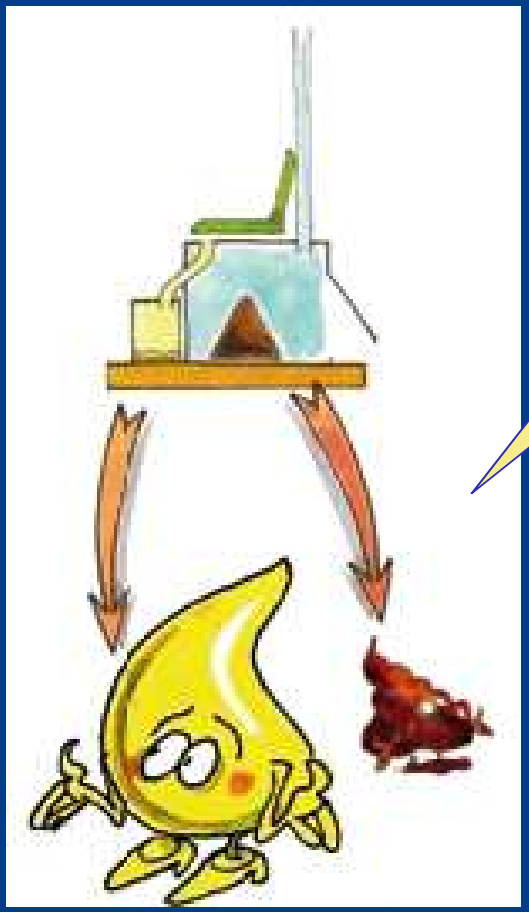
Why should we mix what Nature did separate?



Trockentrenn-toiletten (UDDT)

