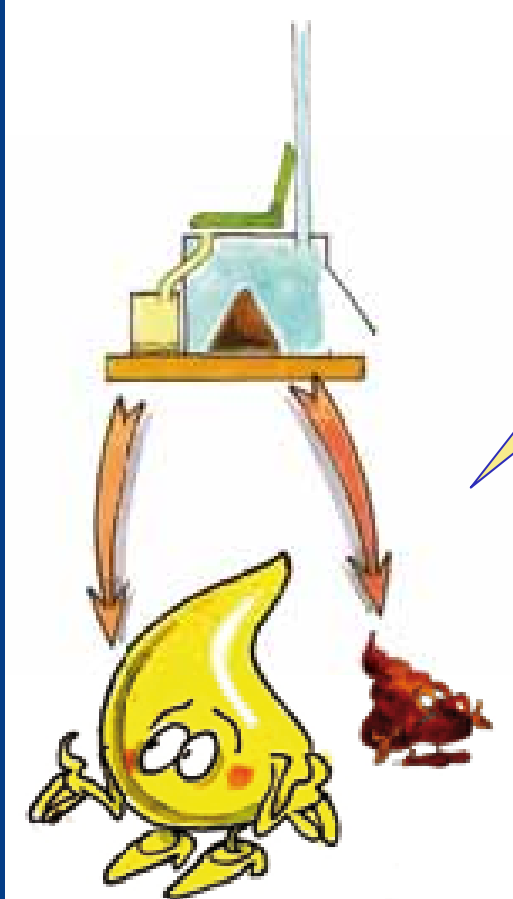


*Why should we mix what  
Nature did separate?*



# Trockentrenn- toiletten (UDDT)

Claudia Wendland  
Stefan Deegener  
Fedde Jorritsma

# WECF

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## Trenntoilettendesign

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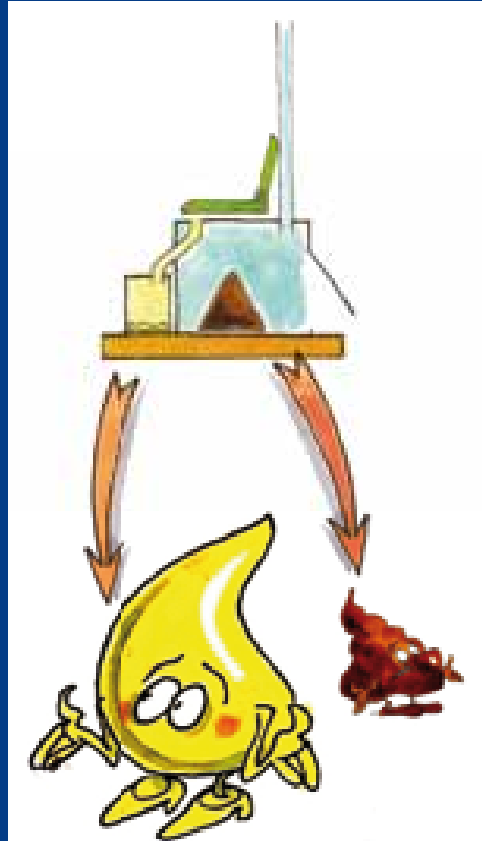
