

# Sustainable Innovations; why to develop water resources

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Sustainable Innovations Academy, 21-2-2013

Surpassing sacrifice of wealth is sacrifice of wisdom,  
for every action totally is perfected in wisdom  
(Parrinder, 1996 translation of Bhagavad Gita 4:33)

# Adding value to water

Water is available (even in deserts)

97.5% is salty or deep, 2.5% is fresh on surface

70% of the fresh surface water is ice or moisture

< 1% of all water is the accessible fresh water

> 90% of the accessible fresh water just passes,  
but > 90% of the passing water is now misused

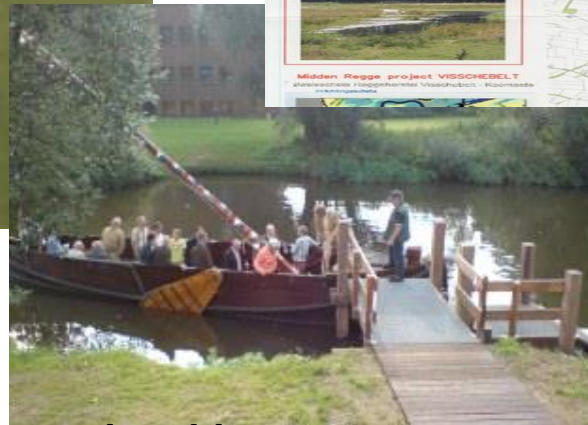
Plenty of reasons not to misuse this resources

# River revitalization

**Regge: citizens' participation in flood prevention with regional development**



**Old meander and new waterbed**



**Wetland boats**



**Walking along marsh**

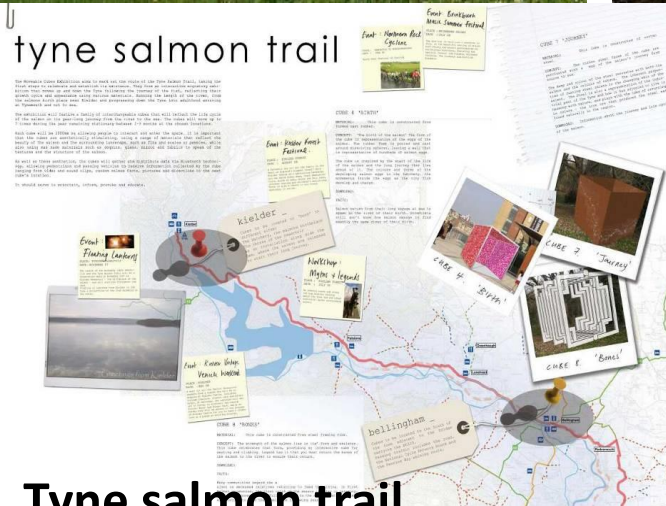


# On the way with ICT

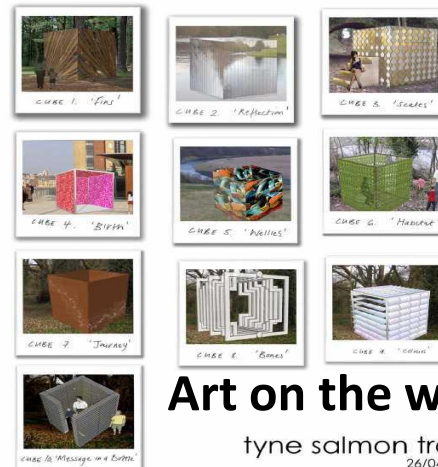
## Norwich surrounding: real and painted