Claudia Wendland
Stefan Deegener
Fedde Jorritsma

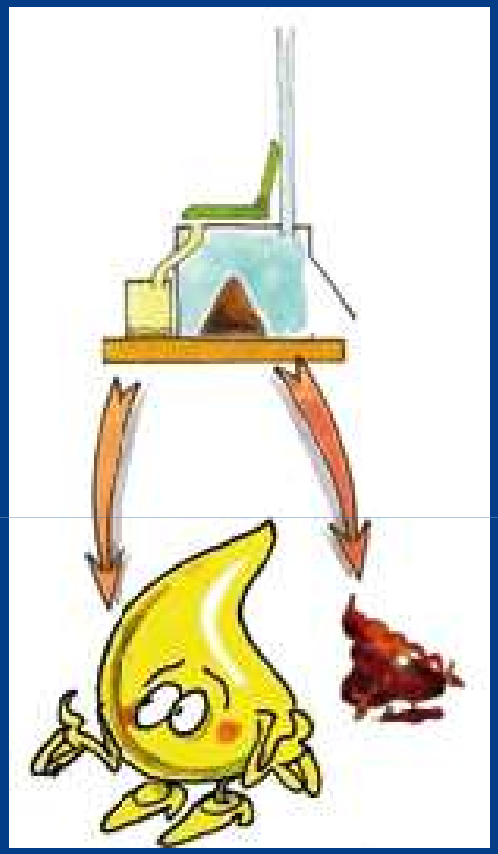
WECF

www.wecf.eu

Aufbauworkshop 3./4.März 2012 in Berlin

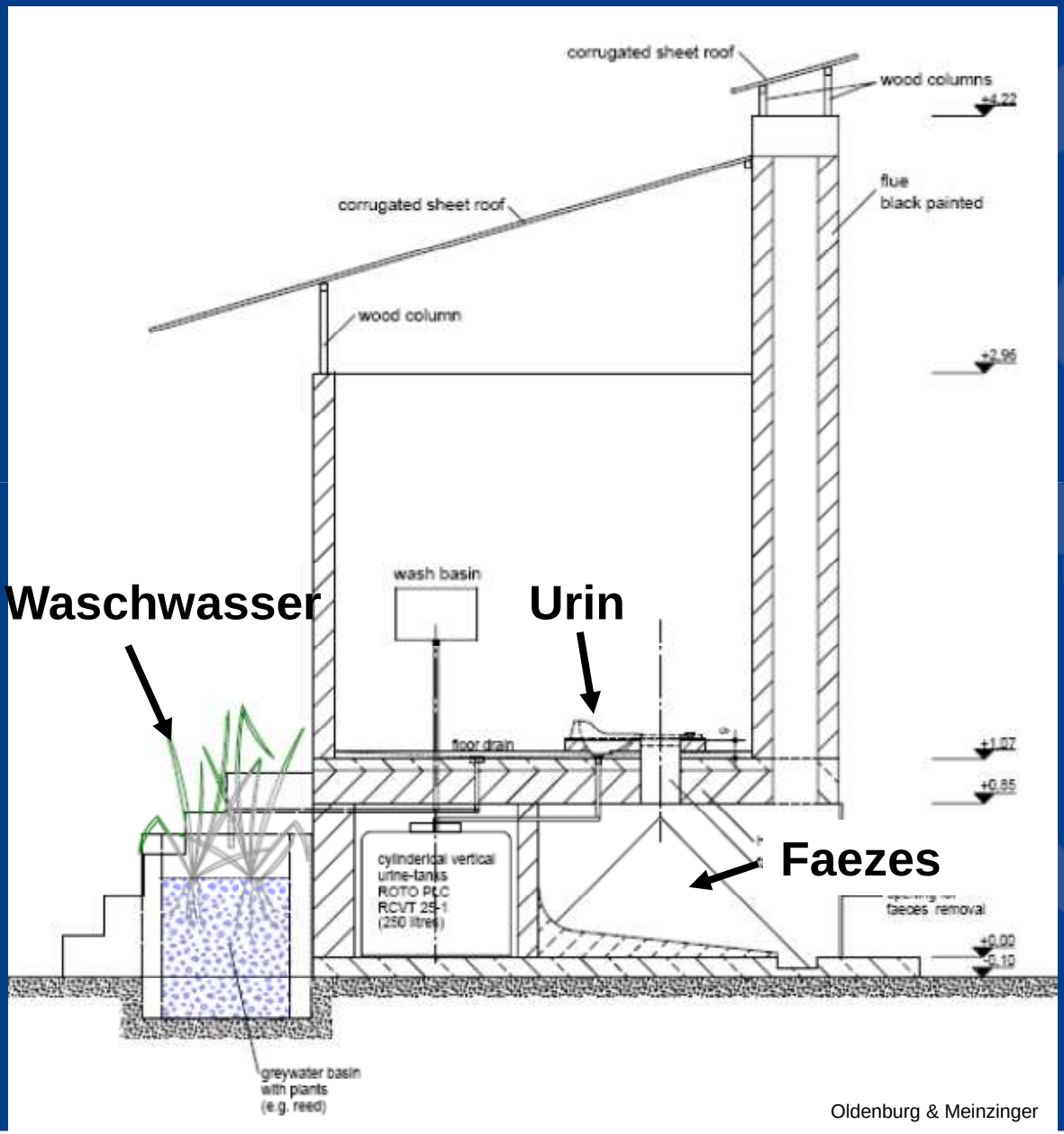
Inhalt

- Trenntoilettendesign
  - Sitztoiletten/Hocktoiletten
  - Toiletten für Menschen mit körperlichen Einschränkungen
  - Wasserlose Urinale
- Speicherung von Fäces
  - Einkammer/Zweikammersysteme
  - Ventilation
- Sammlung von Urin
  - Geruchsstopp
  - Urinleitungen und -tanks



Trenntoiletten-design

Trockentrenntoilette Schema



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Different constructions of outdoor or adjacent toilet buildings










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Different constructions of indoor toilets