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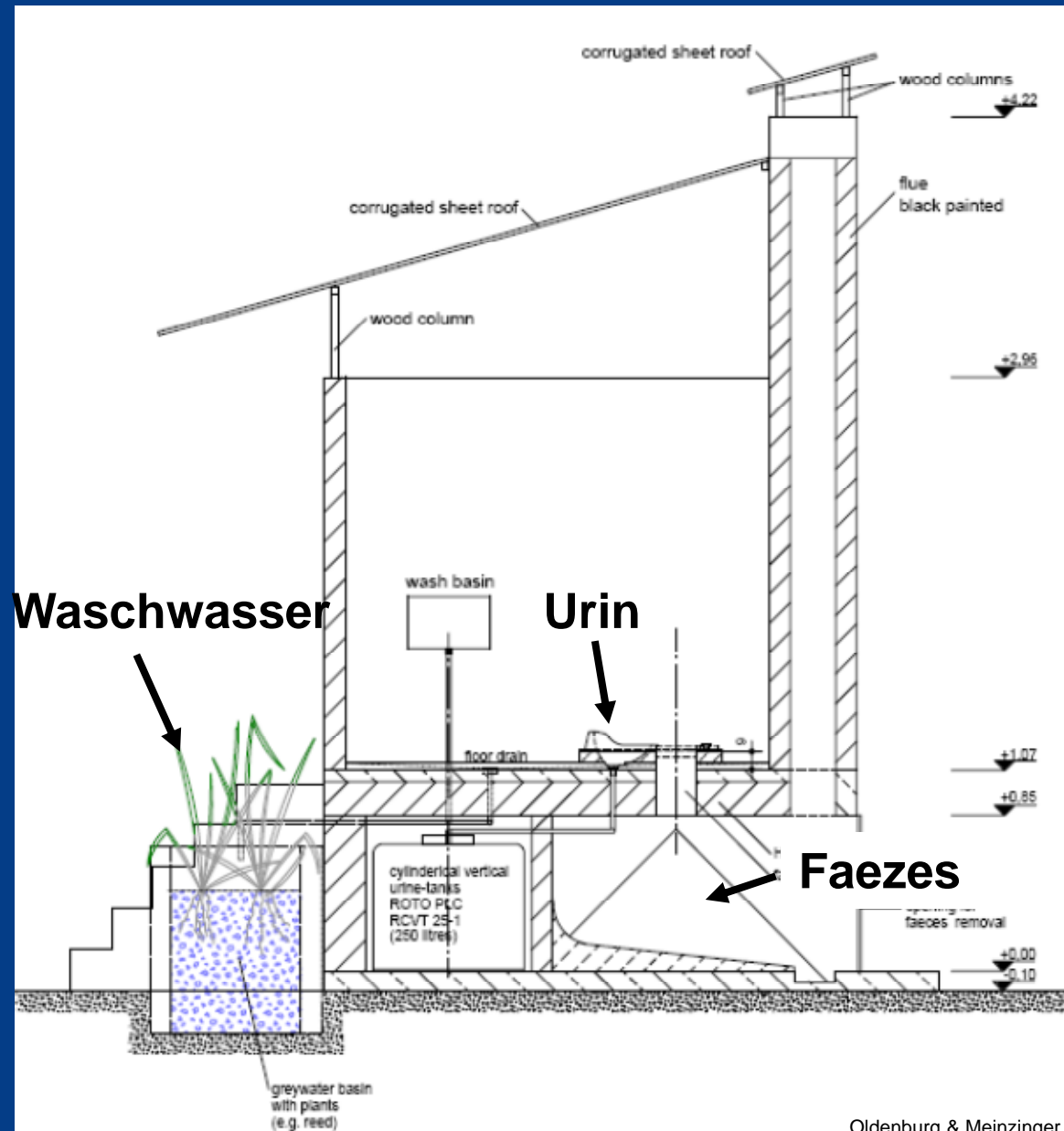
Geruchsstopp

Urinleitungen und -tanks



# Trenntoiletten- design

# Trockentrenntoilette Schema



# Different constructions of outdoor or adjacent toilet buildings



[www.wecf.eu](http://www.wecf.eu)

