



**SIEMENS**

# **Giornata di studio**

# **La depurazione delle acque reflue**

# **finalizzata al riutilizzo**

Politecnico di Bari  
21 Maggio 2010





Associazione Idrotecnica Italiana  
Sezione Pugliese



Politecnico di Bari  
Dipartimento di Ingegneria  
delle Acque e di Chimica



Ordine degli Ingegneri della  
Provincia di Bari

# SIEMENS

## LA DEPURAZIONE DELLE ACQUE REFLUE FINALIZZATA AL RIUTILIZZO



**21 Maggio 2010**  
**Giornata di Studio**

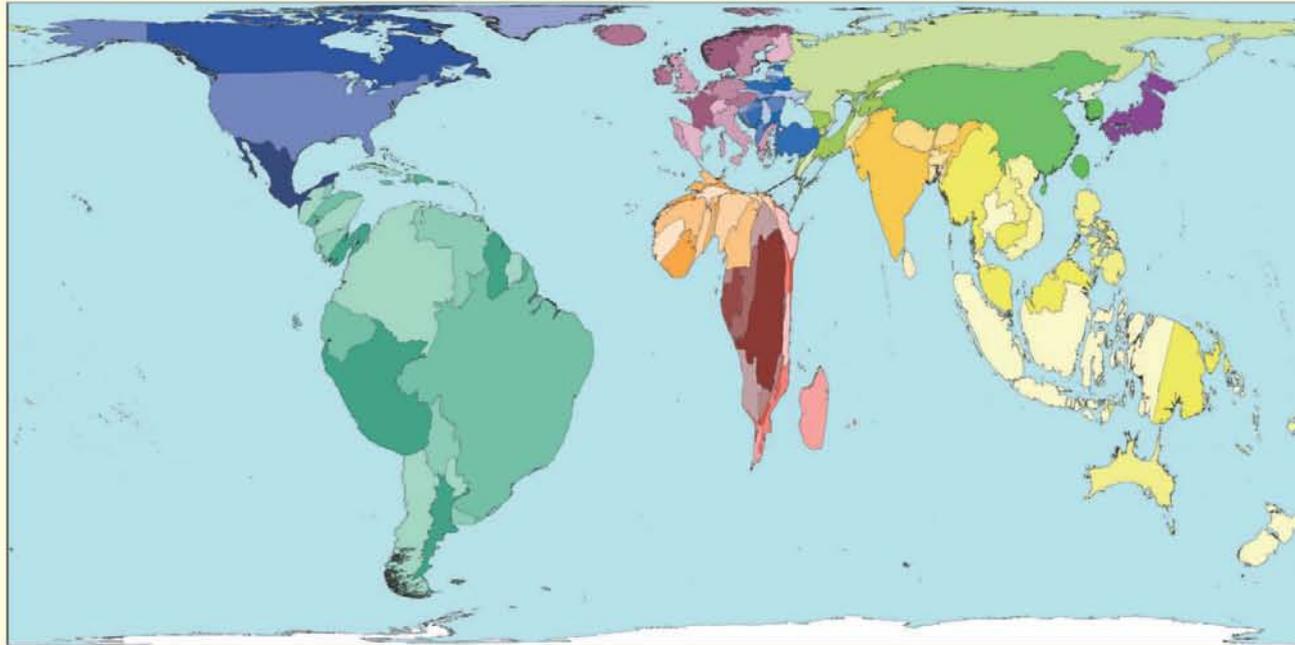
**Aula Magna "Attilio Alto"**  
**POLITECNICO DI BARI**  
**Via E. Orabona, 4**  
**70125 Bari**