tyne salmon trail



Tyne salmon trail



Art on the way

tyne salmon trail  
26/04/07

xsite

## Experience exchange



Pump station

# Sportive along river

With a ship upstream



100 km from the  
City to  
mountains



Use of lights to mark historical  
and natural qualities



Skien in Norway

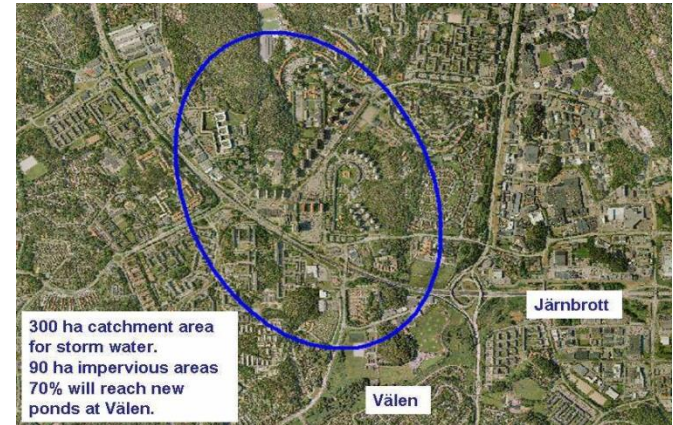




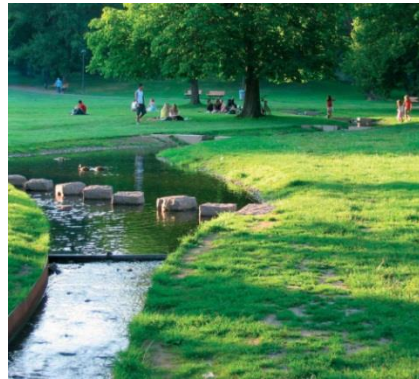
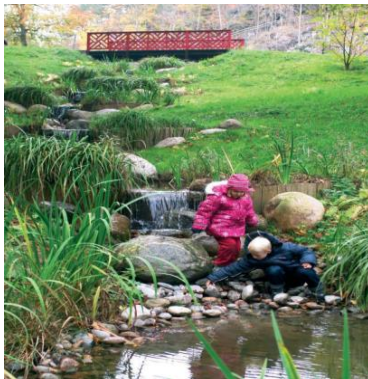
# Water for diversity



Goteborg (SE)



