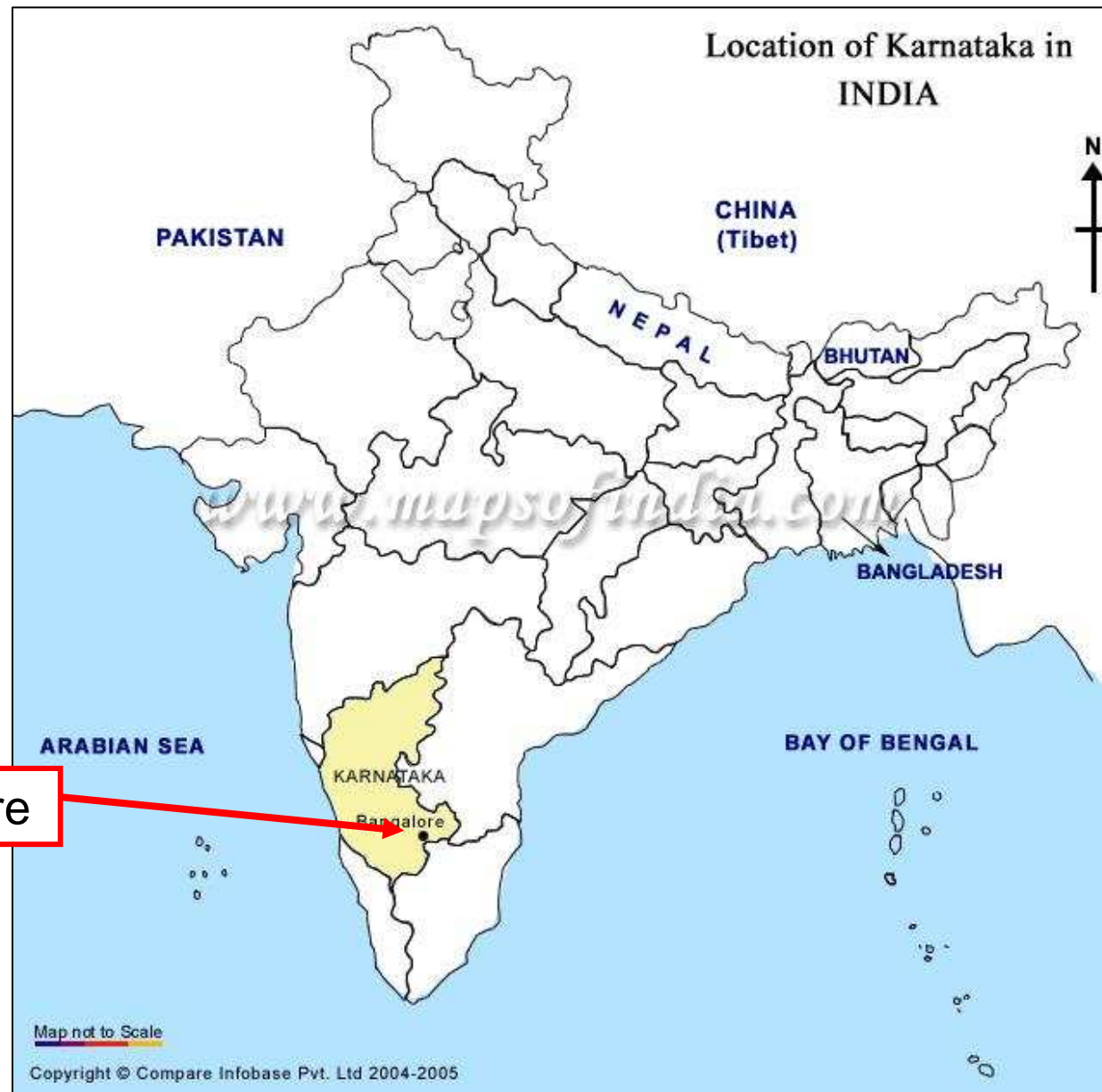
seecon
International gmbh



gtz | ecosan program
recycling oriented
wastewater management
and sanitation systems



Location of ecosan project: Bangalore, India



Project Setting



Rajendra Nagar Slum

- 12'000 to 15'000 inhabitants
- 1500 - 1600 households
- Existing toilets (2000): 44



Problems:

- open sewers are a health hazard
- sewers overflow during monsoon
- lack of toilets → lack of dignity
- open defecation puts especially girls and women at a risk of harassment and rape
- Inconvenience
- environmental pollution



Objectives of the ecosan model project

Improvement of living conditions:

- minimize risk of disease spreading (monsoon)
- increase women's safety & dignity

Recycling of nutrients and organics:

- separate collection of urine and feces
- fertilizer and compost production
- Banana plantation
- Biogas plant

Income generation for slum deve

- Generation of new employment opportunities
- Sale of compost & bananas
- Biogas production
- small user's fees

Attitudes development:

- human urine and faeces = valuable resource

**MAYBE NOT
NECESSARY?**

Bangalore ecosan model toilet system



Source separating public toilet

Greywater to municipal sewer



Transport of blackwater & urine in vacuum truck



Urine Storage



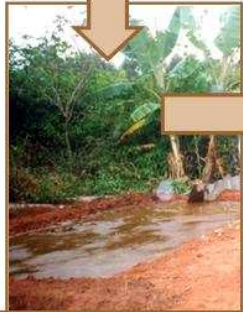
Biogas Plant



Banana Plantation



Biogas for cooking



Sludge Drying



Compost

Facts and Figures on the model project



500 – 600 users per day (declining due to installation of another public toilet close to the ecosan toilet)

| | | |
|---------|-------|-----------------------------|
| Ø 2003: | Urine | ~ 250l/day |
| | Feces | ~ 370l/day (with washwater) |
| Ø 2005: | Urine | ~ 230l/day |
| | Feces | ~ 250l/day (with washwater) |



Community Health:

- more hygienic surroundings
- safe collection and containment of human excreta

Food Security:

- production of vegetables
- average production of 6 tons of Bananas/year
- production of ~ 13m³ Biogas per day



Human dignity:

Privacy for all users

Safe place, especially for women and children

Up-scaled project

| | |
|---------------------------|--|
| Up-scaled project: | |
| INVESTMENT COST | 5 NEW TOILET CENTRES: <ul style="list-style-type: none">• 800 users per day per centre (total 4000/day)<ul style="list-style-type: none">- 4000L of Urine/day- 4000L of blackwater/day• New optimized vehicles• Larger biogas facility |
| RECURRING COST | <ul style="list-style-type: none">• Optimal use of vehicle (fully loaded)• Optimal workload for employees |
| INCOME GENERATION | <ul style="list-style-type: none">• larger banana plantation (5 ha)• optimised use of biogas• User's fees @ 50 paisa for use of toilet (Urinal for free)• Savings through production of own fertilizer |

Cots of up-scaled toilet project (5 blocks)

| ANNUALIZED CAPITAL COSTS <i>without</i> INTEREST | | TOTAL |
|---|-------------------|--------------------------|
| Construction of 5 toilet centres | 8'400 – 11'300 € | |
| 2 New Vacuum Trucks with larger volume | ca. 5'600 € | |
| Treatment Facility (biogas plants & urine storage) | ca. 1'900 € | 15'900 – 18'700 € |
| RECURRING COST PER YEAR | | |
| Operation of Vehicle (Fuel, Taxes & Maintenance) | 5'900 – 9'300 € | |
| Wages (Toilet Centre, Transport & Plantation) | 8'300 € | |
| O & M of Toilet Block | 1'000 – 1'500 € | |
| Land Lease & Banana Plantation | 3'100 – 3'300 € | 18'000 – 22'000 € |
| TOTAL COSTS PER YEAR | | 33'900 – 40'700 € |
| User's Fees @ 50 Paise/use (urinals free), 50% pay | 3'400 – 6'800 € | |
| Sale of Bananas | 17'600 – 29'500 € | |
| Fertilizer Savings | 2'300 € | |
| Savings through production of biogas | 9'700 – 11'600 € | |
| Value of compost generated, 25 – 50% sold | 4'100 – 24'600 € | |
| TOTAL INCOME PER YEAR | | 37'400 – 69'500 € |
| Percentage of return to ANNUALIZED COSTS | | 92 – 205 % |

