VUNA
Recover nutrients and promote sanitation

Kai M. Udert, Bastian Etter, Teddy Gounden

Eawag: Swiss Federal Institute of Aquatic Science and Technology

75,000 UDDTs in peri-urban Durban / South Africa

Pictures: Max Grau, Thomas Hug

Urine-diverting dehydration toilets (UDDTs)

Volume of faeces is reduced, most pathogens are killed.

Usually, urine is infiltrated into the ground.

Picture: Linda Strande

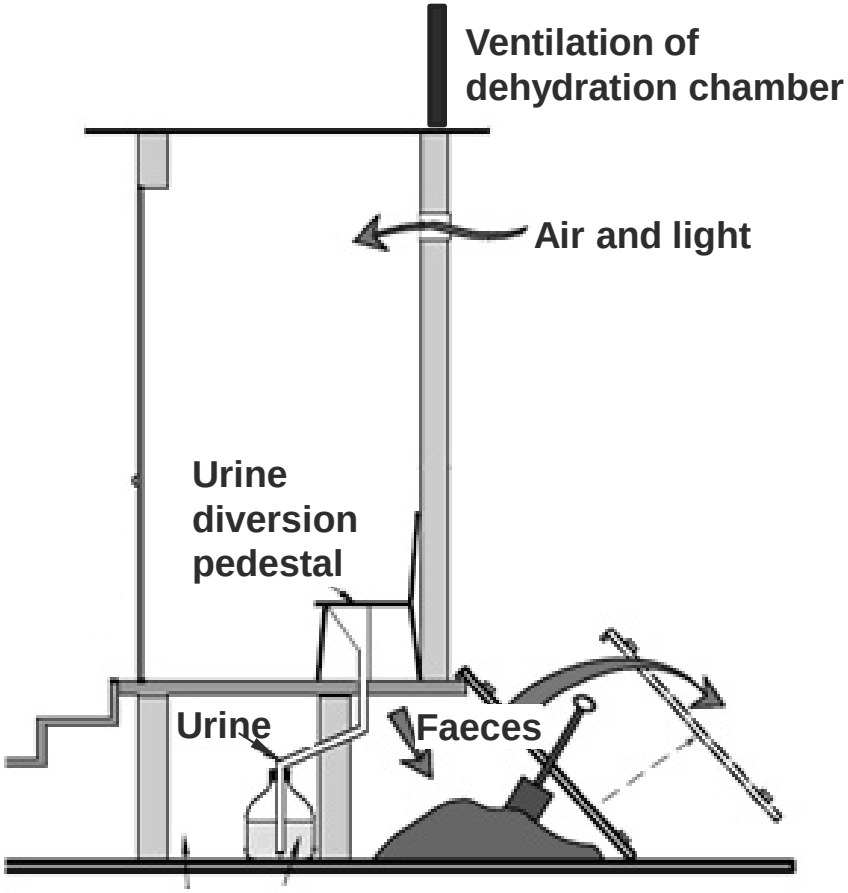
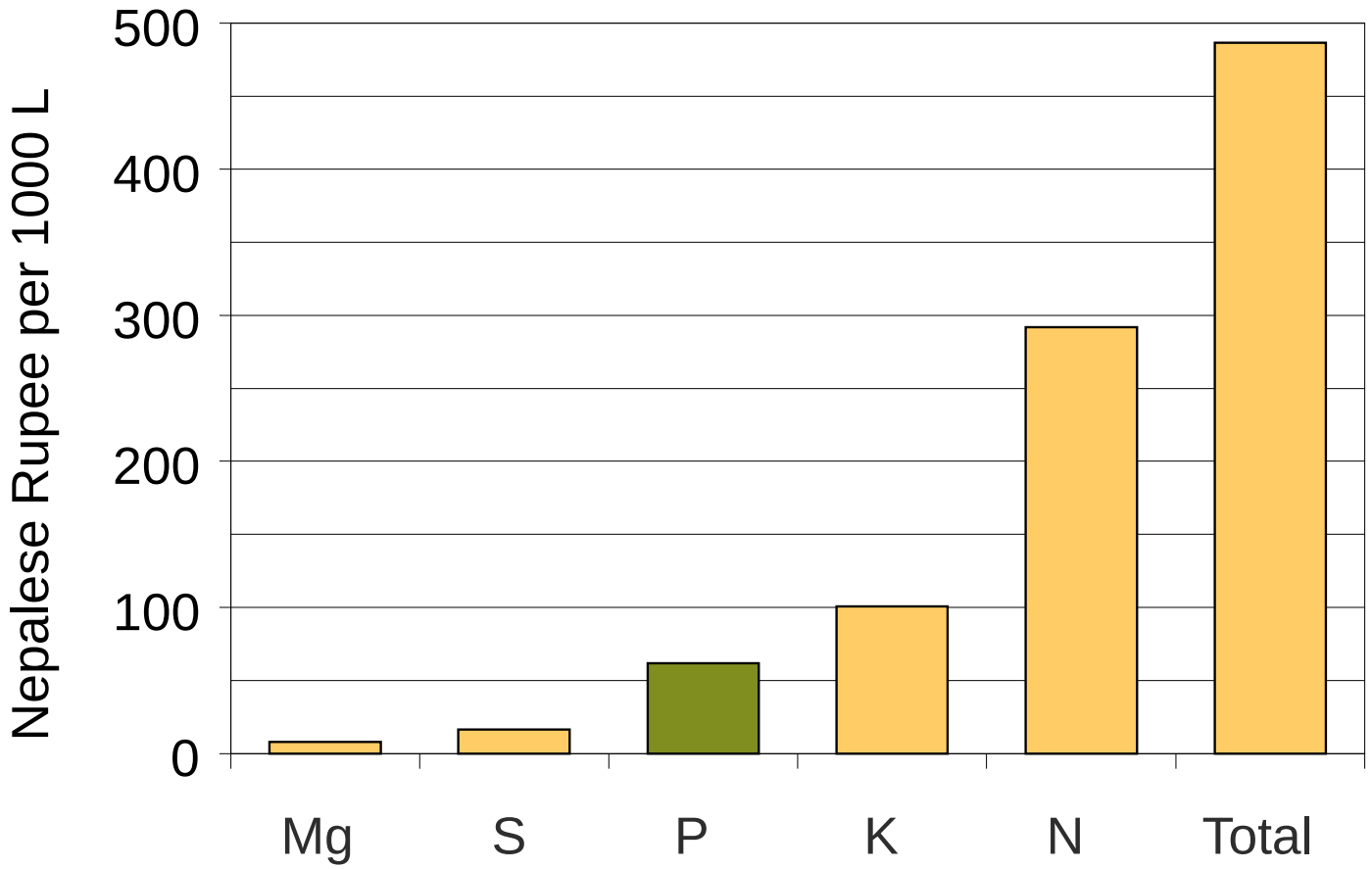