Ukraine Sevastopol

Ukraine Nizhyn

Hand wash basin in Moldova with water reservoir

Sitztoiletten

Made of concrete (Mexican mould) and painted by local partner

Made of concrete (Mexican mould) by company

Ceramic Toilet in Georgia

Betontoilettenbau in Georgien

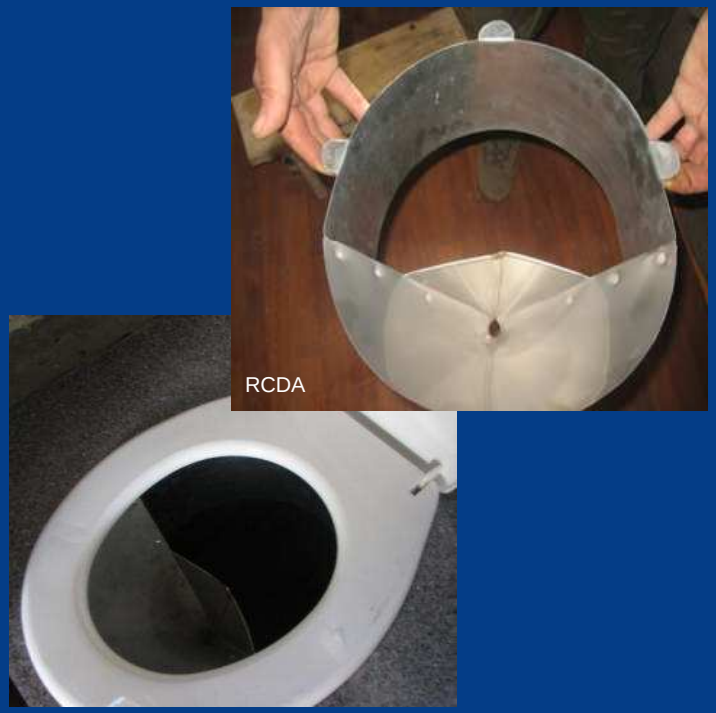
Mexican model of Cesar Anorve

Betontoilettenbau in Kirgistan

Mexican model replicated
by Agerkech

Agerkech and WECF

Sitztoiletten mit separatem Urintrenneinsatz

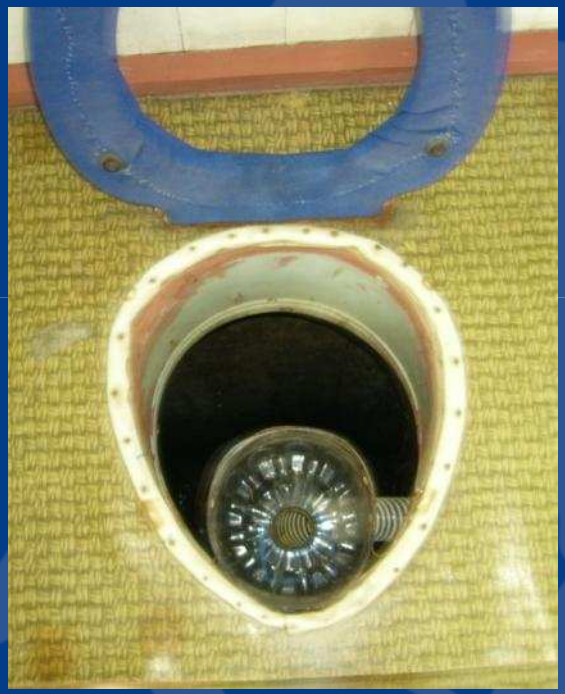


Ceramic UDDT made in Georgia

Ceramic datcha model with plastic UDD device (separett Sweden)

Sitztoiletten mit self-made Urintrenneinsatz

Ceramic datcha model with recycled UDD device (bottle)



Sitztoiletten im Eigenbau

Vorteile:

- Keine Spezialanfertigung notwendig
- Geeignet auch Menschen mit körperlichen Einschränkungen

Hocktoiletten

Self made squatting (tiles)
made in KG

Slab of plastic
made in China

Toiletten für Menschen mit körperlichen Einschränkungen

Handläufe

Toiletten für Menschen mit körperlichen Einschränkungen

Rampe

Toiletten für Menschen mit körperlichen Einschränkungen

Ebenerdiger
Bau der Toilette

Sitztoiletten im Eigenbau

Vorteile:

- Keine Spezialanfertigung notwendig
- Geeignet auch Menschen mit körperlichen Einschränkungen

Wasserlose Urinale

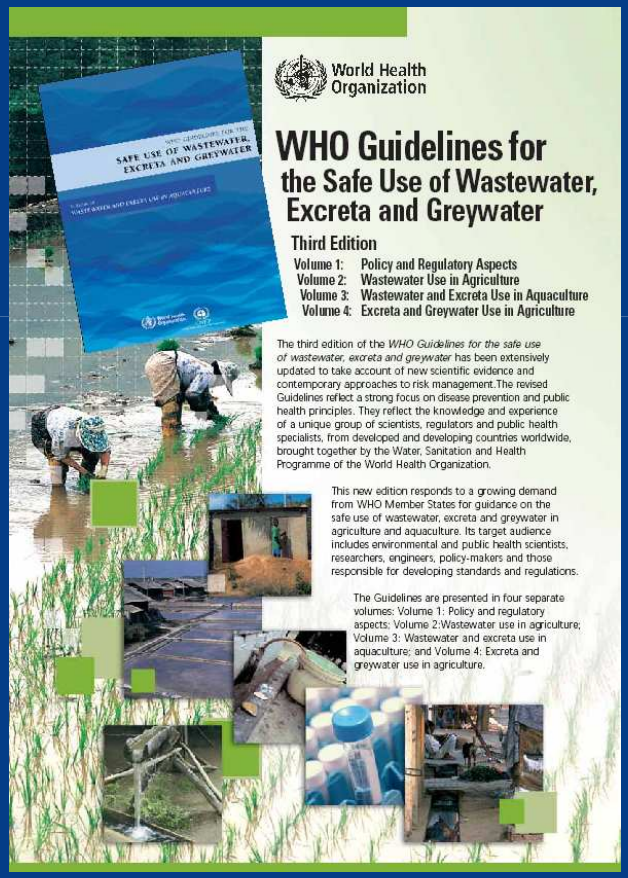
Self-made urinals or ceramic urinals (designed for flushing) can be used

Speicherung von Fäces

Wir arbeiten dran !