Art and nature in the park



Water en nature on the crossroads



30- 50 % metal reduction



# Cruising and hiking



sensing



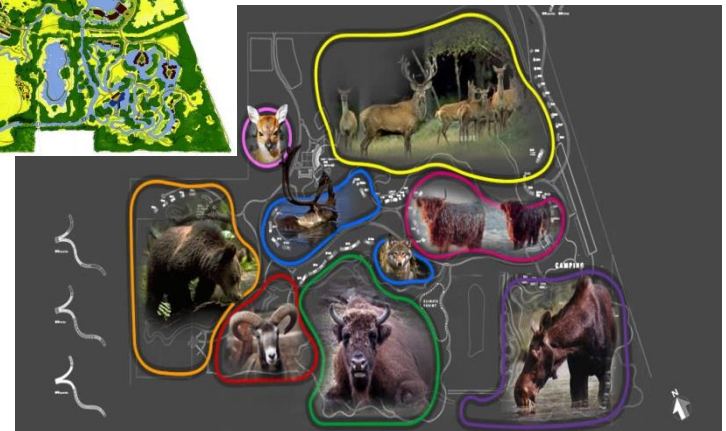
Electric fleet



Solar boat for bikes



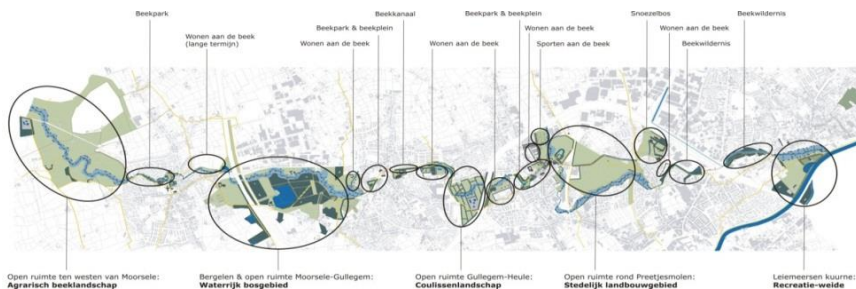
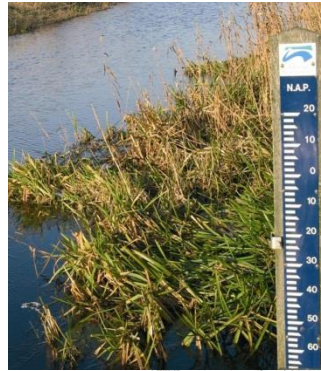
Wildlife  
ParkResort





# Buffers against floods

## Peize plan: combines nature and water storage on 2000 ha



**Kortrijk plan: green corridor met buffers  
contra flooding (BE)**

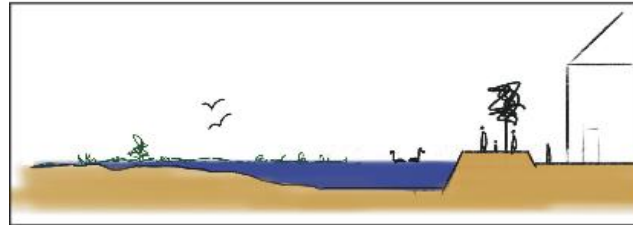




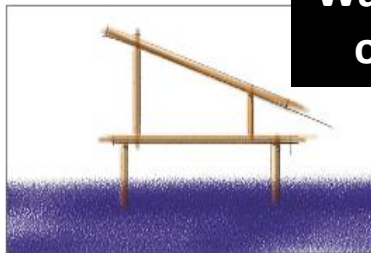
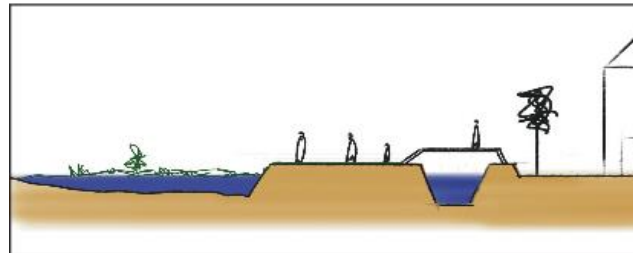
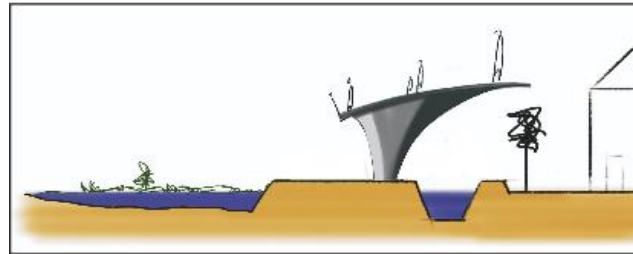
# View on City development



