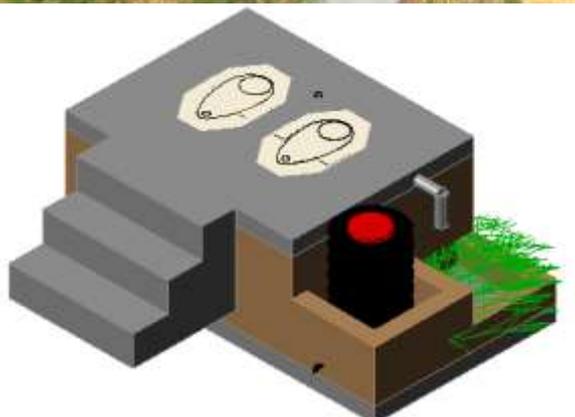
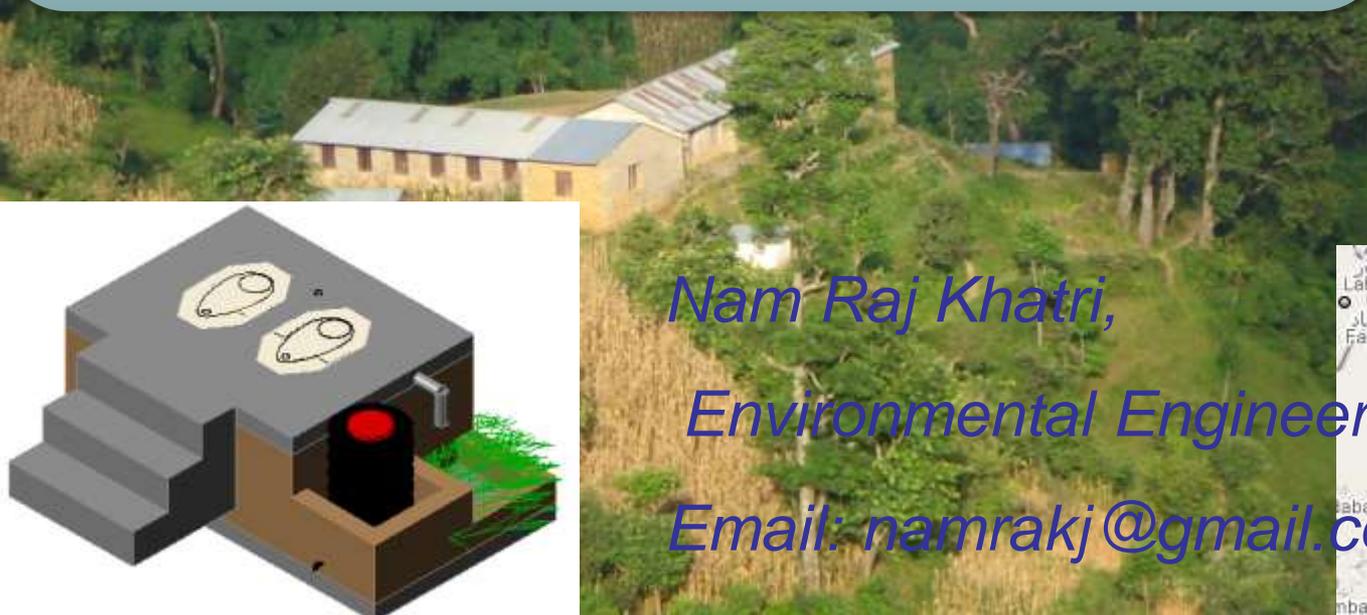




Sustainability and Climate Change aspects of EcoSan Toilet: Nepal prospective



Nam Raj Khatri,

Environmental Engineer, Nepal

Email: namrakj@gmail.com



What is Ecological Sanitation

Ecological sanitation (eco-san) Principle:

- ❖ Human excrement is not a waste product but contains the nutrients required to fertilize in a close loop

Ecological sanitation cycle:

- ❖ Excreta are held in the sanitation installation and sanitized through one or several processes which cause pathogen die off and resultant become safe soil conditioner.
- ❖ The urine is often collected separately :and used as fertilizer to assist crop production.