Düsseldorf, Altstadt/ Foto von Otterpohl

WHO guidelines 2006



World Health Organization

WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater

Third Edition

Volume 1: Policy and Regulatory Aspects
Volume 2: Wastewater Use in Agriculture
Volume 3: Wastewater and Excreta Use in Aquaculture
Volume 4: Excreta and Greywater Use in Agriculture

The third edition of the *WHO Guidelines for the safe use of wastewater, excreta and greywater* has been extensively updated to take account of new scientific evidence and contemporary approaches to risk management. The revised Guidelines reflect a strong focus on disease prevention and public health principles. They reflect the knowledge and experience of a unique group of scientists, regulators and public health specialists, from developed and developing countries worldwide, brought together by the Water, Sanitation and Health Programme of the World Health Organization.

This new edition responds to a growing demand from WHO Member States for guidance on the safe use of wastewater, excreta and greywater in agriculture and aquaculture. Its target audience includes environmental and public health scientists, researchers, engineers, policy-makers and those responsible for developing standards and regulations.

The Guidelines are presented in four separate volumes: Volume 1: Policy and regulatory aspects; Volume 2:Wastewater use in agriculture; Volume 3: Wastewater and excreta use in aquaculture; and Volume 4: Excreta and greywater use in agriculture.

Volume 1 of the Guidelines presents policy issues and regulatory measures distilled from the technical detail found in volumes 2, 3 and 4. Those faced with the need to expedite the development of policies, procedures and regulatory frameworks, at national and local government levels, will find the essential information in this volume. It also includes summaries of the other volumes in the series and an index for all four volumes.

Volume 2 of the Guidelines explains requirements to promote safe use concepts and practices, including health-based targets and minimum procedures. It also covers a substantive revision of approaches to ensuring the microbial safety of wastewater used in agriculture. It distinguishes three vulnerable groups: agricultural workers, members of communities where wastewater-fed agriculture is practiced and consumers. It introduces health impact assessment of new wastewater projects.

Volume 3 of the Guidelines informs readers on the assessment of microbial hazards and toxic chemicals and the management of the associated risks when using wastewater and excreta in aquaculture. It explains requirements to promote safe use practices, including minimum procedures and specific health-based targets. It puts trade-offs between potential risks and nutritional benefits in a wider development context. Special reference is made to food-borne trematodes.

Volume 4 of the Guidelines focuses exclusively on the safe use of excreta and greywater in agriculture. Recent trends in sanitation, including ecological sanitation, are driven by rapid urbanization. The momentum created by the Millennium Development Goals is resulting in dramatic changes in human waste handling and processing. New opportunities enable the use of human waste as a resource for pro-poor agricultural development, particularly in periurban areas. Best practice to minimize associated health risks is at the heart of this volume.

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http://www.who.int/water_sanitation_health/wastewater/gsuww/en/

Recommendations for faeces – household level (WHO 2006)

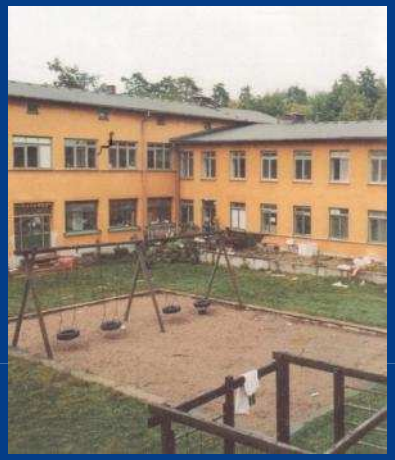
Treatment	Criteria	Comment
Storage (only treatment); Ambient temperature 2-20°C	1.5 - 2 years	Will eliminate most bacterial pathogens; regrowth of *E coli* and *Salmonella* not considered if rewetted; will substantially reduce viruses, protozoa and parasites. Some soil-borne ova may persist
Storage (only treatment) Ambient temperature 20-35°C	> 1 year	As above
Alkaline treatment	pH >9 during > 6 months	If temperature >35°C and moisture <25%. Lower pH and/or wetter material will prolong the time for absolute elimination.