- |              |   |
|--------------|---|
| <b>14:00</b> | <b>REGISTRAZIONE DEI PARTECIPANTI</b>   |
| <b>14:30</b> | <b>SALUTI</b><br><i>Prof. Ing. Michele Mossa (Presidente della Sezione Pugliese dell'Associazione Idrotecnica Italiana)</i><br><i>Prof. Dott. Piero Mastroianni (Direttore del Dipartimento di Ingegneria delle Acque e di Chimica)</i><br><i>Dott. Ing. A. Domenico Perrini (Presidente dell'Ordine degli Ingegneri della Provincia di Bari)</i> |
| <b>14:45</b> | <b>EVOLUZIONE TECNOLOGICA E DI SISTEMA DEI TRATTAMENTI DI DEPURAZIONE DELLE ACQUE REFLUE</b><br><i>Prof. Ing. Vincenzo Belgiorno (Università di Salerno)</i>  |
| <b>15:15</b> | <b>COFFEE BREAK</b>   |
| <b>15:30</b> | <b>IMPIANTI MBR</b><br><b>L'applicazione delle membrane a fibra cava nella fase biologica di depurazione acque reflue</b><br><i>Ing. Davide Perduca (SIEMENS WATER TECHNOLOGIES)</i>  |
| <b>16:00</b> | <b>ASPETTI SOCIO ECONOMICI DEL RIUSO DELLE ACQUE REFLUE URBANE</b><br><i>Prof. Ing. A. Ferruccio Piccinini (Politecnico di Bari)</i>  |
| <b>16:30</b> | <b>ESIGENZE LOCALI DI RIUTILIZZO E ESIGENZE DI QUALITÀ DELLO SCARICO IN AREE SENSIBILI</b><br><i>Ing. Mauro Spagnoletta (PURA Depurazione Srl - Gruppo AQP Spa)</i>   |
| <b>17:00</b> | <b>TRATTAMENTI TERZIARI PER IL RIUSO DELLE ACQUE REFLUE</b><br><b>Filtrazione a dischi a tela - Filtrazione a sabbia - Ultrafiltrazione a membrane</b><br><i>Ing. Michele Galdi (SIEMENS WATER TECHNOLOGIES)</i>  |
| <b>17:30</b> | <b>TAVOLA ROTONDA</b><br><i>Coordina: Prof. Ing. Michele Mossa (Presidente della Sezione Pugliese dell'Associazione Idrotecnica Italiana)</i>   |
| <b>18:30</b> | <b>CHIUSURA LAVORI</b>  |

Per ulteriori informazioni si contatti la segreteria organizzativa:

Associazione Idrotecnica Italiana - Sezione Pugliese - Dipartimento di Ingegneria delle Acque e di Chimica  
Tel.: 080 596 3557 ; e-mail: f.deserio@poliba.it

# Water Resources



Water resources here include only freshwater, because saline (sea) water requires treatment before most uses.

Only 43 600 cubic kilometres of freshwater is available as a resource each year, despite more than twice this amount falling as precipitation (rain and snow). Much is lost through evaporation. Those countries with higher rainfall often have larger water resources. Of all the water available, the regions of South America and Asia Pacific have the most.

People living in Kuwait use sea water that is processed at a desalination plant. As such Kuwait has no area on this map because there are no freshwater resources there.

Territory size shows the proportion of all worldwide freshwater resources found there.



Land area

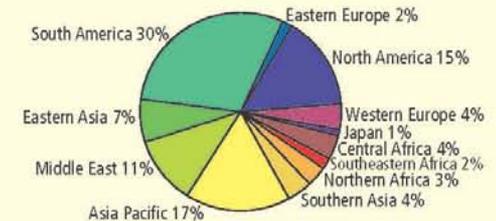
- Technical notes**
- These data are from the United Nations Environment Programme.
  - Only freshwater resources are shown here.
  - \*Kuwait had no recorded freshwater resources
  - See website for further information.

## MOST AND LEAST WATER RESOURCES

Rank	Territory	Value	Rank	Territory	Value
1	Sao Tome and Principe	227	190	Qatar	0.46
2	Sierra Leone	223	191	Oman	0.32
3	Costa Rica	220	192	Turkmenistan	0.29
4	Liberia	208	193	Niger	0.28
5	Colombia	203	194	Bahamas	0.20
6	Bhutan	202	195	Egypt	0.18
7	Panama	198	196	United Arab Emirates	0.18
8	Taiwan	186	197	Saudi Arabia	0.11
9	Papua New Guinea	177	198	Mauritania	0.04
10	Malaysia	177	199	Libyan Arab Jamahiriya	0.03

centimetres of water per year (cubic centimetres of water volume per square centimetre of land area)\*