Figure: © WEDC

Fertilizer value of urine in Nepal



based on Nepalese fertilizer prices in 2008
Tilley et al. (2009)

The VUNA project

2010 - 2014

Promoting sanitation by recovering nutrients from source-separated urine

1. Reactor technology
2. Management of dispersed urine tanks and reactors
3. Socio-economic boundaries

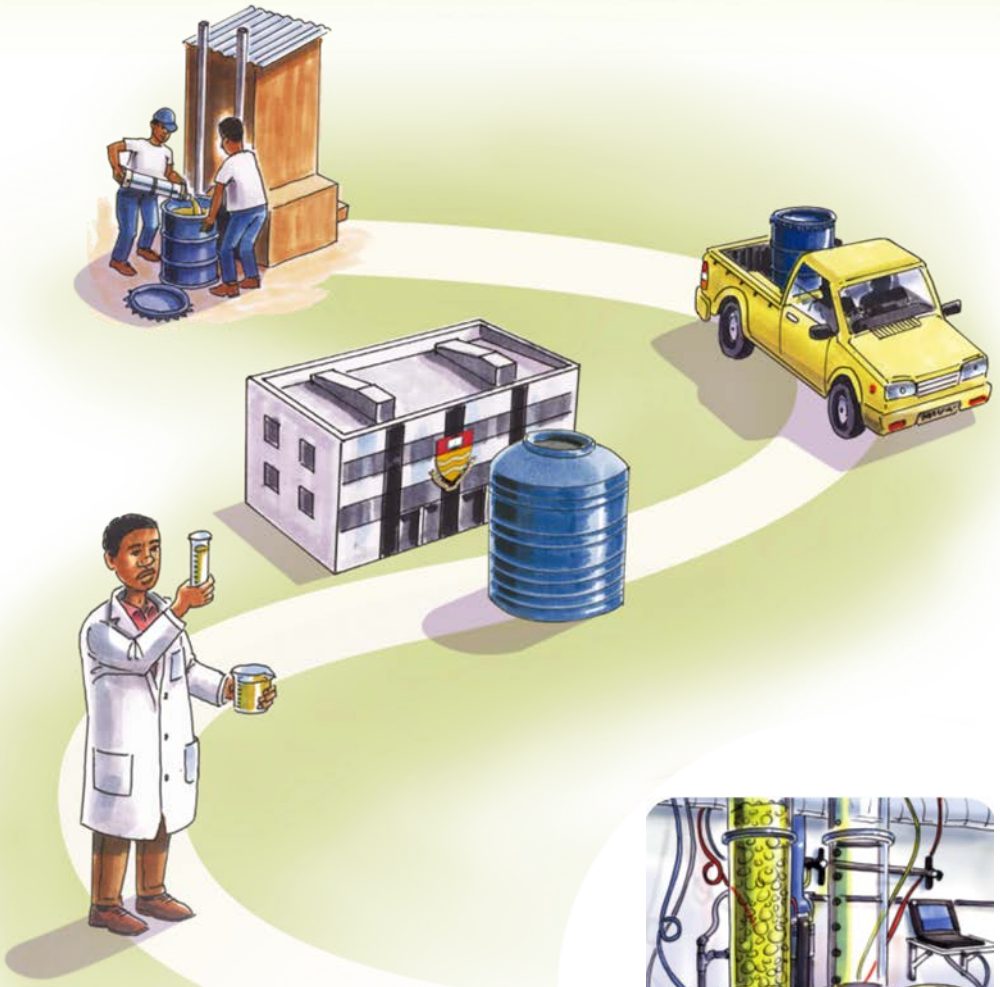


Figure: © Eawag

eawag aquatic research

Urine collection networks

Urine collection
Setting up a system

Performance model
Optimising collection

Optimise collection
Minimising cost

Socio-economic aspects

Incentives
Encouraging collection

Hygiene education
Improving health

Social acceptance
Feedback from users

Urine treatment processes

Nitrification
Stabilising urine

Distillation
Concentrating urine

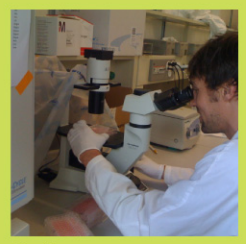
Electrolysis
Compact reactors

Complete recovery
All nutrient solution

Struvite Production
Phosphorus fertiliser

Nutrient recovery

Risks of using urine



Pathogens
Inactivation

Pharmaceuticals
Degradation