Recommendations for faeces – municipal level (WHO 2006)

Treatment	Criteria	Comment
Alkaline treatment	pH >9 during >6 months	Hypothesis: If temperature >35°C or moisture <25%. Lower pH and/or wetter material will prolong the time for absolute elimination.
Composting	Temperature >50°C for >1 week	Minimum requirement. Longer time needed if temperature requirement can not be ensured
Incineration	Fully incinerated (<10% carbon in ash)	
Storage Ambient temperature 2-20°C Ambient temperature 20-35°C	 1.5 - 2 years > 1 year	Time modification needed based on local conditions. Large systems needs a higher level of protection. Than at household level. Additional storage adds to safety

Einkammersystem für Fäces

Gebers, Stockholm, Sweden



Ukraine/ Kyrgyzstan

Zweikammersystem für Fäces

Zweikammersystem für Fäces

Mama86 and WECF

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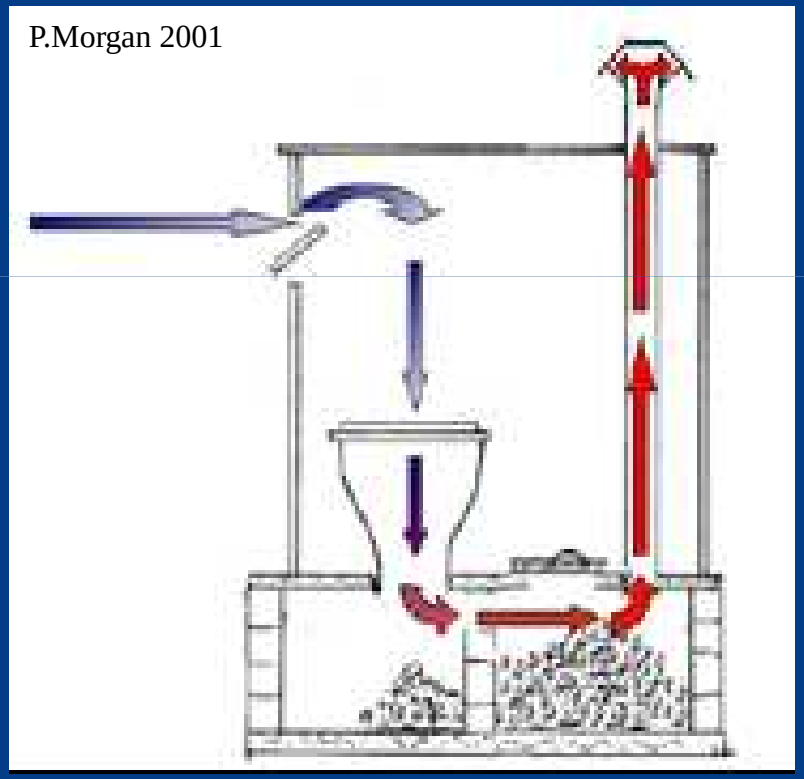
Ventilation – Entlüftung der Fäceskammer



Empfehlung:

PP Rohr 110 mm
Min. bis 30 cm über Dachkante
Abdeckung gegen Regen
Netz gegen Fliegen
Keine 90° Bögen

Ventilation – Entlüftung der Fäceskammer

Do´s

- ✔ The pipe should be as straight as possible
- ✔ Connect the two faeces chambers in such a way that only one ventilation pipe is needed
- ✔ Use black materials for the vent-pipe which absorbs heat more easily

Don´t s

- ✔ Don‘t make sharp turns in the ventilation pipe, it blocks the air flow

Ventilation – passive
Entlüftung der Fäceskammer

Uzbekistan

Ukraine

Mama86 and WECF

Ventilation – aktive Entlüftung der Fäceskammer

Elektrische Entlüftung
oder windgetrieben

Ventilation – Entlüftung der Fäceskammer

Einfache Kontrolle der Entlüftung

Composting of faeces

Nachkompostierung in Gebers, Stockholm Sweden

Composting and use of faecal matter

www.wecf.eu

Subsoil-composting

Sammlung und Lagerung von Urin

Geruchsstopp

Urin kann sehr unangenehmen Geruch verursachen – kann die Akzeptanz für Ecosan komplett untergraben

Vermeidung von Geruchsproblemen durch:

-> Technische Maßnahmen (Geruchsverschluss)

-> Reinigung und Spülung

Geruch??