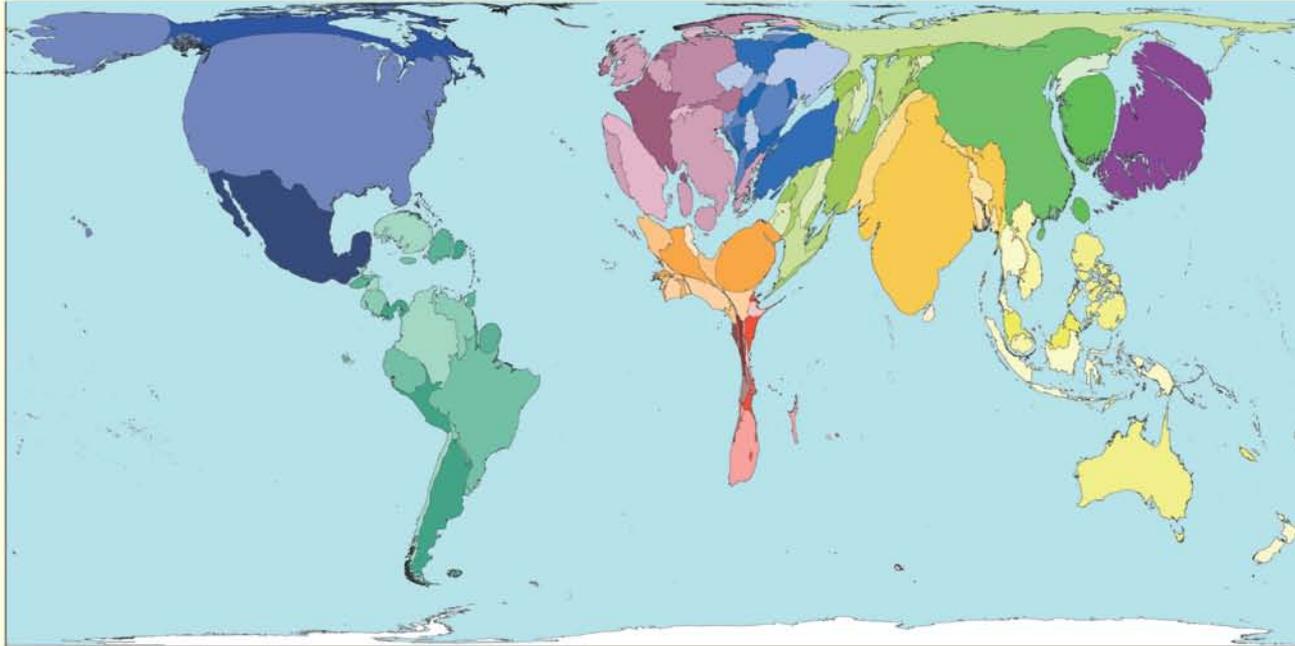
## WORLD WATER RESOURCE DISTRIBUTION



*“The Amazonian basin, where ten of the twenty largest rivers in the world are to be found ... represents one fifth of the entire fresh water reserves of the planet.”*

Brazilian Government's Ministry of External Affairs, 2002

# Domestic Water Use



Water for domestic purposes includes drinking water, use for public services, commercial service establishments (such as hotels), and homes. 325 billion cubic metres of water are so used worldwide each year. The world average water use per person is 52 cubic metres per year.

There is huge variation in water use per person. Between 1987 and 2003 people living in Cambodia, where the majority do not have access to improved water supplies, used an average of 1.8 cubic metres of water each. People in Costa Rica used one hundred times more. The residents of Australia on average each use another 300 cubic metres again per year - much to water their lawns and fill pools.

Territory size shows the proportion of all water used for domestic purposes that was used there.