**Water and roads**



**View on the city  
and suburbs**



**Watch tower  
on water**



**Watch tower  
on land**



# Infrastructure



**Sluice**



**Bridge**



**Pump station museum**



**Dike**

**Aquaduct**





# Sanitation

Rooftop

Living space

Work space



irrigation, parks, playgrounds, nature, fodder, energy





# Floating houses



**Floating house: Arie  
Taal Amsterdam**



**Floating house , Rotterdam  
van Buren**

**GeWoonboot: water and  
energy self-sufficient**



**Brockholes Village  
(UK), Khan**



**Floating house in  
Amsterdam Ijburg  
Jan Elferink**





# Boats



**Solitair**



**IJscoman**

**Speed boats  
solar power  
(Czeers, NHL)**



**Sailing boat: only sun  
and wind (Hoorra)**



**Submarine  
and scooter**



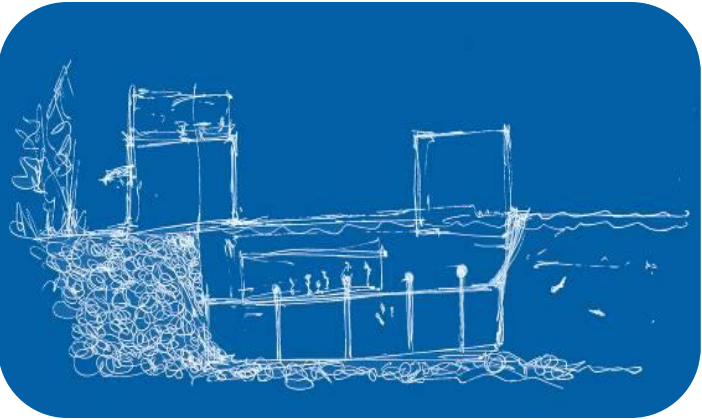
**Sea tour solar power yacht**



**Electric sailing**

# Musea

**Art impressie underwater Fryslan**



**Underwater museum  
Cancun (ME)**



**Herod castle in  
Cesarea (IS)**



**Biosphere in Montreal (CN)  
Water Wonders exhibition**



**Watermuseum Park  
Sonsbeek (Arnhem)**





# Concerts on water



**Blues drive in Giethoorn**



**Classic concert**

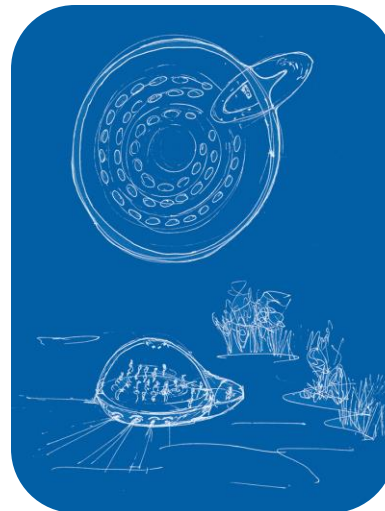


**Opera**



**Pampus kids festival,**

7/14/2014



**Floating  
concert  
hall**

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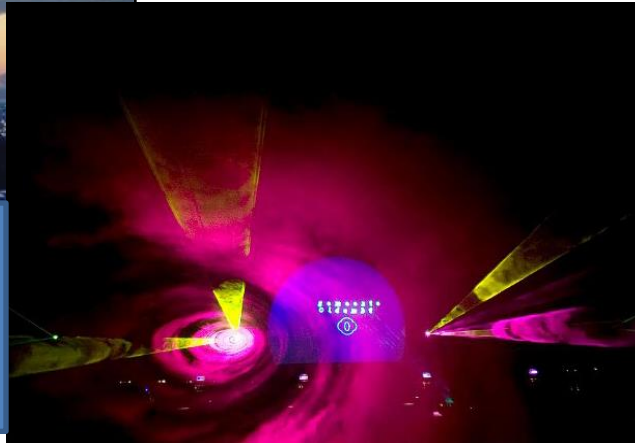