Health aspects of the EcoSan

Reduce risk factors in Ecological sanitation

One, Design: Increased storage time, temperature and pH and moisture content (pathogen reduction)
Minimum one year of storage is required.

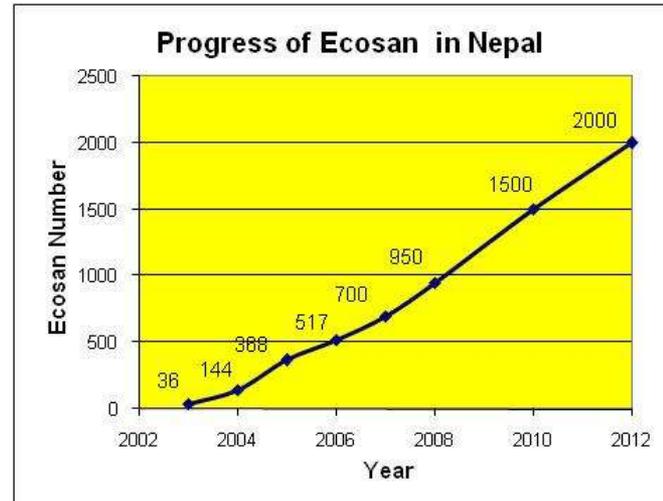
Two, O&M of Latrine. : Risk are direct contact during removal, contact during application and through crop contamination. Sanitation workers adequately protected, excreta trenches covering 25 cm by soil and root crops plantation avoided.

Three, Safe management principles: washed hands

Dry Ecosan



ECOSAN Models



Wet Ecosan



Dry: Urine diverted and feces composted in a box under pan and recycled in a year. Ash used.

Wet: Urine diverted. Feces stored in a pit. Flushing allowed. Urine used



EcoSan Sustainability factors

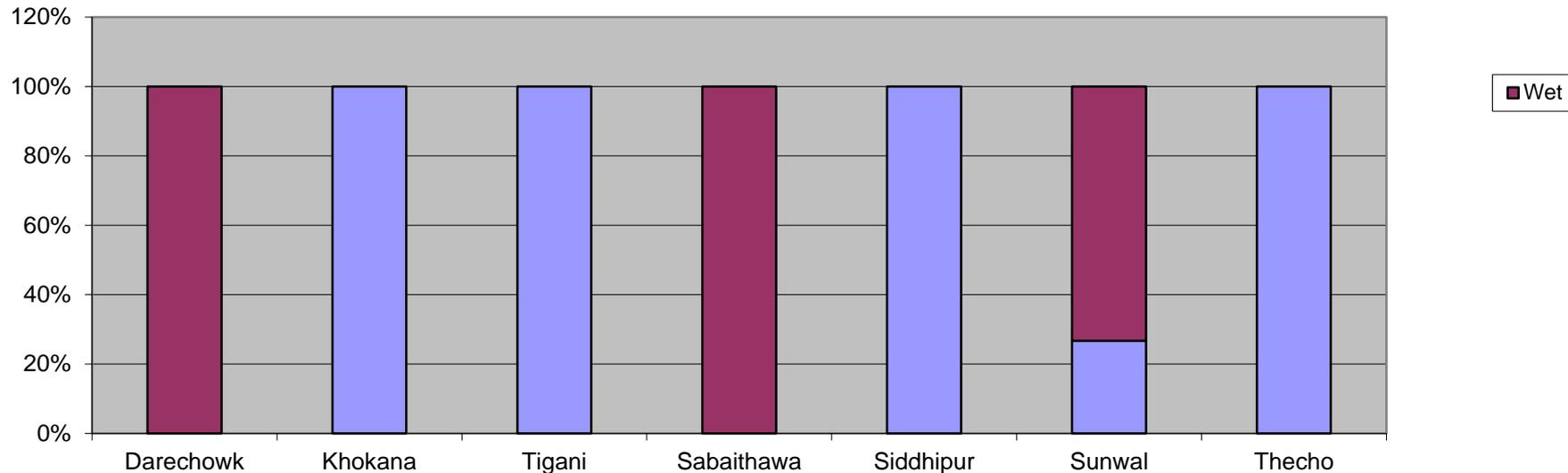
Social factor: Traditional practice, shared responsibility for maintenance of toilet, facility to wash, dignity after installation and reaction of neighbor.

