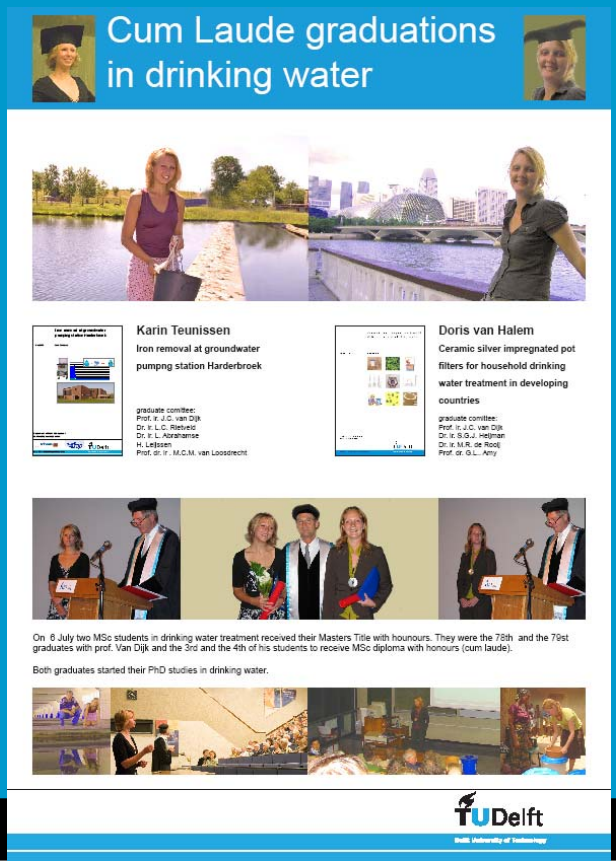
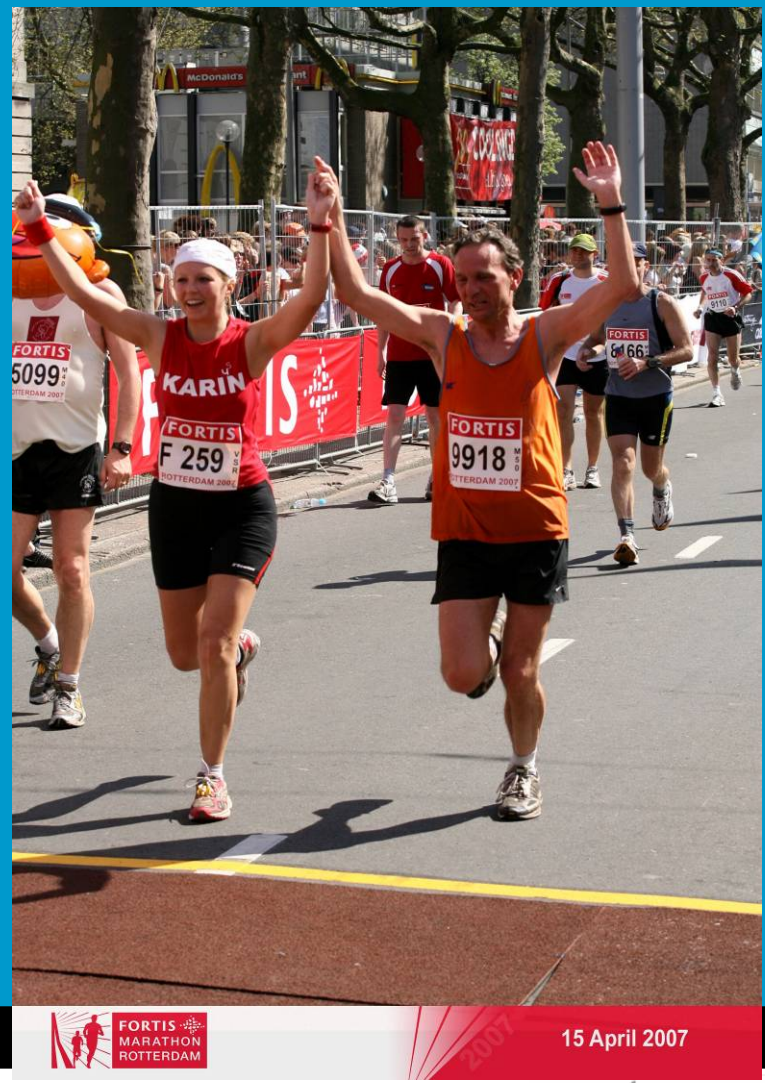
Civiele Gezondheidstechniek

Prof. Hans van Dijk





Afdeling Watermanagement
Sectie Gezondheidstechniek

TU Delft
Technische Universiteit Delft

Overzicht 3011 , deel Gezondheidstechniek

- Boek Drinkwater-principes en praktijk verkrijgbaar bij Mieke Hubert, kamer 4.55
- Vraagstukken in boek
- Computer assignments op blackboard
- Oude tentamens op blackboard
- 7 colleges conform schema

Drinkwater- principes en praktijk

Gezondheidstechniek	3011
Drinkwaterbedrijven	3011
Planning en ontwerp	3420
Financiën	3420
Waterverbruik	3011
Waterkwaliteit	3011
Grondwater	3420
Oppervlaktewater	3420
Distributie	3011

Colleges

- 27 sept. Inleiding gezondheidstechniek
- 1 okt. Waterkwaliteit 1: eisen/micro
- 4 okt. Waterkwaliteit 2: natuur/chemie
- 8 okt. Drinkwaterbedrijven 1: grondwater
- 11 okt. Drinkwaterbedrijven 2: oppervlaktewater
- 15 okt. Waterverbruik
- 18 okt. Distributie