Geruchsverschluss – high tech

Geruchsverschluss – low tech

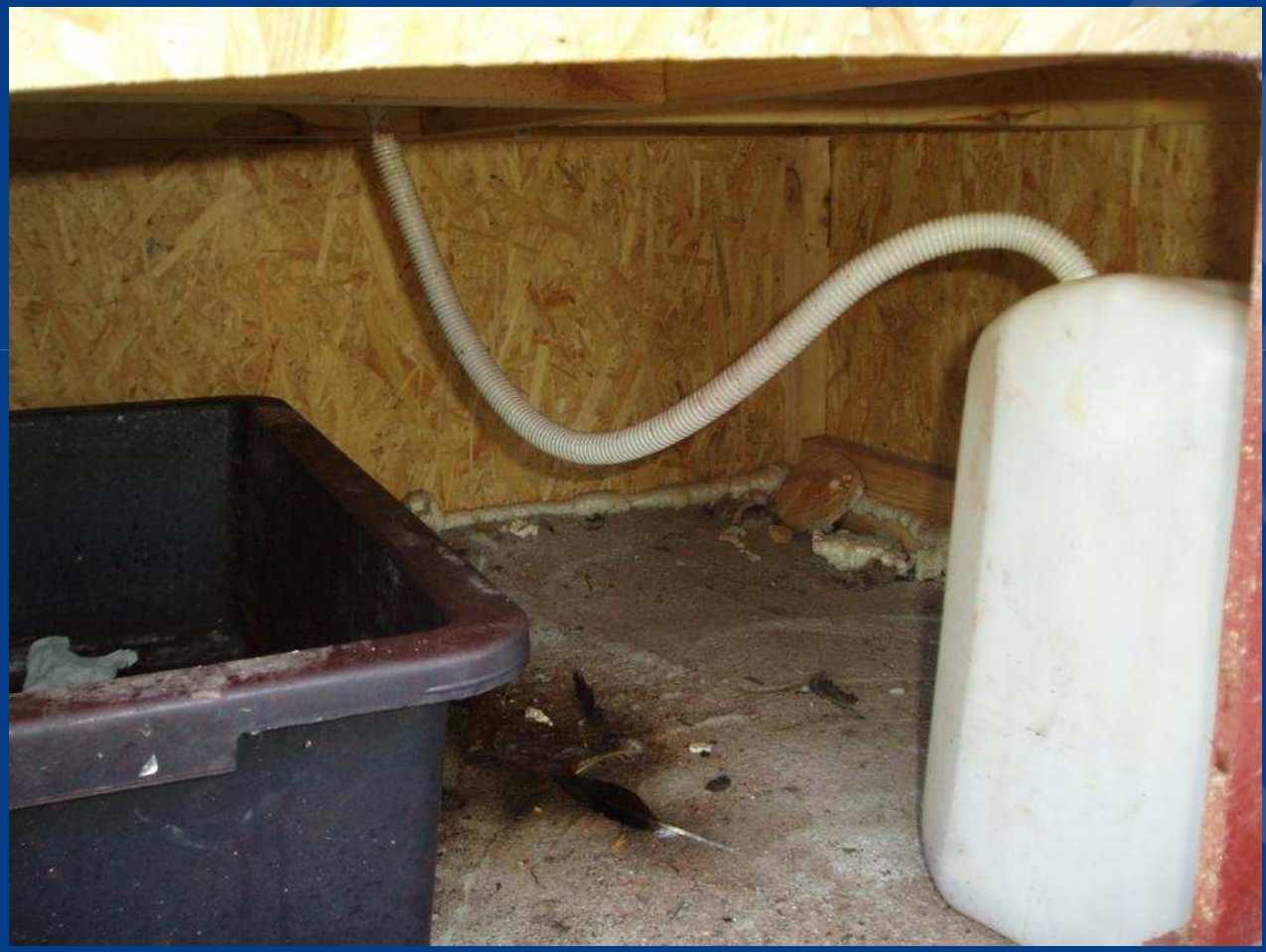
Kondom

Urinleitungen

Empfehlung:

* 50 mm Leitungen aus PP
* 1% Gefälle in den Leitungen
* Isolierung bei kaltem Klima notwendig
* Urinleitung bis auf den Boden des Urintanks führen

Typischer Fehler



Recommendations for urine – household level

If urine is used as a fertilizer of crops for household consumption only, it can be used directly without storage.

The likelihood of household disease transmission that results from the lack of hygiene is much higher than that of transmission through urine applied as a fertilizer.

Recommendations for urine in larger systems (WHO 2006)

Storage temperature	Storage time (months)	Possible pathogens in the urine mixture	Recommended crops
4°C	> 1	Viruses, protozoa	Food and fodder crops that are to be processed
4°C	> 6	Viruses	Food crops that are to be processed, fodder crops*
20°C	> 1	Viruses	Food crops that are to be processed, fodder crops*
20°C	> 6	Probably none	all crops**

- Urine or urine and water. When diluted, it is assumed that the urine mixture has a pH of at least 8.8 and a nitrogen concentration of at least I g/1.
- Gram-positive bacteria and spore-forming bacteria are not included in the underlying risk assessments, but are not normally recognized as a cause of any infections of concern.
- A larger system in this case is a system where the urine mixture is used to fertilize crops that will be consumed by individuals other than members of the household from whom the urine was collected.