**Silent disco**

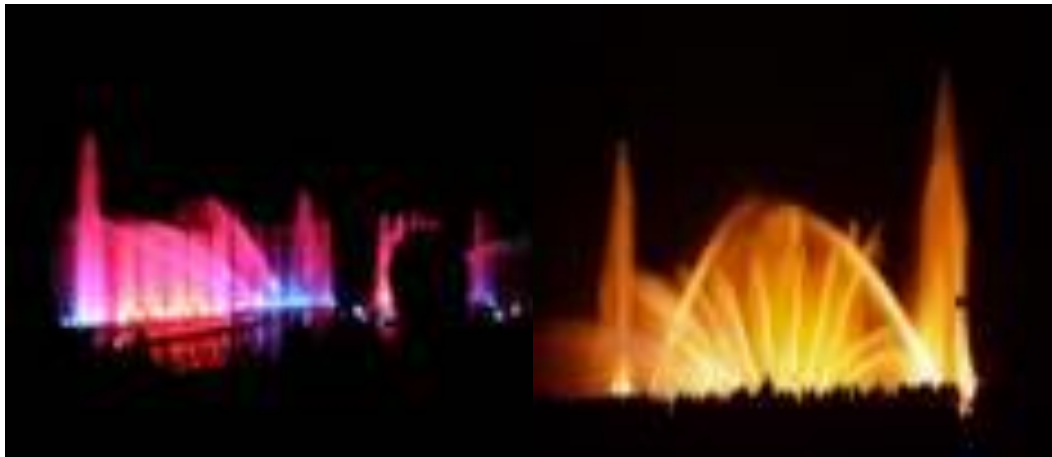
# Watershow



**Sail-in film and  
laser show**



**Music and lightshow  
Sat-Chit-Anand (IN)**



**Music and lightshow Hamburg (D)**

**Acrobatics  
(Macao CN)**





# Hospitality



**Underwater restaurant  
(Malediven)**



**Hotel accommodation (Daniel Andersson)**



**Wellness centers in Amsterdam (art impression)**



# Children playing



**Rolling**



**Chilling**

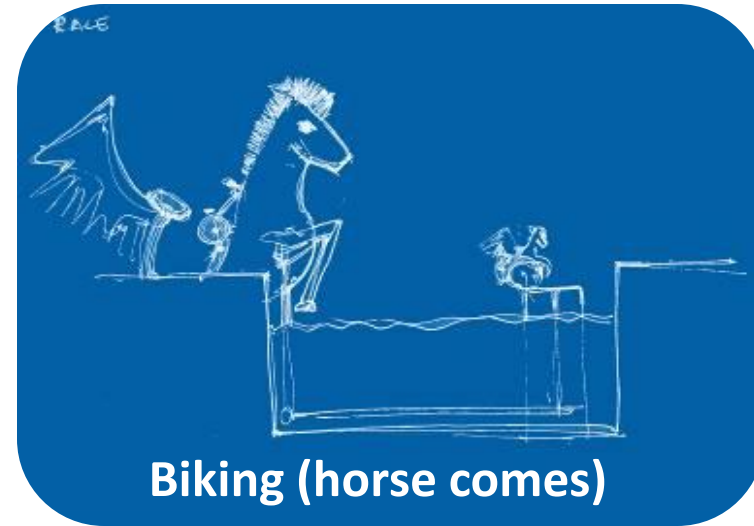
**Gliding**



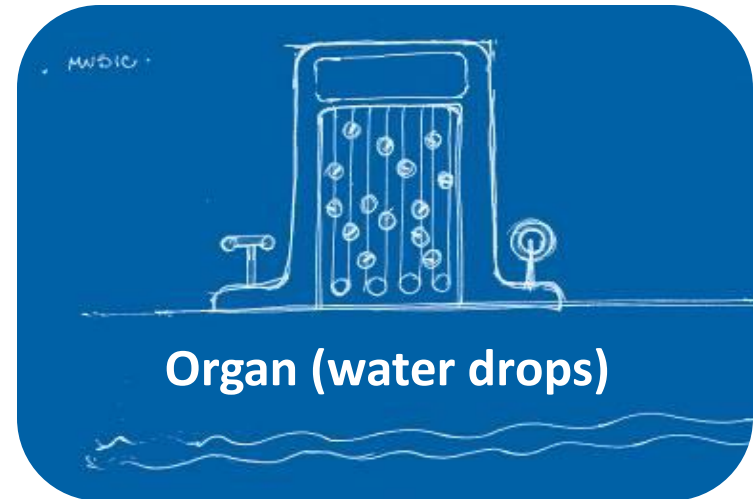
**Balling**



**Floating**



**Biking (horse comes)**



**Organ (water drops)**



# In house

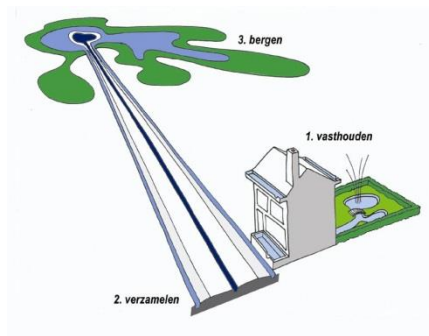