Excursie naar de Berenplaat op 11 oktober na college

Wat is Gezondheidstechniek?

grondwater

drinkwater

riolering

afvalwater

oppervlaktewater

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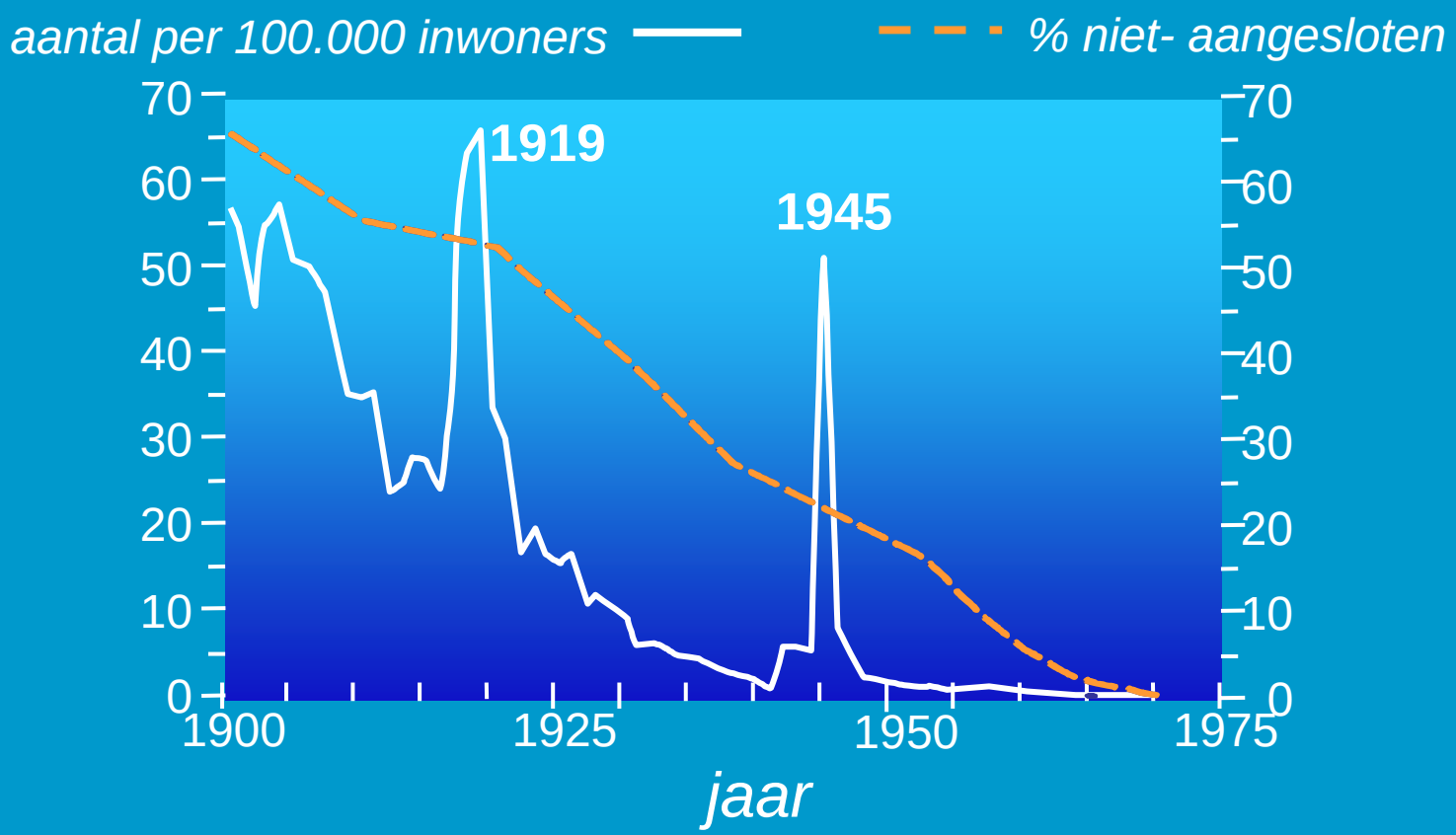
Schoon water voor een gezond leven..



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Wat is Gezondheidstechniek?

Goede waterkwaliteit ten dienste van mens en milieu

Kennis van:

- waterwinning
- waterzuivering
- watertransport
- waterchemie
- microbiologie

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Wat is Gezondheidstechniek?

Gezondheidstechnisch ingenieur maakt gebruik van kennis van:

- hydraulica
- hydrologie
- constructieve vormgeving
- informatica
- projectrealisatie

Wat is Gezondheidstechniek?

- van groot belang voor de volksgezondheid
- grootschalige gespecialiseerde infrastructuur
- goed georganiseerde sector met heldere taken

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Drinking water and Delft

75th MSc graduate in drinking water (1991-2006)

Graduates with prof. ir. J.C. van Dijk:

1991	Gertjan Schers	1995	Jan Leen van der Vlies	1997	Steven Oterdoom	2002	Remco Keijser
1992	Robert Willemse	1995	Gert-Jan Schoterman	1997	Martin de Koning	2002	Angela Puts
1992	Idsart Dijkstra	1995	Marieke van Winkelen	1997	Michiel Riemersma	2002	Martijn Kramer
1993	Carel Aeyelts Averink	1995	Mireille Beumer	1997	Jonneke Klomp	2002	Guy Heijnen
1993	Jan Timmer	1995	Marc Eikens	1998	Siebe van der Zel	2004	Sawan Raktoe [2]
1993	Georgina Martinez Ortiz	1995	Edgardo Valeriano	1998	Bonne Hijlkema	2004	Michiel van der Meulen
1993	Jenne van der Velde	1995	Peter Tienhooven	1998	Alex van der Helm [3]	2004	Christiaan Kivit
1993	Peter Wessels	1996	Marc Brieskorn	1999	Jeroen Krijgsman	2005	Maarten Lut
1994	Nico Versteeg	1996	Jasper Verberk	1999	Bram Martijn	2005	Menno van Leenen
1994	Ellen van Duikeren	1996	Maarten Keuten	1999	Johan Boel	2005	Jan-Hendrik Vos
1994	Roel Bronda	1996	Piet-Hein Spaans	1999	René van der Aa [1,2]	2005	Anke Grefte [2]
1994	Patrick van der Wens	1996	Ernst-Jan Hageman	2000	Johannes Vijlbrief	2005	Sharleen Alberga
1995	Petra Holzhaus	1996	Martijn Nijsse	2000	Ignaz Worm [3]	2006	Leo Meijer
1995	David Visscher	1996	Francois v. Ekkendonk [1]	2000	Anton van Rosmalen	2006	David de Ridder
1995	Ronald van den Berg	1996	Marij Hendriks	2000	Jan Post [2]	2006	Qing Wang
1995	Hella van de Maarel	1996	Joukje Keuning	2001	Sian Gwan Tan		
1995	Örjan van Drongelen	1996	Erik Schwencke	2001	Maaike Glastra		
1995	Martijn Bakker	1996	Eelco Trietsch	2001	Pepijn Koenders		
1995	Patrick Smeets	1997	Jan-Dik Verdel	2002	Colette de Roo		
1995	Bas van Efferen	1997	Weren de Vet	2002	Michel Bretveld		

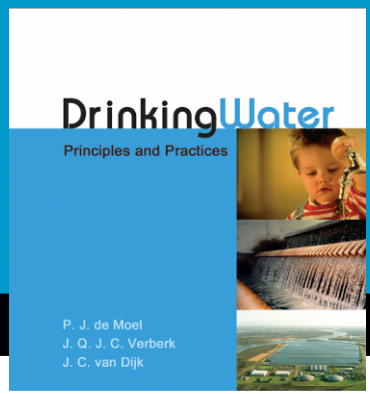
[1] Graduation with honours (cum laude)
[2] Gijs Oskam Award for best young researcher
[3] Faculty Award for best graduation

TU Delft
Delft University of Technology

28 september 2007

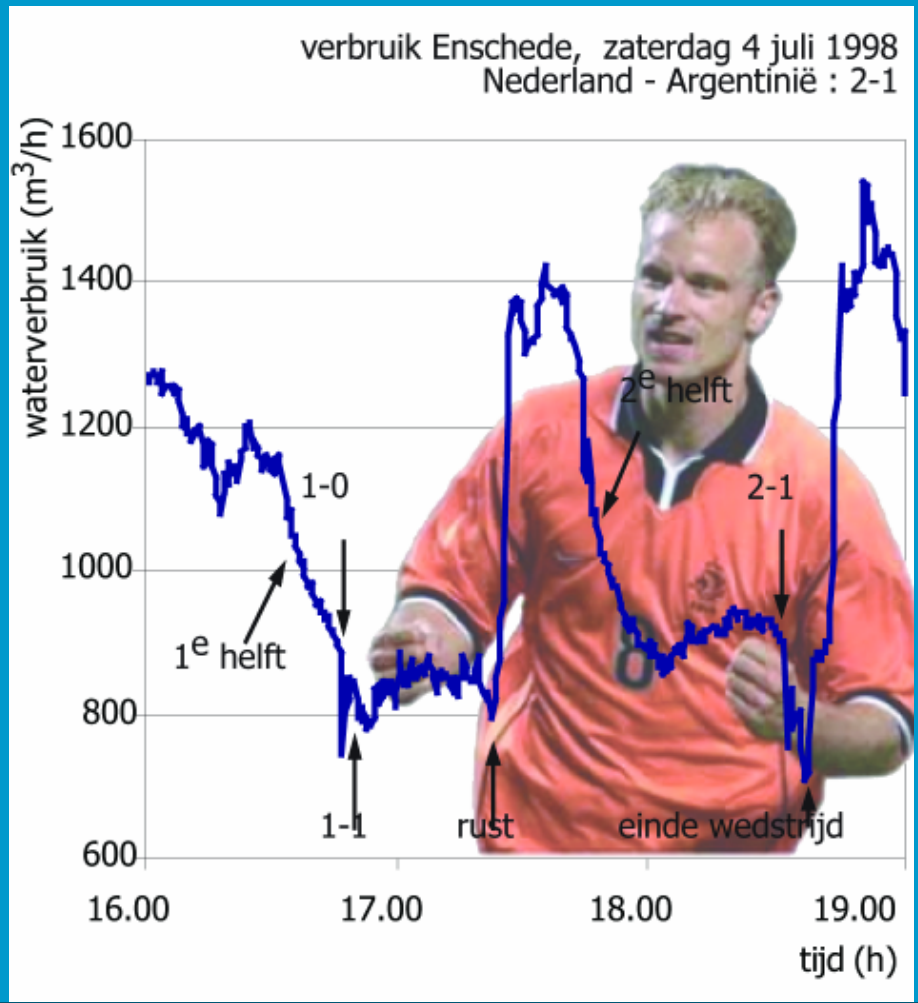
Celebrating the completion of design course

Crown Prince Willem-Alexander during a guest lecture at TU Delft



PhD graduation of Jasper Verberk (2005)