Cots of up-scaled toilet project (5 blocks)

| ANNUALIZED CAPITAL COSTS with INTEREST | | TOTAL |
|--|-------------------|--------------------------|
| Construction of 5 toilet centres | 11'800 – 16'900 € | |
| 2 New Vacuum Trucks with larger volume | 10'100 – 11'300 € | |
| Treatment Facility (biogas plants & urine storage) | 3'800 – 4'300 € | 25'700 – 32'500 € |
| RECURRING COST PER YEAR | | |
| Operation of Vehicle (Fuel, Taxes & Maintenance) | 5'900 – 9'300 € | |
| Wages (Toilet Centre, Transport & Plantation) | 8'300 € | |
| O & M of Toilet Block | 1'000 – 1'500 € | |
| Land Lease & Banana Plantation | 3'100 – 3'300 € | 18'000 – 22'000 € |
| TOTAL COSTS PER YEAR | | 45'500 – 54'500 € |
| User's Fees @ 50 Paise/use (urinals free), 50% pay | 3'400 – 6'800 € | |
| Sale of Bananas | 17'600 – 29'500 € | |
| Fertilizer Savings | 2'300 € | |
| Savings through production of biogas | 9'700 – 11'600 € | |
| Value of compost generated, 25 – 50% sold | 4'100 – 24'600 € | |
| TOTAL INCOME PER YEAR | | 37'400 – 69'500 € |
| Percentage of return to ANNUALIZED COSTS | | 69 – 153 % |

Cots of up-scaled toilet project (5 blocks)

| TOTAL CAPITAL COSTS <i>without</i> INTEREST | | TOTAL |
|--|-------------------|----------------------------|
| Construction of 5 toilet centres | 42'200 – 56'300 € | |
| 2 New Vacuum Trucks with larger volume | ca. 56'500 € | |
| Treatment Facility (biogas plants & urine storage) | ca. 25'000 € | 124'000 - 138'000 € |
| RECURRING COST PER YEAR | | |
| Operation of Vehicle (Fuel, Taxes & Maintenance) | 5'900 – 9'300 € | |
| Wages (Toilet Centre, Transport & Plantation) | 8'300 € | |
| O & M of Toilet Block | 1'000 – 1'500 € | |
| Land Lease & Banana Plantation | 3'100 – 3'300 € | 18'000 – 22'000 € |
| TOTAL COSTS PER YEAR | | 142'000 – 160'000 € |
| User's Fees @ 50 Paisa/use (urinals free), 50% pay | 3'400 – 6'800 € | |
| Sale of Bananas | 17'600 – 29'500 € | |
| Fertilizer Savings | 2'300 € | |
| Savings through production of biogas | 9'700 – 11'600 € | |
| Value of compost generated, 25 – 50% sold | 4'100 – 24'600 € | |
| TOTAL INCOME PER YEAR | | 37'400 – 69'500 € |
| YEARLY % OF RETURN TOTAL COSTS | | 23 – 49 % |

Cots of up-scaled toilet project (5 blocks)

| TOTAL CAPITAL COSTS with INTEREST | | TOTAL |
|--|---------------------|---------------------------|
| Construction of 5 toilet centres | 59'100 – 84'400 € | |
| 2 New Vacuum Trucks with larger volume | 101'300 – 112'500 € | |
| Treatment Facility (biogas plants & urine storage) | 52'700 – 59'600 € | 213'000 – 256'500 € |
| RECURRING COST PER YEAR | | |
| Operation of Vehicle (Fuel, Taxes & Maintenance) | 5'900 – 9'300 € | |
| Wages (Toilet Centre, Transport & Plantation) | 8'300 € | |
| O & M of Toilet Block | 1'000 – 1'500 € | |
| Land Lease & Banana Plantation | 3'100 – 3'300 € | 18'000 – 22'000 € |
| TOTAL COSTS PER YEAR | | 231'000- 278'500 € |
| User's Fees @ 50 Paisa/use (urinals free), 50% pay | 3'400 – 6'800 € | |
| Sale of Bananas | 17'600 – 29'500 € | |
| Fertilizer Savings | 2'300 € | |
| Savings through production of biogas | 9'700 – 11'600 € | |
| Value of compost generated, 25 – 50% sold | 4'100 – 24'600 € | |
| TOTAL INCOME PER YEAR | | 37'400 – 69'500 € |
| YEARLY % OF RETURN TOTAL COSTS | | 13 – 30 % |