**Vegetation roof**



**Rain for gardening**



**Water recycling in a district**



**Fontain**





# Around house



**Rain water for playing (Malmo, SE)**



**Nijmegen**



# Arts

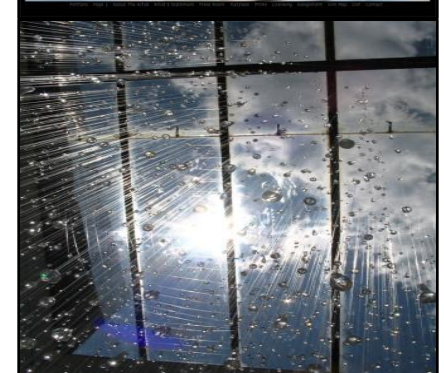


Ice sculpture with earth heat

Forms, sculptures,  
photos, water and fire.



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# Music

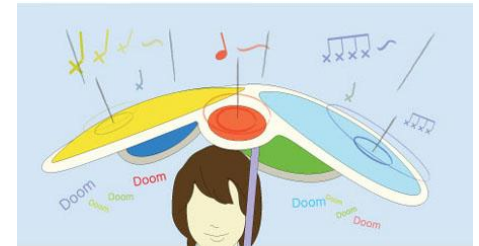
**Glaswaterharp**



**Duo**



**Hydraulophon**



**Umbrella**



**Singing tree Tonkin Liu**

7/14/2014



**Woodwater, hydraulic hyperinstrument**

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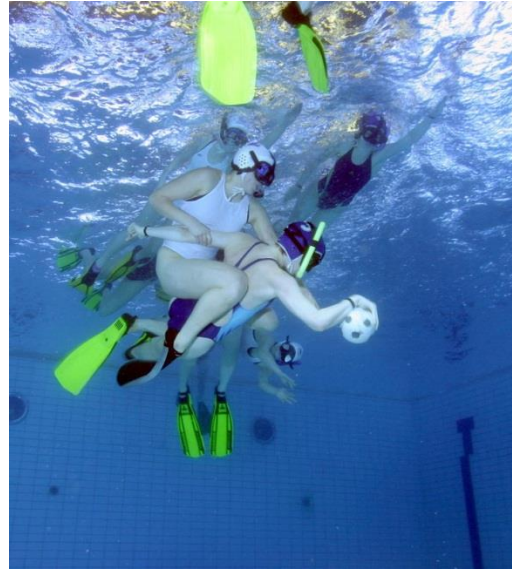
**Singing float (Hoite Pruiksmá)**



# Sport



Flierjeppen (renewed)