Wat doet een waterleidingingenieur?
Studies



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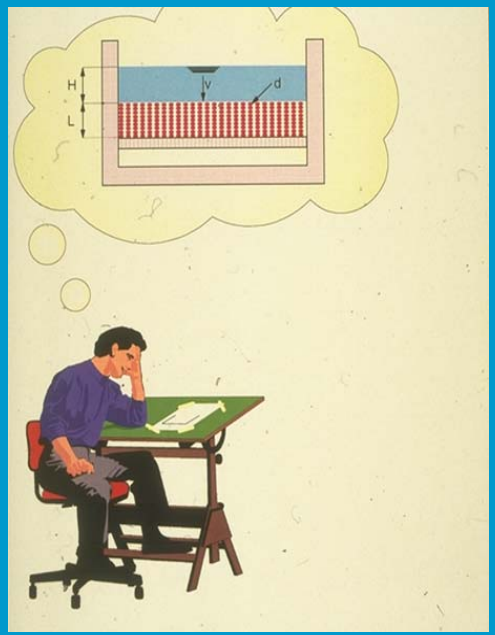
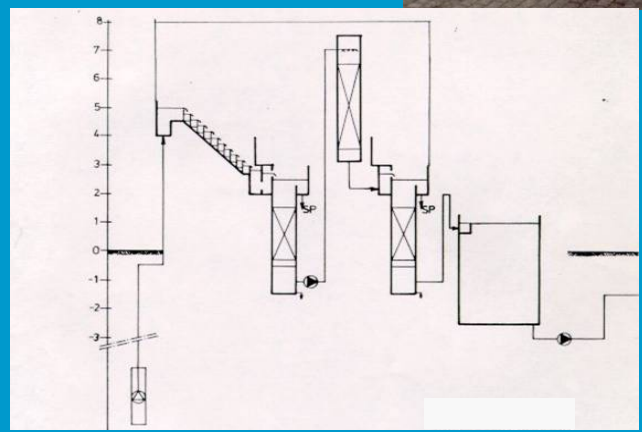
Wat doet een waterleidingingenieur?
Ontwerpen





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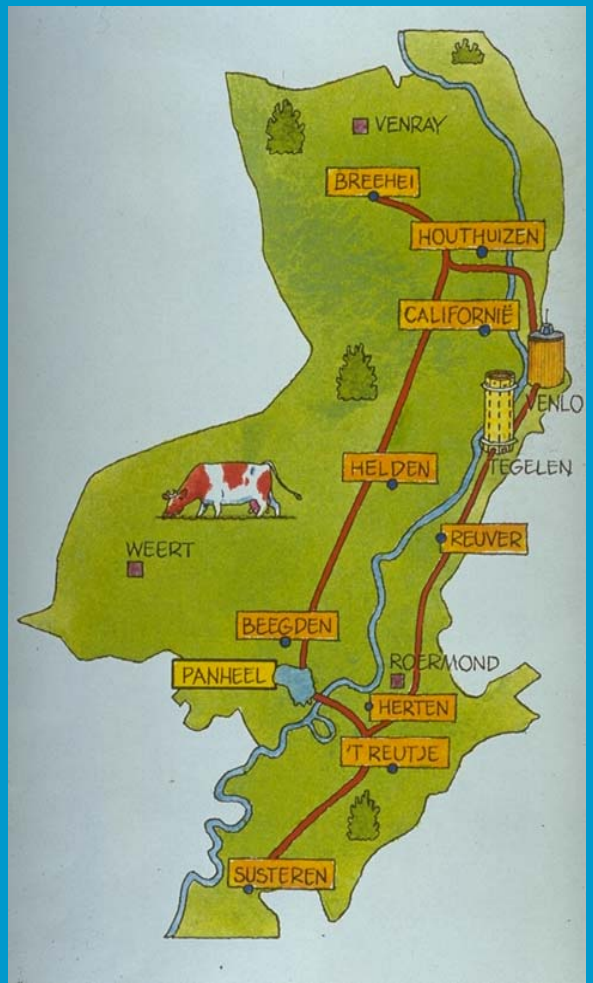
Wat doet een waterleidingingenieur?



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Wat doet een waterleidingingenieur?

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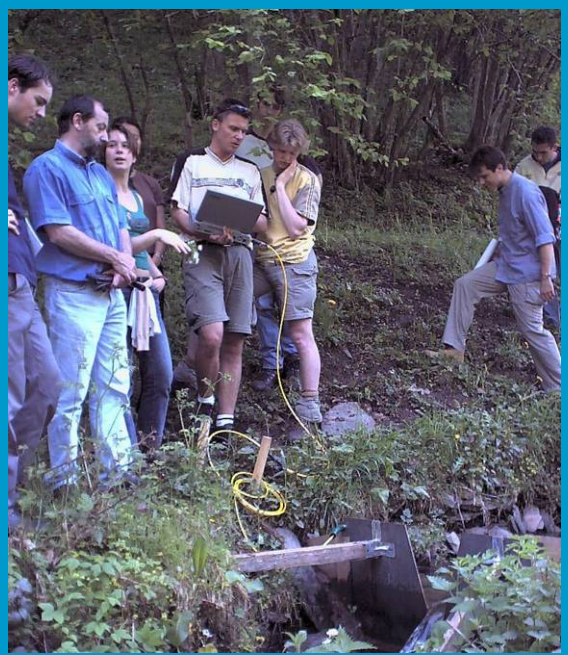
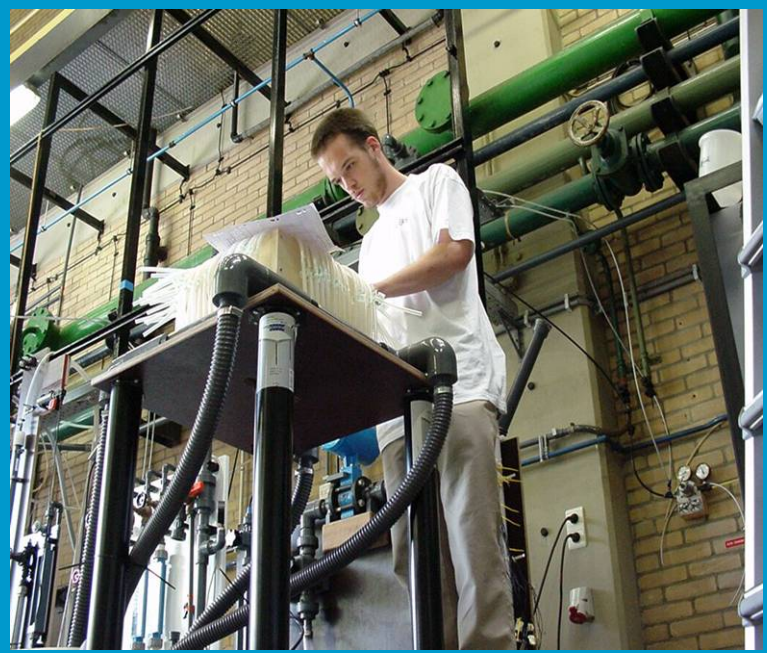
Wat doet een waterleidingingenieur? Onderzoek