Mama86 and  
WECF, Ukraine

# Different constructions of indoor toilets



Mama86 and WECF, Ukraine



Hand wash basin in Moldova with water reservoir



RCDA and WECF, Georgia

# 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





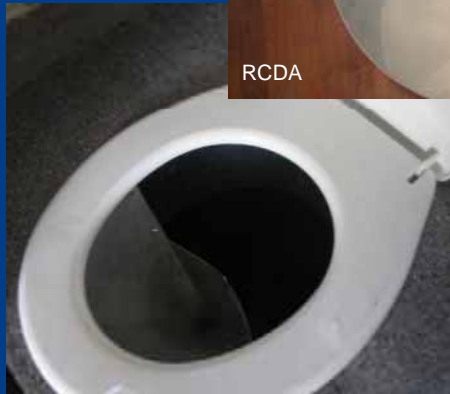
# Betontoilettenbau in Kirgistan

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 Kyrgyzstan



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

DIES MÄRCHEN WIRD  
WOHL NIEMALS WAHR



*Wir arbeiten  
dran !*

# WHO guidelines 2006

**World Health Organization**

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

Third Edition

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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.

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- Volume 4, Excreta and greywater use in agriculture

[http://www.who.int/water\\_sanitation\\_health/wastewater/gsuww/en/](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 <i>E coli</i> and <i>Salmonella</i> 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		Time modification needed based on local conditions. Large systems needs a higher level of protection. Than at household level. Additional storage adds to safety
Ambient temperature 2-20°C	1.5 - 2 years	
Ambient temperature 20-35°C	> 1 year	



# Einkammersystem für Fäces



# Gebers, Stockholm, Sweden



# Ukraine/ Kyrgyzstan



Mama86 and WECF

# Zweikammersystem für Fäces



Tajikistan and Kyrgyzstan

# Zweikammersystem für Fäces

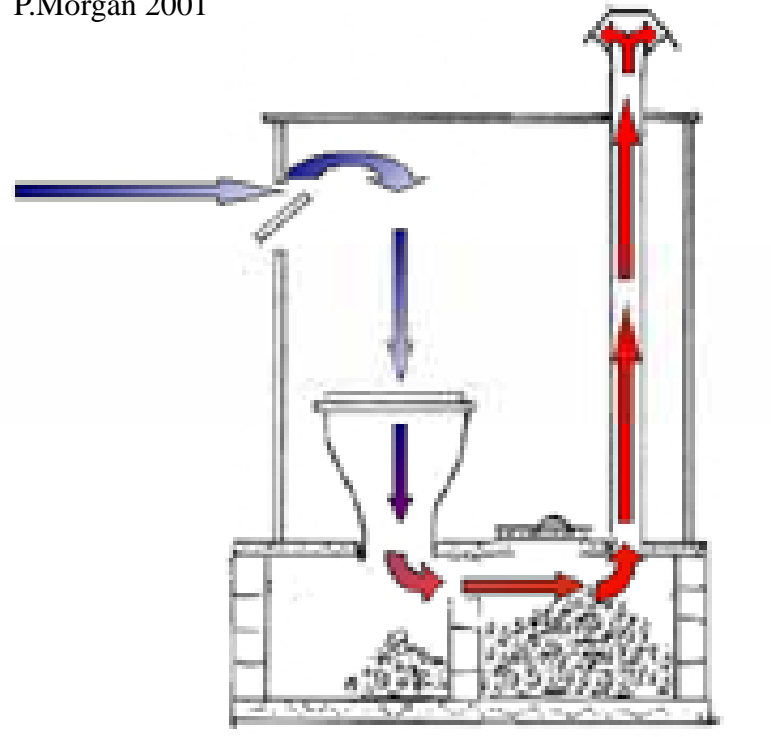


Mama86 and WECF



# Ventilation – Entlüftung der Fäceskammer

P.Morgan 2001



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



# 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 1 g/l.
- 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



# Urintanks in Haushalten



Kyrgyzstan  
WECF und KAWS



# Urintanks in Schulen - Auslegungsgröße

No of users	Volume of urine tanks [m <sup>3</sup> ]
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 for schools where the pupils attend the school in average 5 hours per day, 5 days a week and 9 months per year