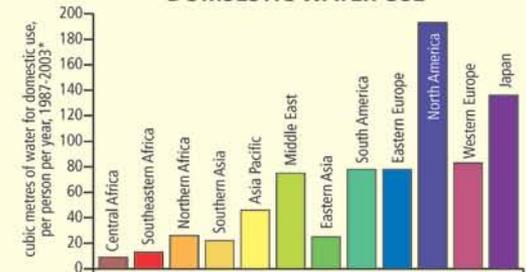
Land area

## HIGH AND LOW DOMESTIC WATER USE

Rank	Territory	Value	Rank	Territory	Value
1	Australia	487	191	Democratic Republic of Congo	4.8
2	Armenia	281	192	Chad	3.9
3	Canada	259	193	Ethiopia	3.5
4	New Zealand	242	194	Benin	3.5
5	Cuba	225	195	United Republic of Tanzania	3.0
6	United States	209	196	Mozambique	2.9
7	Singapore	203	197	Uganda	2.6
10	Costa Rica	184	198	Somalia	2.5
11	United Arab Emirates	174	199	Mali	2.2
12	Ecuador	159	200	Cambodia	1.8

cubic metres of domestic water use per person per year, 1987-2003\*

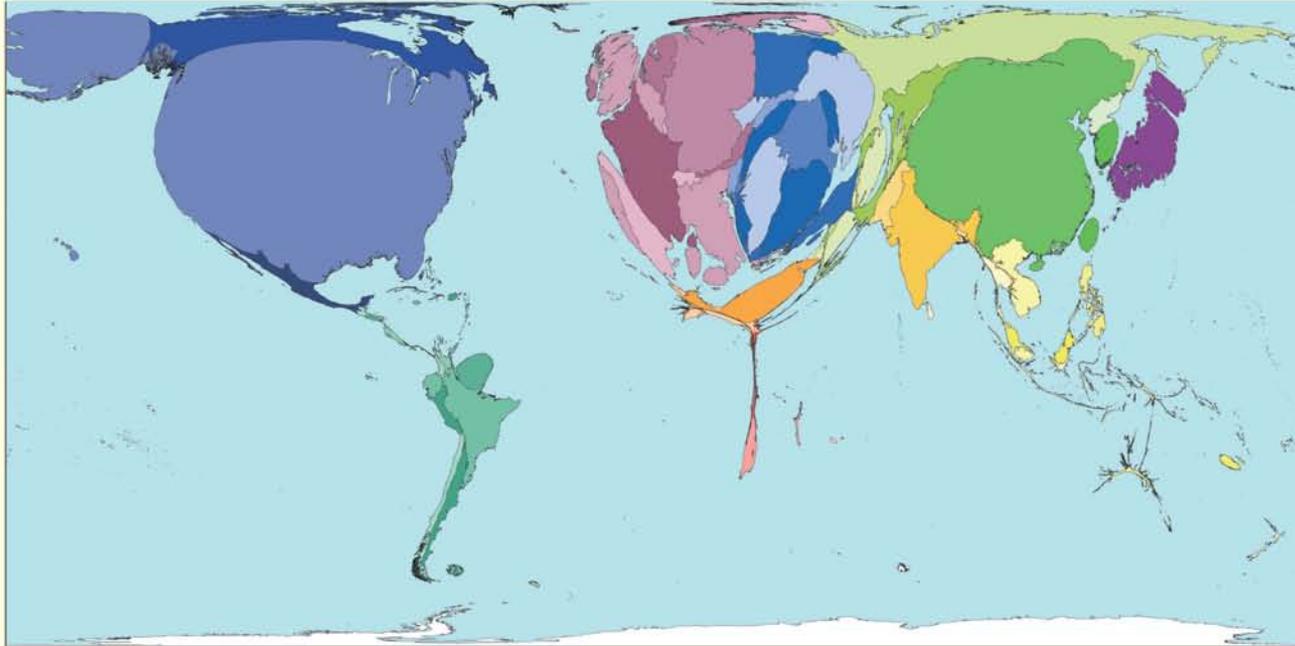
## DOMESTIC WATER USE



- Technical notes**
- Data are sourced from the World Bank's 2005 World Development Indicators.
  - \*Territories which assumed the regional average, due to missing data, are not shown in the table.
  - Domestic water use is all piped water use except for industry and agriculture.
  - See website for further information.

*"I remember when I was 14, carrying a 20 litre water can on my head, filling it from a river some thirty minutes away. When I came to Canada, I was shocked by the extravagant use of water here."* Sieru Efrem, 2003

# Industrial Water Use



Between 1987 and 2003 roughly twice as much water was used by industries than was used for what is classed as domestic purposes: on average 665 billion cubic metres per year. Just under a third of this water usage was recorded in the United States. Just under a thirtieth was used by all 19 territories of Southeastern Africa.