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Dutch drinking water: principles and practices

Prof. ir. Hans van Dijk

28 september 2007

TU Delft
Technische Universiteit Delft

Drinking water in the Netherlands

- Total volume:1.2 x 10^9 m^3/jaar
- Sources
  - Groundwater: 2/3
  - Surface water: 1/3
- Treatment
  - Groundwater: aeration and sand filtration
  - Surface water: very extensive treatment
- Distribution
  - *no chlorine!*

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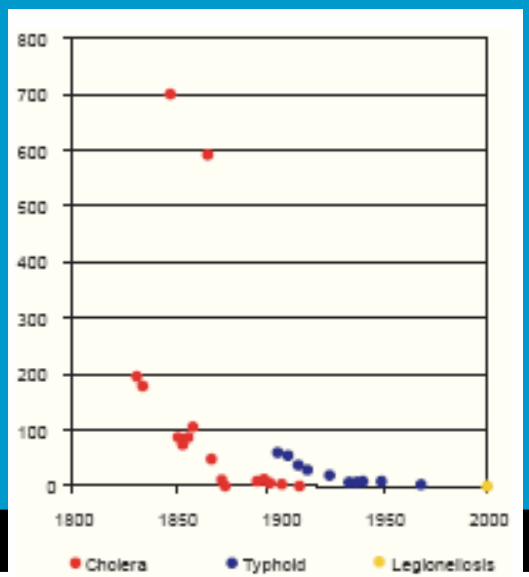
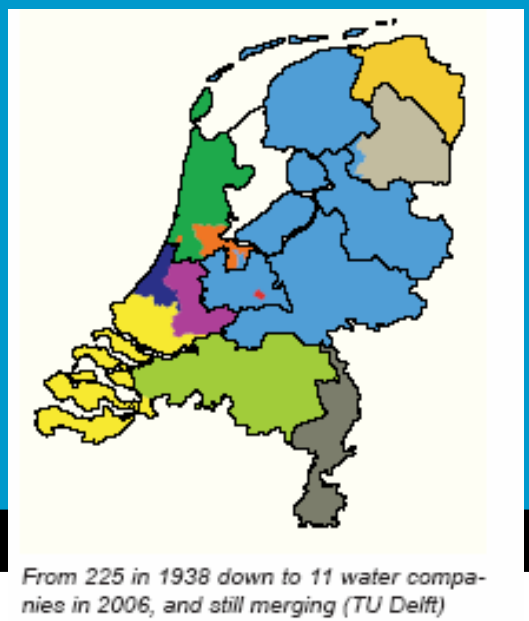
Principles and practices:1

1. Focus on public health...
2. Large publicly owned private companies...
3. With joined efforts for research and communication



Mortality per 100,000 person in the Netherlands by drinking water related diseases (RIVM)



From 225 in 1938 down to 11 water companies in 2006, and still merging (TU Delft)