Technical factor: outlook and cleanliness of pan comfort to use, easy to manage feaces, smooth diversion of urine, and knowledge of maintenance of eco-san toilet.

Utility factor/ use of urine, use of feaces, increased productivity, increased quality of crops, increased quality of soil, facility for urine bank, knowledge of urine use and benefit.

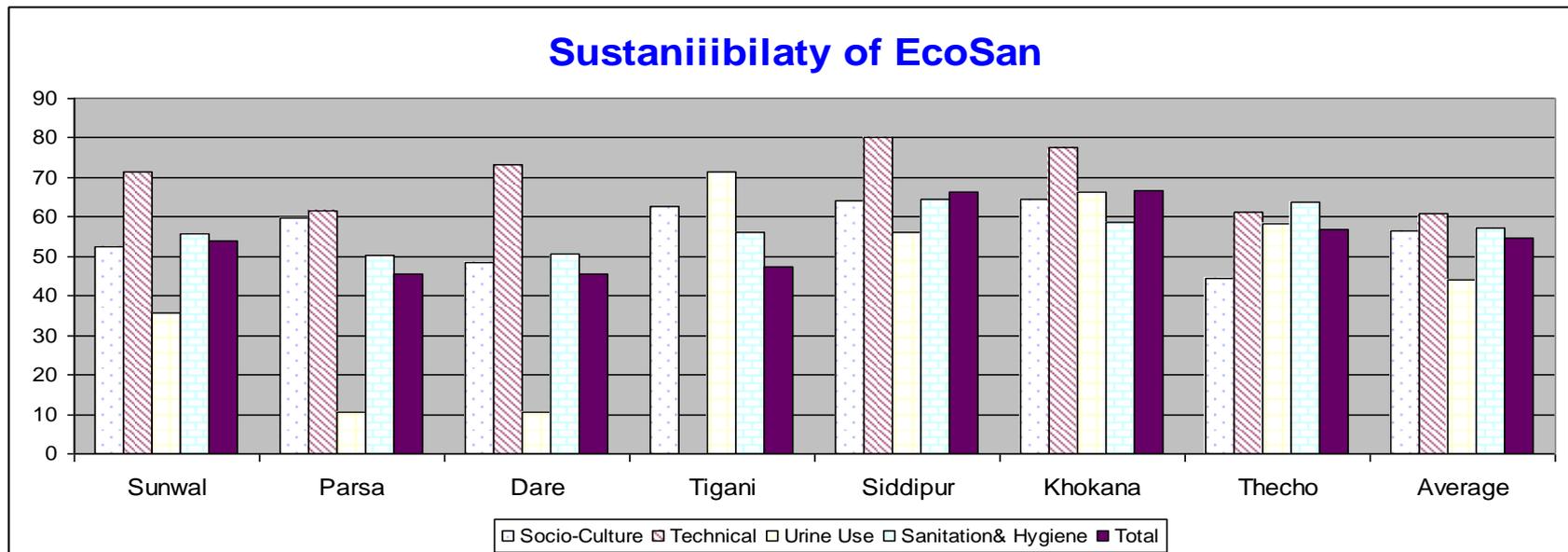
Public health: Digestion of feaces, safe application of feaces, safe application of urine, safe hygiene practices, Types of crops using feaces and urine. Ways of using urine and feaces.

Sustainability study Models(2009)