* Not grasslands for production of fodder.
** For food crops that are consumed raw, it is recommended that the urine be applied at least one month before harvesting and that it be incorporated into the ground if the edible parts grow above the soil surface.

Urintanks in Haushalten

Welches Volumen gewählt wird, ist in erster Linie eine Handlingfrage:

- Wann wird der Urin genutzt?
- Wie oft kann der Urintank geleert werden?
- Wer leert den Urintank, wird eine Pumpe gebraucht?

Urintanks in Haushalten

Ukraine
WECF und
Mama86

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Urintanks in Haushalten

Kyrgyzstan
WECF und KAWS

www.wecf.eu

Urintanks in Schulen - Auslegungsgröße

No of users	Volume of urine tanks [m³]
50	2*0,75
100	2*1,25
200	2*2,5
300	2*3,75
400	2*5
500	2*6,25
600	2*7,5
800	2*10
1000	2*12,5

The recommended volumes are schools where the pupils attend the school in average 5 hours per day, 5 days a week and 9 months per year

Siehe http://www.wecf.eu/download/2009/wecf_school_sanitation_english.pdf

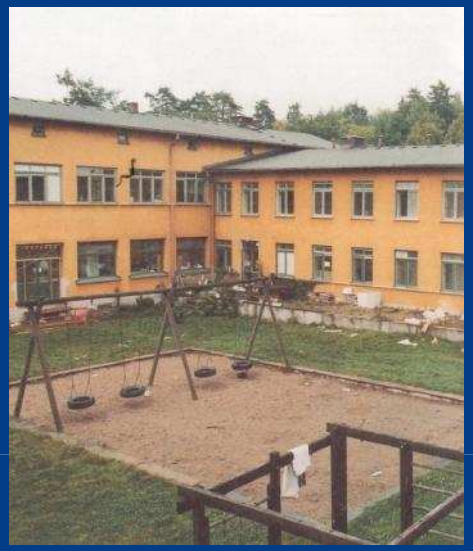