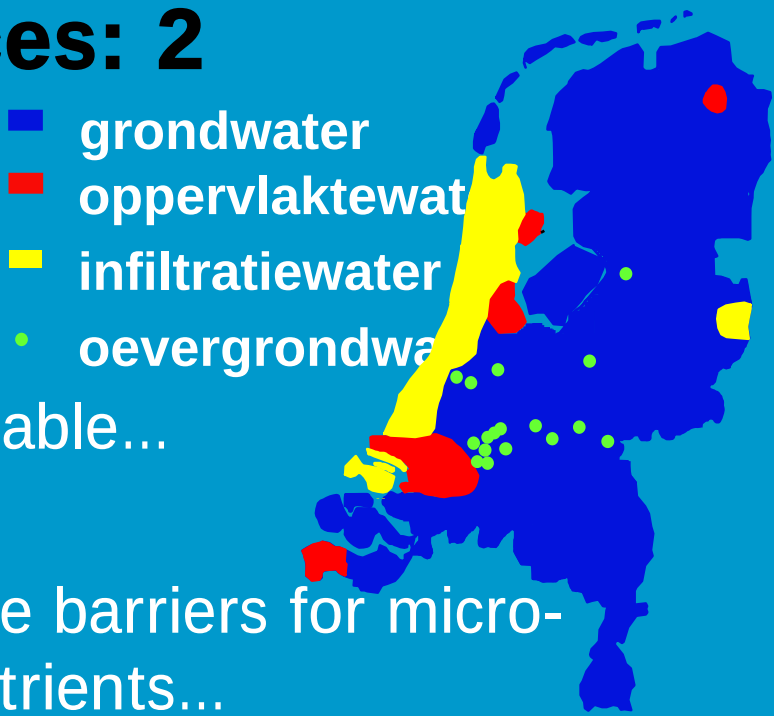
kiwa
Partner for progress

VEWIN

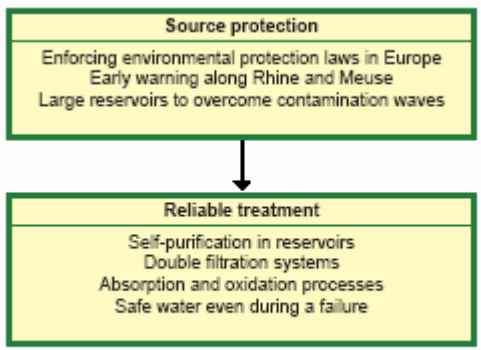
kvwn
Koninklijke Vereniging voor Waterleidingbelangen in Nederland

TU Delft

Principles and practices: 2



1. Source protection
2. Safe groundwater when available...
3. Or artificial groundwater...
4. Or surface water with multiple barriers for micro-organisms, pollutants and nutrients...



Multiple barriers in drinking water production from surface water

Three water reservoirs in Biesbosch National Park

Source	Number of locations	Abstraction (million m³)
Groundwater (natural)	192	709
Artificial groundwater (riverbank filtration)	12	61
Artificial groundwater (dune infiltration)	7	214
Surface water (reservoirs)	7	293
Total	218	1,277

Different sources for drinking water production in the Netherlands in 2004 (VEWIN/RIVM 2004)

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Source protection

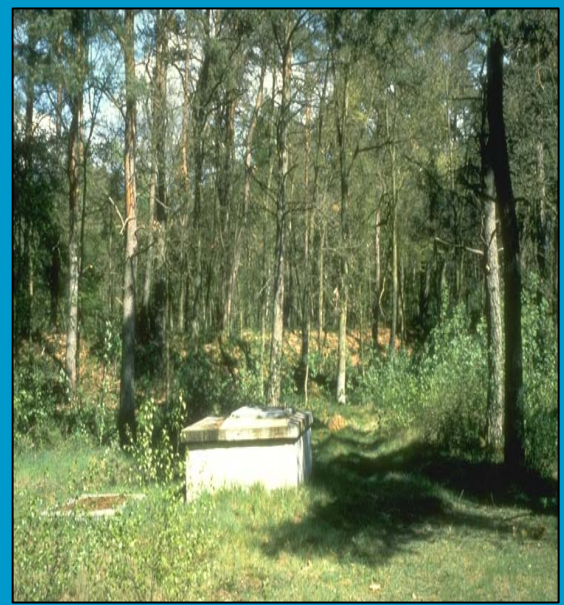
Waterbedrijven eisen verbod lozen bentazon

Van onze verslaggeefster

DEN HAAG — Er is onenigheid ontstaan tussen de waterleidingbedrijven en het kabinet over de aanpak van de omstreden chemische stof bentazon. Deze is aangetroffen in het drinkwater

consument dan 10 tot 20 cent meer voor een kubieke meter water betalen.

De wettelijke norm voor de aanwezigheid van pesticiden is 0,1 microgram per liter leidingwater. Die norm is door alle EG-landen onderschreven op grond van



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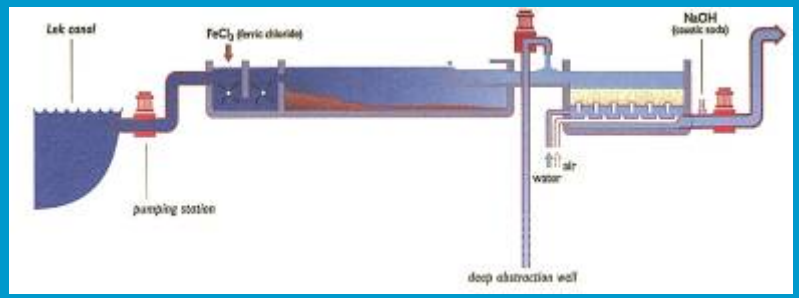
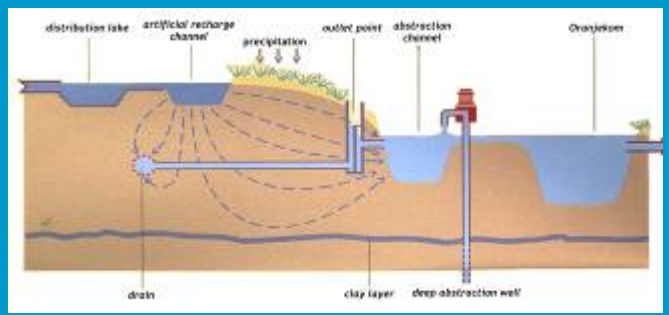
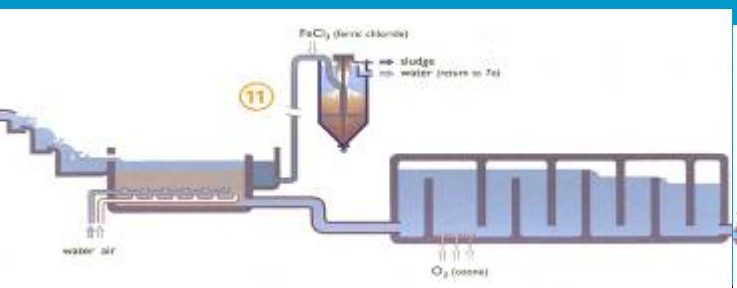
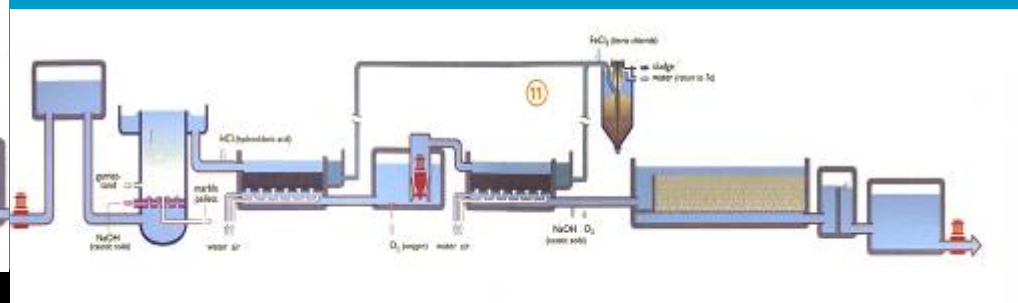
Groundwater