Aqua rugby

Water walking

Water sprint: on, under en over



Water biking



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# Animals and plants

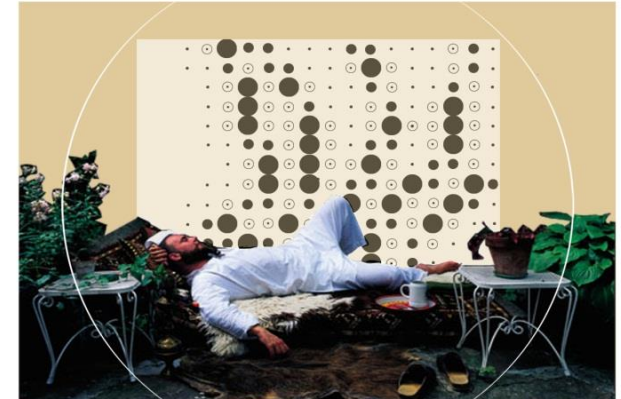
## Dos Winkel sea photography



**Symbiosis**



**Patterns with sensors**

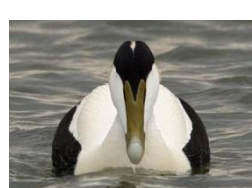


**Art impression of nature reserve**

**Over**

**In**

**On**

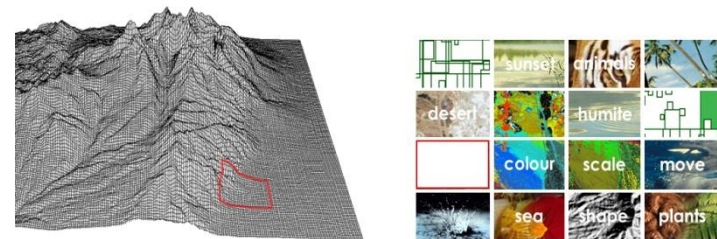


**On**

**At**

**In**

**Hortus  
on water**

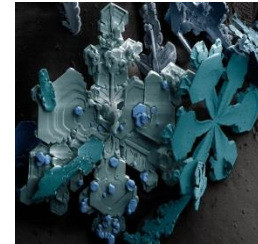


**living sensory map (Chris Ryan)**



# Personalities

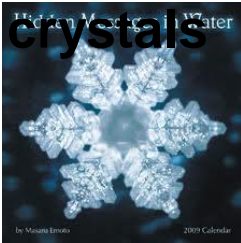
## Snow and ice



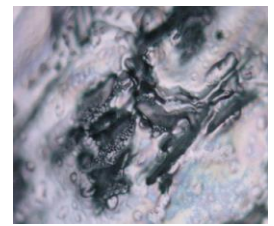
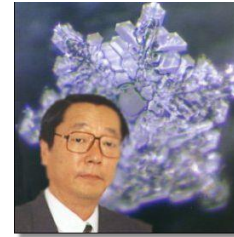
## Distortions



## Masaru Emoto: water crystals



Japanese Folk Dance Music



## Rain drops



And many more



# Beneficial sanitation

Most people cannot bear:

- A few months without sex
- A few weeks without food
- A few days without drinking
- A few hours without sanitation

Why do we bother so little about Pooh and Pee?

- a. My presentation of a net beneficial sanitation
  - b. Your innovations proposals for sanitation in slums
  - c. Today slum visit, you present proposals on Friday
- Prof. Shyam Asolekar guidance