Rumänien - Schule

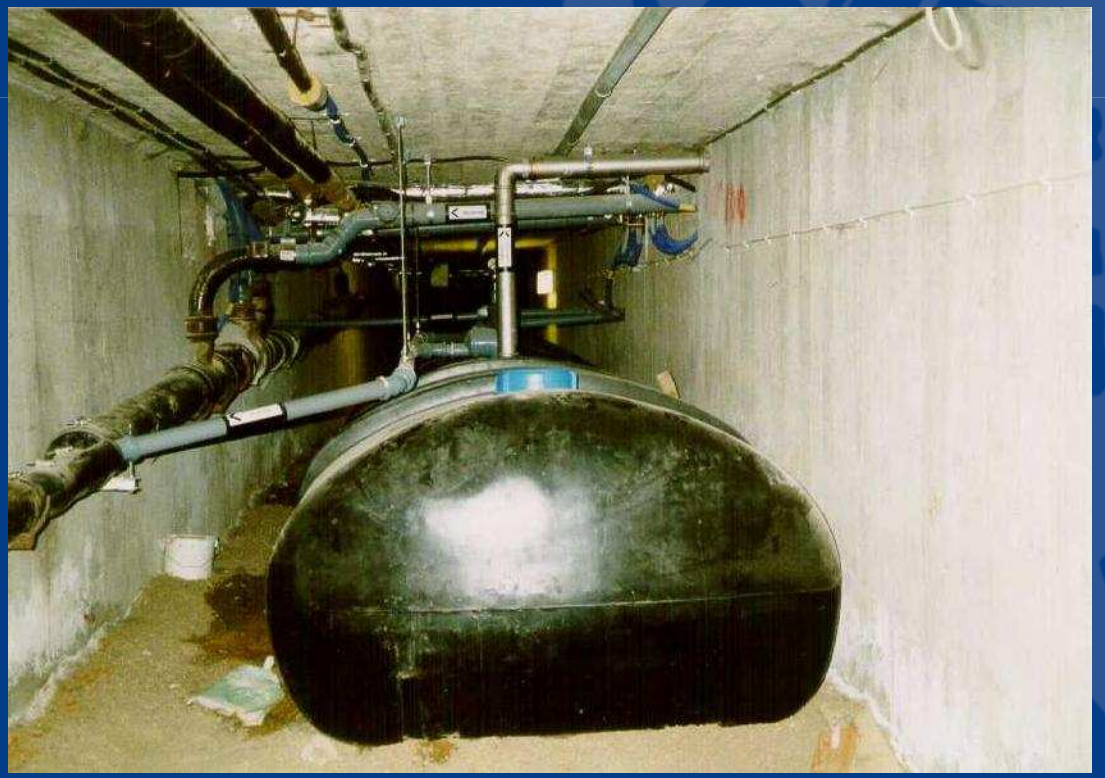
Doppelkammer-
GFK-Tank

Urinleitungen in Schultoiletten

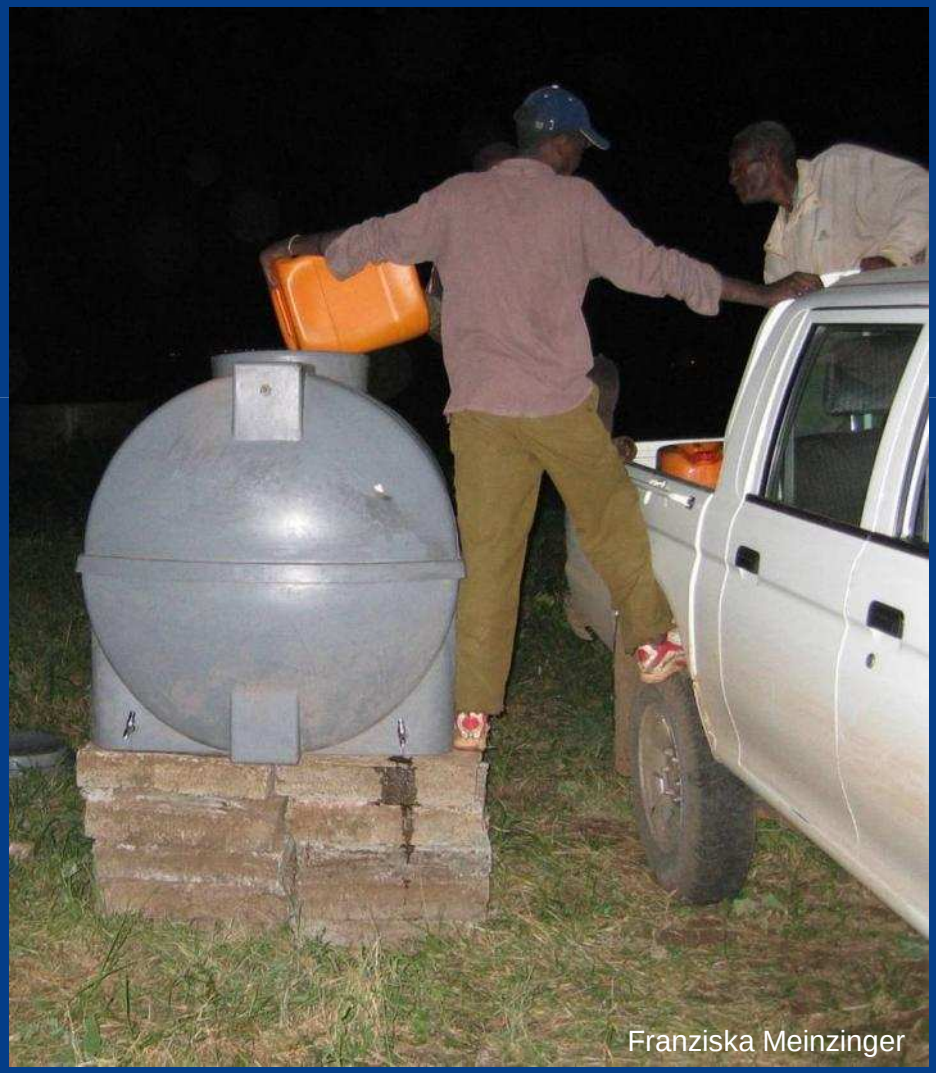
Urinleitungen in Schultoiletten

Gebers, Stockholm Sweden





Äthiopien



Lagerung zentral
beim Landwirt

Applying urine as liquid fertiliser

Urine is rich in nitrogen, phosphorus, potassium and micro nutrients

WECF Broschüren zum Download

Ecosan Guide

http://www.wecf.eu/download/2008/2008_10_ecosan_guide_engl.pdf

Manual how to construct a UDDT for households

http://www.wecf.eu/cms/download/urine_divert_toi.pdf

Sustainable School Sanitation

http://www.wecf.eu/download/2009/wecf_school_sanitation_english.pdf

Ecological Sanitation and Associated Hygienic Risks

http://www.wecf.eu/cms/download/2007/WP_63b_web.pdf

Urine – the yellow gold

http://www.wecf.eu/download/2010/08/frWEB_WECF_Urine_Flyer_25August.pdf

Compost – the black gold

http://www.wecf.eu/download/2011/March/WECF_Kompostflyer_web.pdf

Let´s cooperate!

Claudia.Wendland@WECF.eu

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