Artificial recharge









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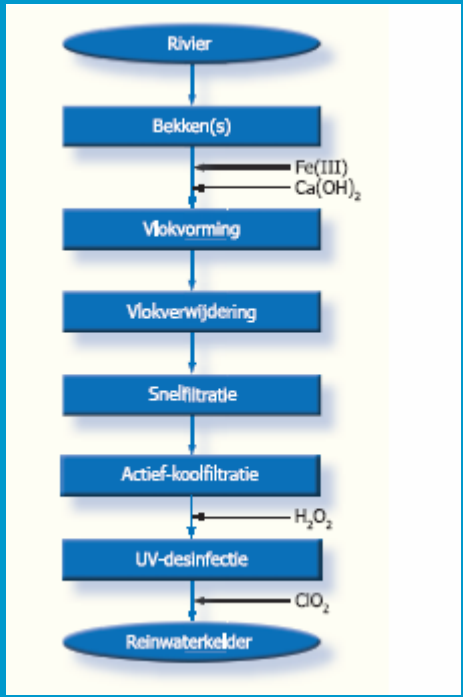
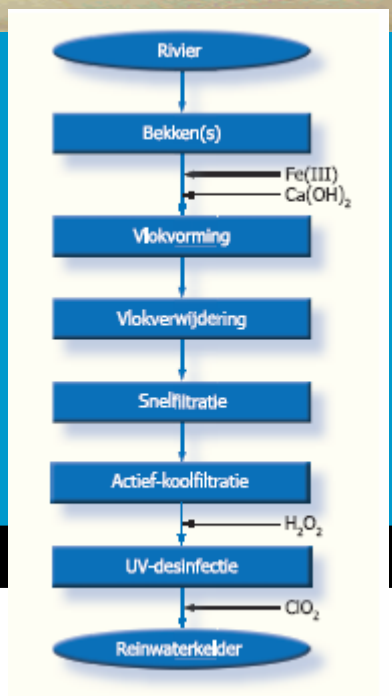
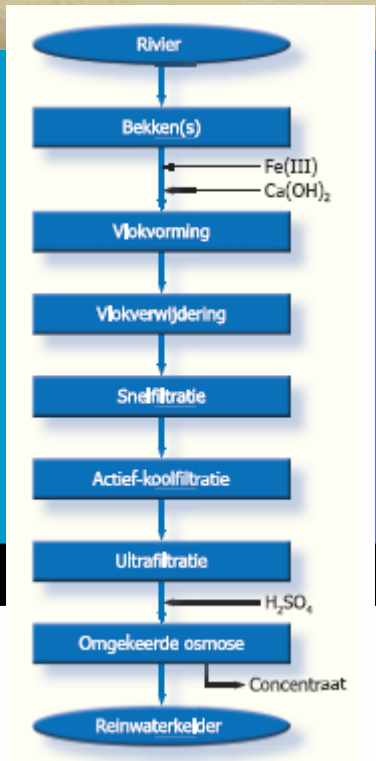
Multiple barriers…



Modern technology…

UV for disinfection at Andijk (PWN 2005)





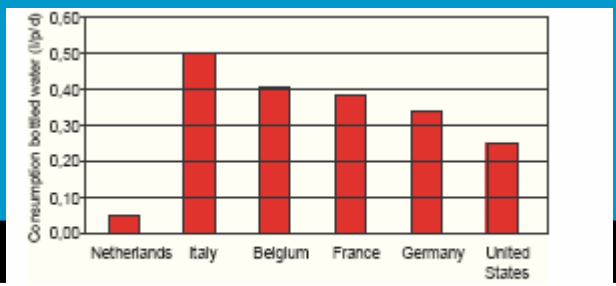
Principles and practices: 3

Chlorine is longer used for disinfection of drinking water in the Netherlands

1. High quality water without chlorine...
2. And with a low hardness...
3. So the customers drink water from the tap

Public health	The environment	Comfort	Economics
Less lead, copper and zinc No risky home filters	Less phosphate Less household waste water Less metals in waste sludge	Better soap while showering Better taste Better appearance (tea) Less scaling in hot water	Savings on washing powder Savings on home-filters Savings on scaling Overall lower costs

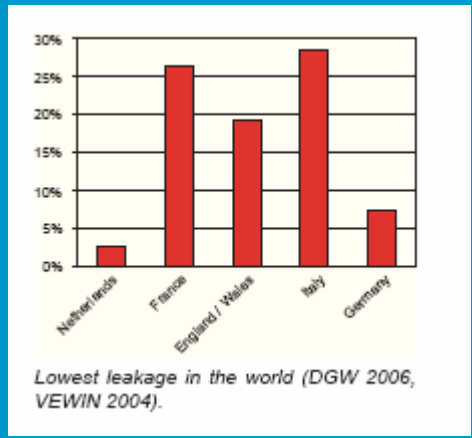
The benefits of soft drinking water are recognized in the Dutch drinking water regulations