Central Africa, Southeastern Africa, Southern Asia, Northern Africa and Asia Pacific all have low per person industrial water use. These regions also are small on the map as the total volume of water used for industrial purposes is relatively low, because the industries that are in these regions together use relatively little water.

Territory size shows the proportion of all water used for industrial purposes that was used there, 1987 to 2003.



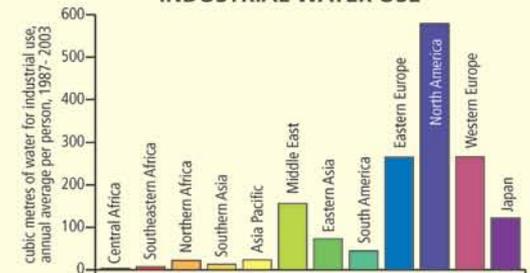
Land area

## HIGH AND LOW INDUSTRIAL WATER USE

Rank	Territory	Value	Rank	Territory	Value
1	Bulgaria	1303	183	Democratic Republic of Congo	1.25
2	Serbia & Montenegro	1061	184	Haiti	1.22
3	Canada	1009	185	Mali	1.11
4	United States	723	186	Ethiopia	0.96
7	Slovenia	520	187	Niger	0.87
8	Azerbaijan	497	188	United Republic of Tanzania	0.66
9	Republic of Moldova	453	189	Mozambique	0.65
10	France	389	190	Uganda	0.64
11	Germany	388	191	Chad	0.48
12	Romania	383	192	Cambodia	0.36