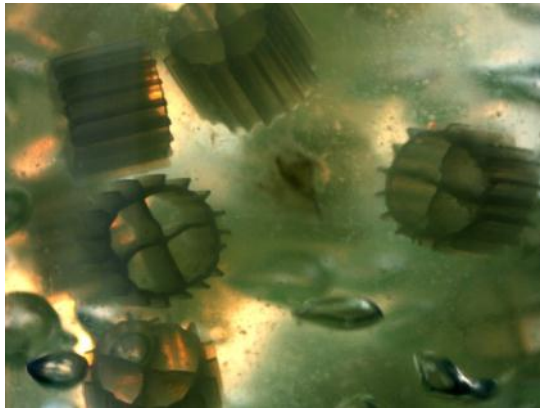
Agricultural use

Urine fertilisers
Greenhouse trials

Urine treatment reactor

Current throughput: 50 $L \cdot d^{-1}$

Nitrification
45 $Wh_{el} \cdot L^{-1}$

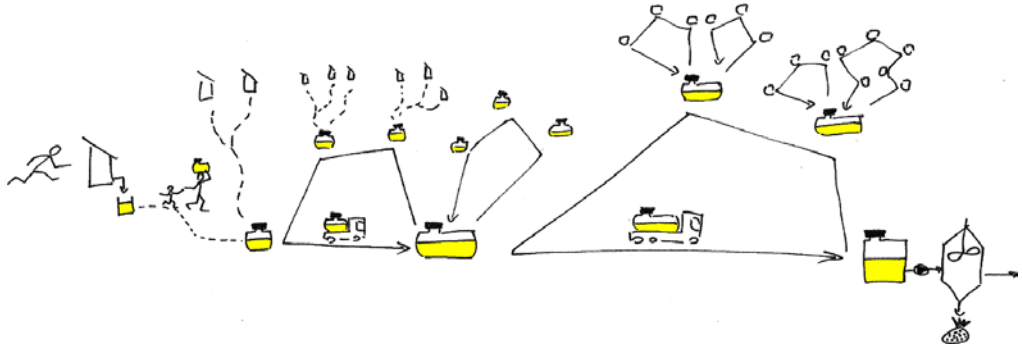


Biofilm carriers

Distillation
80 $Wh_{el} \cdot L^{-1}$

Pictures by Bastian Etter and Kai Udert

Management of urine collection



Institutionalized approach

The utility picks up the urine at the household.

Incentive approach

Toilet users drop off the urine tank at collection point.

Pictures by Thomas Hug and Elizabeth Tilley

Goal

With nutrient recovery from urine, we can establish a sanitation system for the poor in the developing world,

which produces a **valuable local fertilizer**,

lowers costs for sanitation and

reduces pollution of water resources.

Funding and project partners

Funding

ENG, ESS, UCHEM,
SWW, Sandec

eThekwini Water and Sanitation

University of KwaZulu-Natal

Swiss Federal Institutes of
Science and Technology Zurich and Lausanne

Thank you for your attention !

www.vuna.ch