Consumption of bottled water (Bottled water reporter 2005/ VEWIN 2006)

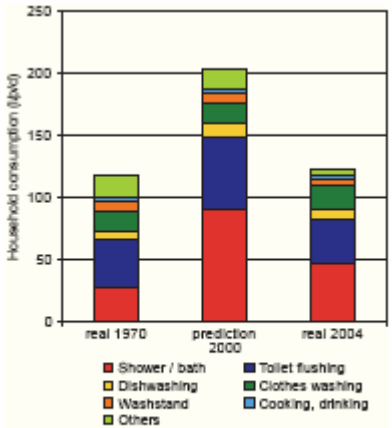
Principles and practices: 4

1. No leakage...
2. Reliable systems...
3. Stimulate water saving...

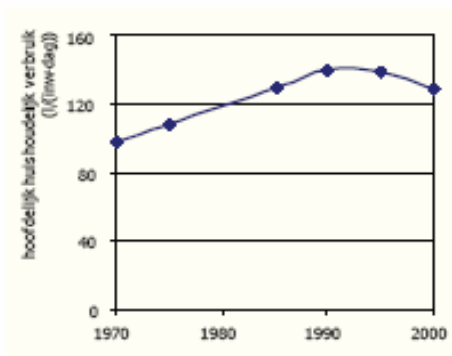


Lowest leakage in the world (DGW 2006, VEWIN 2004).

Drinking water supply with 99,9932% uptime (TU Delft 2005)



Water saving in households (Vakantiecursus 1973, VEWIN 2004)



Figuur 8 - Ontwikkeling hoofdelijk verbruik in huishoudens (l/(inw-d))

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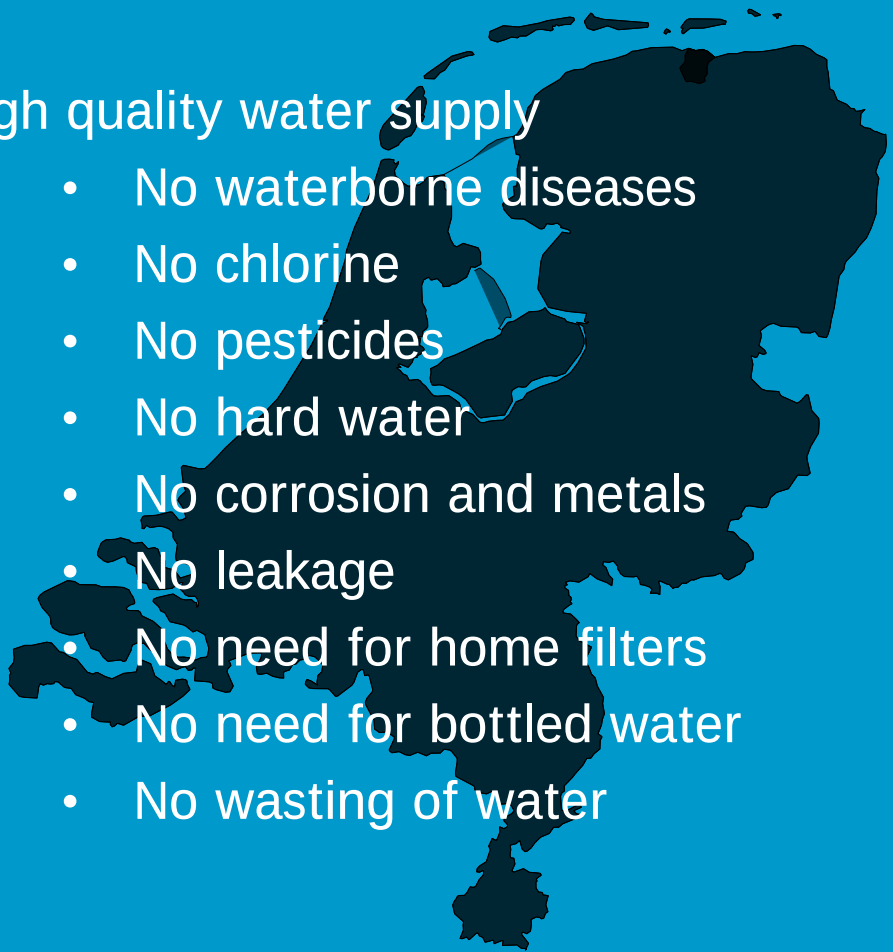
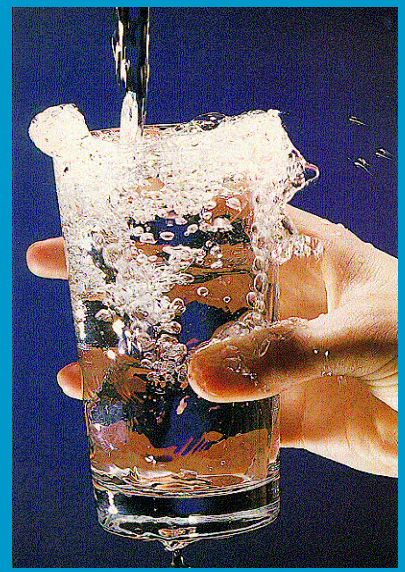
The miracle from the tap



High quality water supply

- No waterborne diseases
- No chlorine
- No pesticides
- No hard water
- No corrosion and metals
- No leakage
- No need for home filters
- No need for bottled water
- No wasting of water



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