cubic metres of industrial water use, annual average per person in 1987-2003\*

## INDUSTRIAL WATER USE



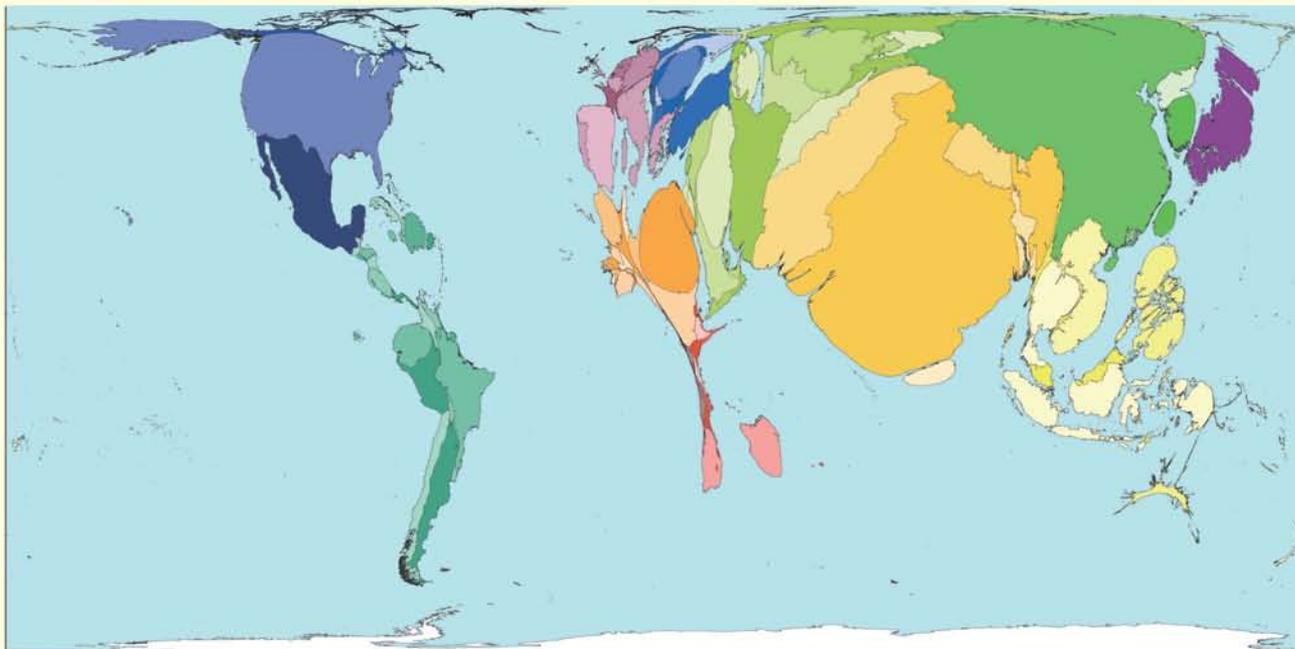
**Technical notes**

- Data are sourced from the World Bank's 2005 World Development Indicators.
- \*Territories which assumed the regional average, due to missing data, are not shown in the table. 8 territories reported no industrial water use: Somalia, Afghanistan, Burkina Faso, Burundi, Nepal, Dominican Republic, Albania & Cuba.
- See website for further information.

*“More than one-half of the world’s major rivers are being seriously depleted and polluted, degrading and poisoning the surrounding ecosystems, thus threatening the health and livelihood of people ...”*

Ismail Serageldin, 1999

# Agricultural Water Use



Between 1987 and 2003, on average 2.4 trillion cubic metres of water were used for agricultural purposes a year. Agricultural water includes that for irrigation and for livestock rearing.

Much of the water used for agriculture is required in Asian territories such as India, Pakistan, Nepal, China, the Philippines, Indonesia, Japan and Vietnam. There is also high per person water use in the Middle Eastern territories of Iran, Iraq, Turkmenistan, Uzbekistan, Kazakstan and Afghanistan.

Agricultural consumption of water resources is less where rainfall is regular, temperatures are moderate or low, fewer crops are grown, and few animals are reared.

Territory size shows the proportion of all water used for agricultural purposes that was used there, 1987 to 2003.



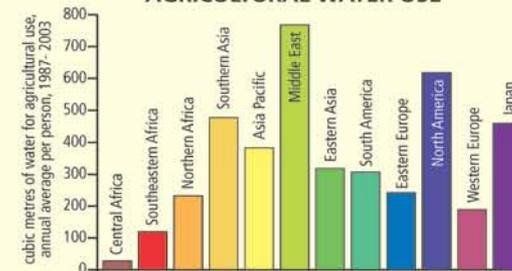
Land area

## HIGH AND LOW AGRICULTURAL WATER USE

Rank	Territory	Value	Rank	Territory	Value
1	Turkmenistan	4859	190	Switzerland	6.7
2	Uzbekistan	2125	191	Slovenia	6.5
3	Kyrgyzstan	1862	192	Congo	6.1
4	Tajikistan	1766	193	United Kingdom	6.0
7	Azerbaijan	1392	194	Czech Republic	5.3
8	Nepal	1167	195	Togo	5.2
9	Costa Rica	1132	196	Uganda	4.8
10	Afghanistan	1127	197	Gabon	4.6
11	Chile	1093	198	Lithuania	2.6
12	Ecuador	1089	199	Democratic Republic of Congo	1.8

cubic metres of agricultural water use, annual average per person, 1987-2003\*

## AGRICULTURAL WATER USE



**Technical notes**

- Data are sourced from the World Bank's 2005 World Development Indicators.
- \*Territories which assumed the regional average, due to missing data, are not shown in the table. Croatia reported no agricultural water use. Croatia would rank 200 in the world.
- See website for further information.

*“The irrigated rice demands a regular flow of water; while millet and sorghum require a river that rises and falls naturally with the seasonal rains.”*

Barbara Chasin, 1981

## I COSTI NEL MONDO

Il prezzo dell'acqua del rubinetto cambia molto da città a città, ma solo di rado tiene conto dello stato delle risorse idriche locali o del consumo giornaliero. Per molti, tariffe più alte scoraggerebbero gli sprechi, e in tutto il mondo le bollette stanno aumentando. Resta il problema di garantire acqua pulita anche ai cittadini più poveri.



## Costo dell'acqua al consumatore per città (2009)

Prezzo al metro cubo, calcolato su un consumo di circa 15 metri cubi al mese.

Kuala Lumpur	Gaborone	Tijuana	Perth	Gand
da €0,00 a €0,19	da €0,20 a €0,50	da €0,51 a €1,50	da €1,51 a €3,50	da €3,51 a €7,00