# Beneficial sanitation

## using BrinkVos vertical flow phytosanitation

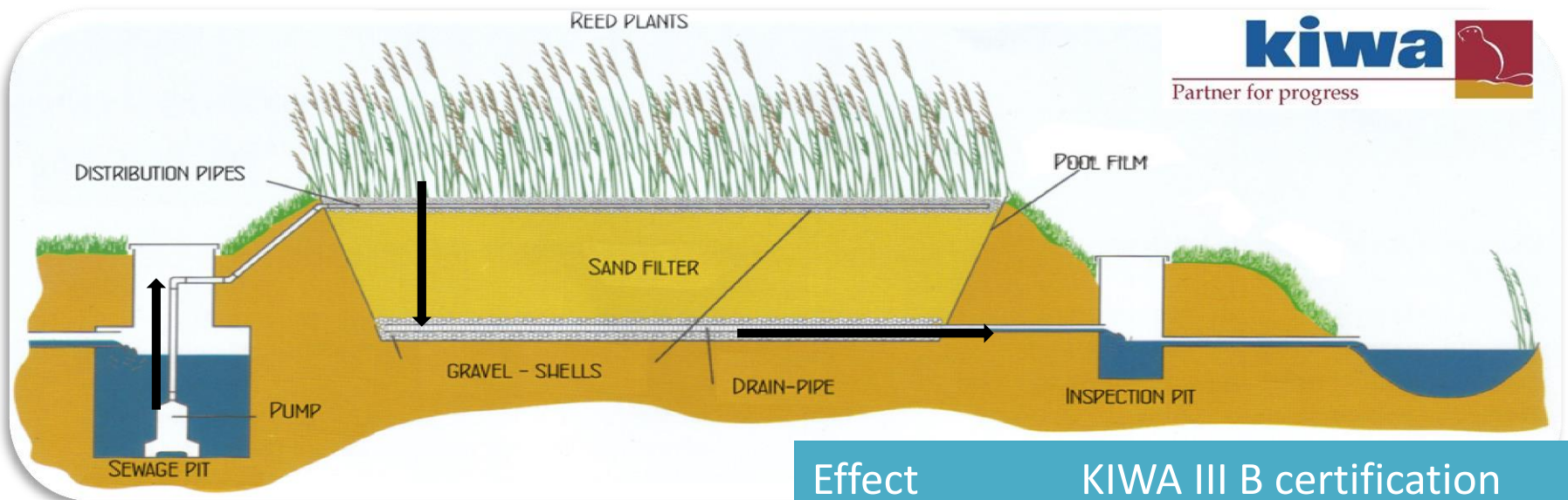
A co-operation between BrinkVos water BV  
(Tinus Vos) and University Twente (Yoram  
Krozer with assistance of SIA)



# BrinkVos water and SIA

- Small Dutch company specialized on water purification in a natural way (phytosanitation)
- A few thousands projects in the Netherlands are realized ([www.brinkvoswater.nl](http://www.brinkvoswater.nl))
- Projects abroad: in start up in Ukraine and Brazil, opportunities in India, Spain, South Africa.
- Co-operation of University Twente, BrinkVos, SIA aims to develop net beneficial sanitation

# Certified performance



- ✓ Safe and clean environment
- ✓ Easy spatially adaptable
- ✓ Low energy (3 kwh/p a year)
- ✓ Low maintenance (robust)
- ✓ Can be small and large scale
- ✓ Accepts peak load and frost

Effect	KIWA III B certification	
	mg/l	Criteria
COD	100	17
BOD	20	3
N-Total	30	18.2
NH4-N	2	0.4
P- total	3	0.09
TSS	30	2.2



# Goals of sanitation

- Attaining world top standards
- Social benefit instead of a cost
- Useful for citizens and industries
- Easy to construct and maintain
- With regards to nature and beauty

Hundreds installations in the Netherlands,  
a few examples...

# Rural areas

A farm



Integrated sanitation in landscape



Swimming pool





# Urban areas

An office  
ca. 250  
staff



Newcomers unaware of  
sanitation



Flats  
ca. 500  
units



# Industrial areas

Expo  
roof



Green spaces at  
industries



A poly  
styren  
e  
factory



# Wetland creation

For surface - and  
groundwater  
intake



Urban biodiversity  
development



For run-off  
from  
industries

# Value adding services

- Avoiding constructions and energy use
- Avoiding sewage and effluent fees
- Water reuse for gardening, fishery and irrigation
- Local, urban parks and playgrounds for kids
- Education about nature and biodiversity
- Crops for fodder, energy and beautification



7/14/2014

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# Costs and Benefits with Dutch data

In 1000 euro	Houses: black water	Wetland: industry water
persons	500	
water use m3/d	80	2,000
filter area in m2	1,500	8,000
investment	120 - 140	110 - 160
annual costs (high assumptions)		
capital	(21)	(18)
manpower	(13)	(12)
land and energy	(16)	(45)
Total cost	(49)	(75)
annual benefits (low assumptions)		
saved effluent fees	33	98
saved water use	9	32
services	24	
Total benefit	66	131
<b>Net (payback)</b>	<b>17 (2,1)</b>	<b>56 (0.8)</b>

Thank you for your patience