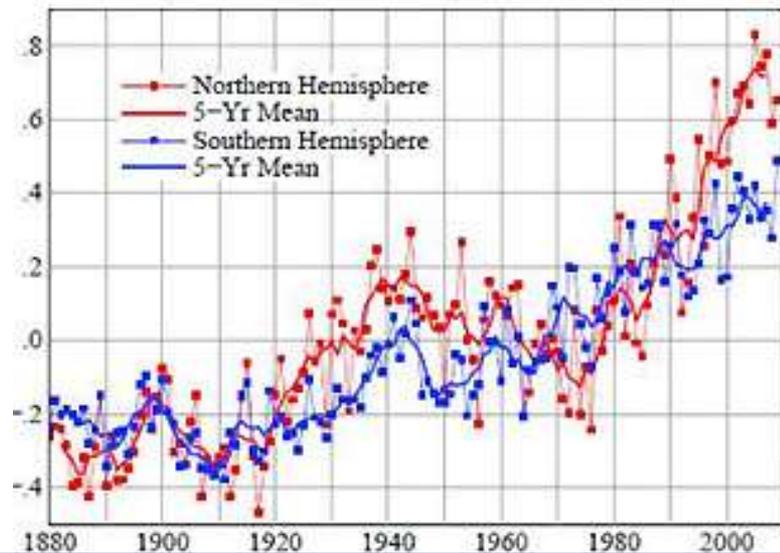
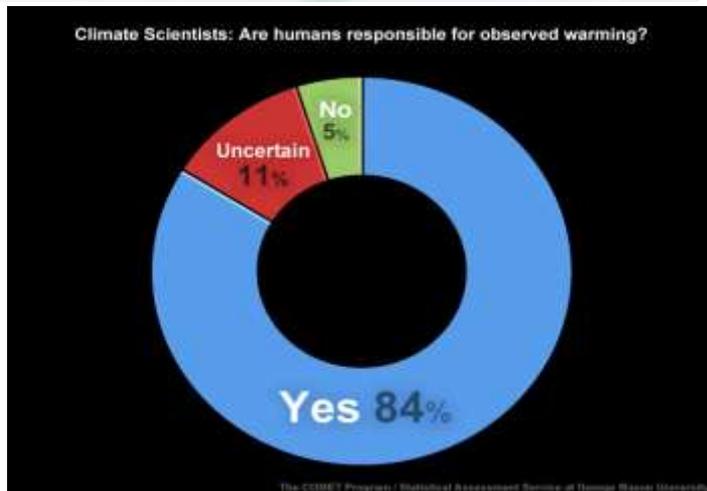
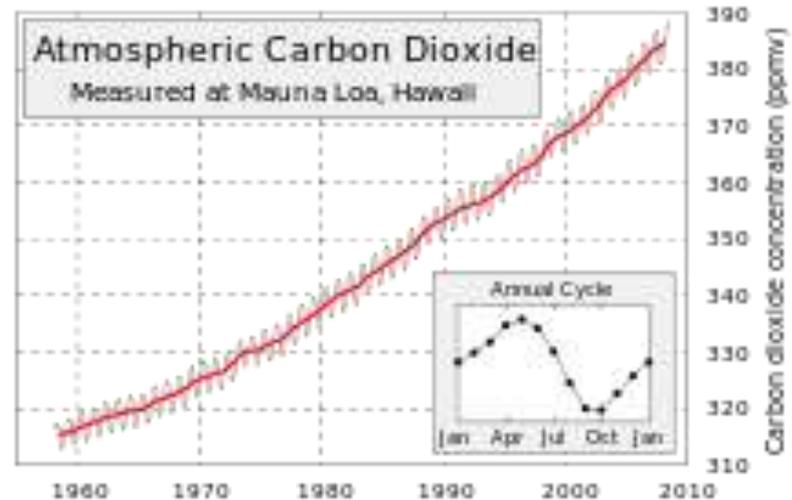
- ❖ Study carried in Seven clusters
- ❖ Two types of toilets: Dry and Wet
- ❖ About 20 HH surveyed in an cluster

Sustainability of ECOSAN



	Social	Technical	use	PH	Average
Sunwal	47	71	36	56	52.4
Parsa	52.8	61	11	50	43.7
Dare	41.5	73	10	50	43.7
Tigani	50.8	14	66	56	46.9
Siddipur	53.9	81	54	63	62.8
Khokana	54.4	74	58	54	60.2
Thecho	37.4	61	56	62	54.1
Average	48	62	41	56	52

Climate Change Indicators



What to do for Climate Change

❖ **Climate change mitigation :**
CO₂ emission avoided by using
urine and feaces and fertilizer.

❖ **Adaptation to global warming**
: saving water, drip irrigation
using urine.