# Rumänien - Schule

Doppelkammer-  
GFK-Tank



# Urinleitungen in Schultoiletten



# Urinleitungen in Schultoiletten



# Gebers, Stockholm Sweden





# Äthiopien

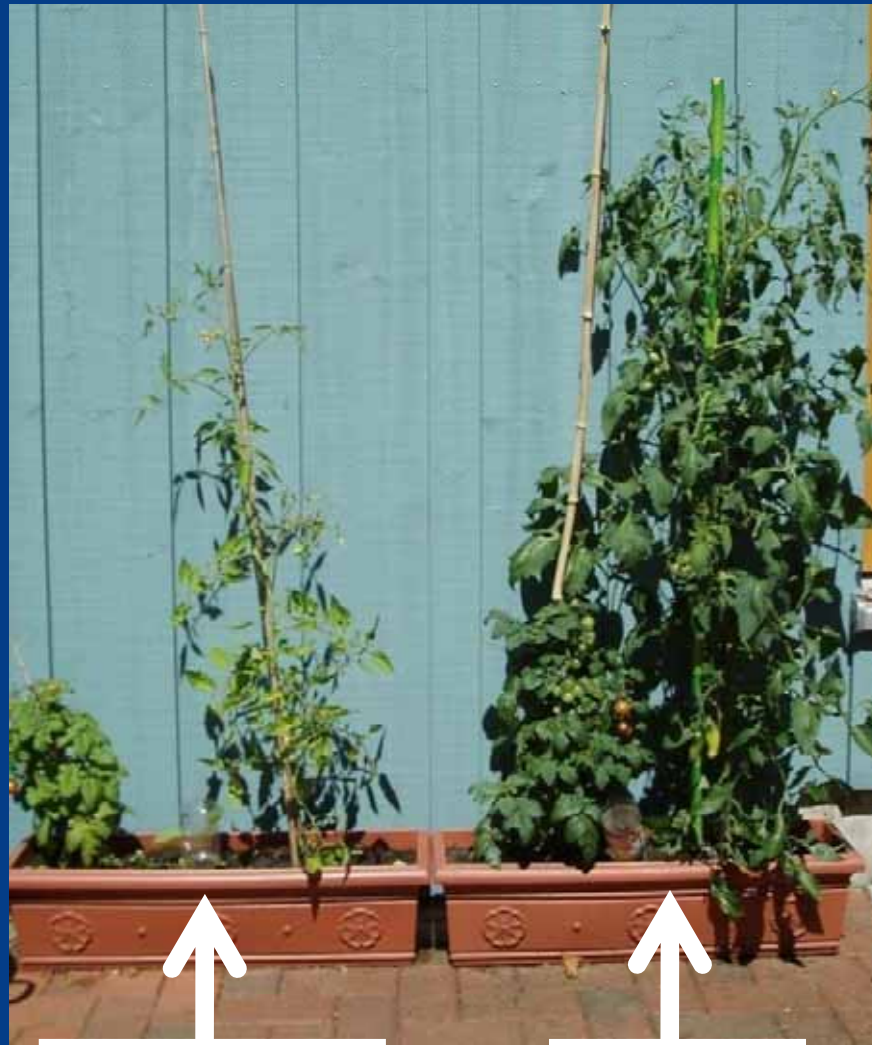


Franziska Meinzinger

Lagerung zentral  
beim Landwirt

# Applying urine as liquid fertiliser

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



without urine

with urine



# WECF Broschüren zum Download

## Ecosan Guide

[http://www.wecf.eu/download/2008/2008\\_10\\_ecosan\\_guide\\_engl.pdf](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](http://www.wecf.eu/cms/download/urine_divert_toi.pdf)

## Sustainable School Sanitation

[http://www.wecf.eu/download/2009/wecf\\_school\\_sanitation\\_english.pdf](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](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](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](http://www.wecf.eu/download/2011/March/WECF_Kompostflyer_web.pdf)



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