CC mitigation of EcoSan

Decomposition of Feaces

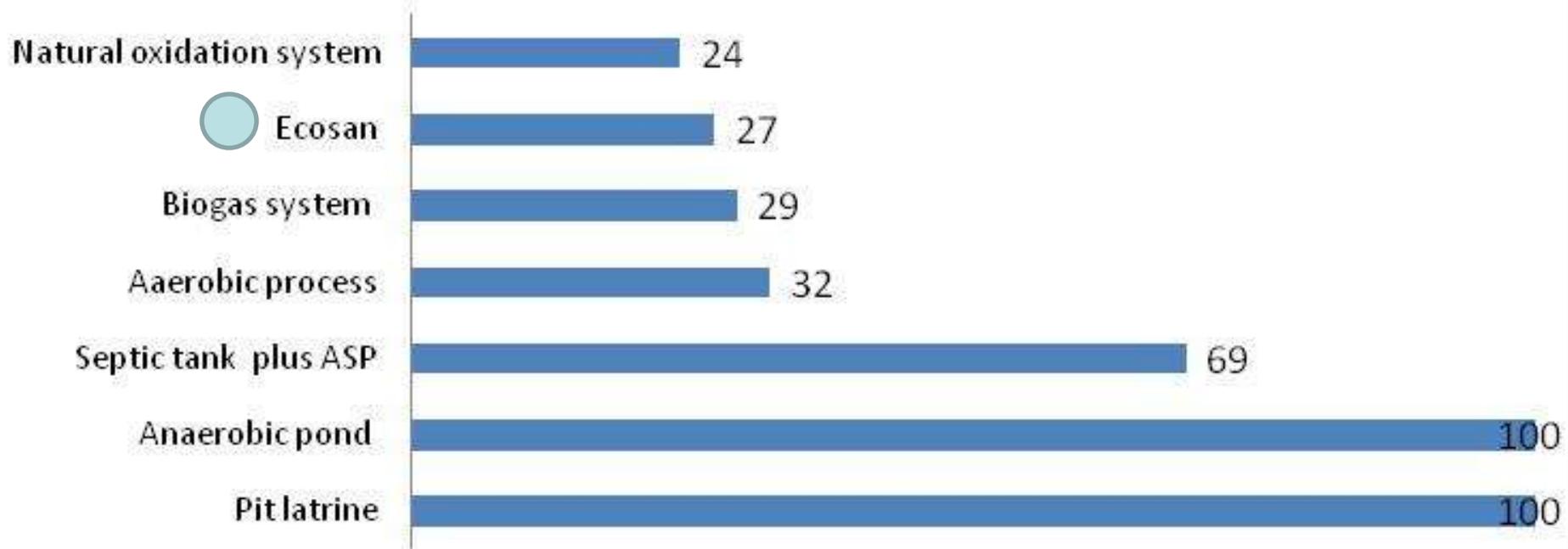
- ❖ One kg of BOD produces 0.68 Kg CO₂ and) 0.25 kg CH₄. Per capita CO₂ emission of onsite pit latrine is 62kg/y.

Use of Urine:

- ❖ A person excretes about 1 liter urine in a day.
- ❖ This makes about 3.5 kg N, 0.5 kg P1 kg K/year.
- ❖ CO₂ emission related to production of NPK is about 9kg for Nitrogen, 4 kg for phosphorus and 12 kg for potassium.
- ❖ This is equivalent to 45 kg/person per year which will be avoided by using urine.

Choice of Sanitation Options

CO2 emissionential of sanitation options(%)



- ❖ Per capita CO₂ emission of onsite pit latrine is 62kg/pe/year.
- ❖ Anaerobic system with gas collection or ecosan should be promoted.

Conclusion

- ❖ Sustainable use of eco-san toilet needs to take care of **social acceptance**, **comfort to use toilet**, **use of urine** and **hygiene** behaviors of users.
- ❖ Eco-san contributes to **avoiding carbon emission** relating to use of urine as fertilizer and feces as soil conditioner up to 107 kg/person/year.
- ❖ In addition it **saves water** and energy
- ❖ EcoSan helps to improve local ecology and **adaptation** and **mitigation** of CC.

Thank you

