Water supply and sanitation in extreme weather events:
copying with facts

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Task Force Extreme Weather Events

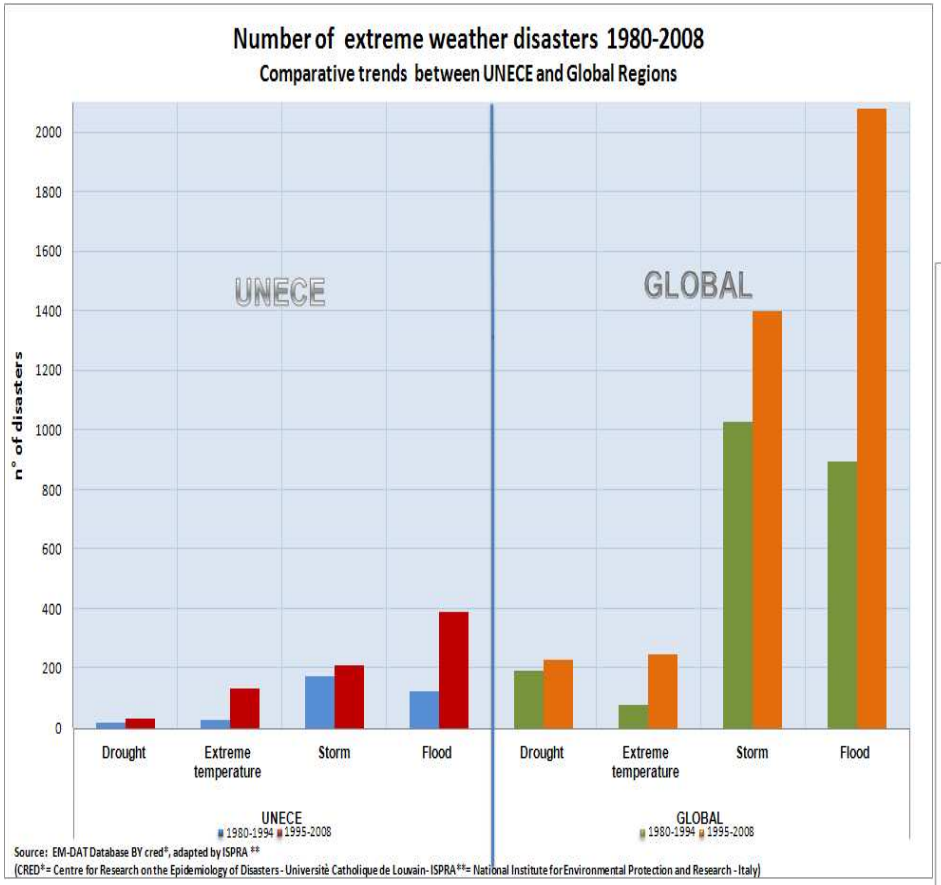
Protocol Water and Health to the UNECE Water Convention

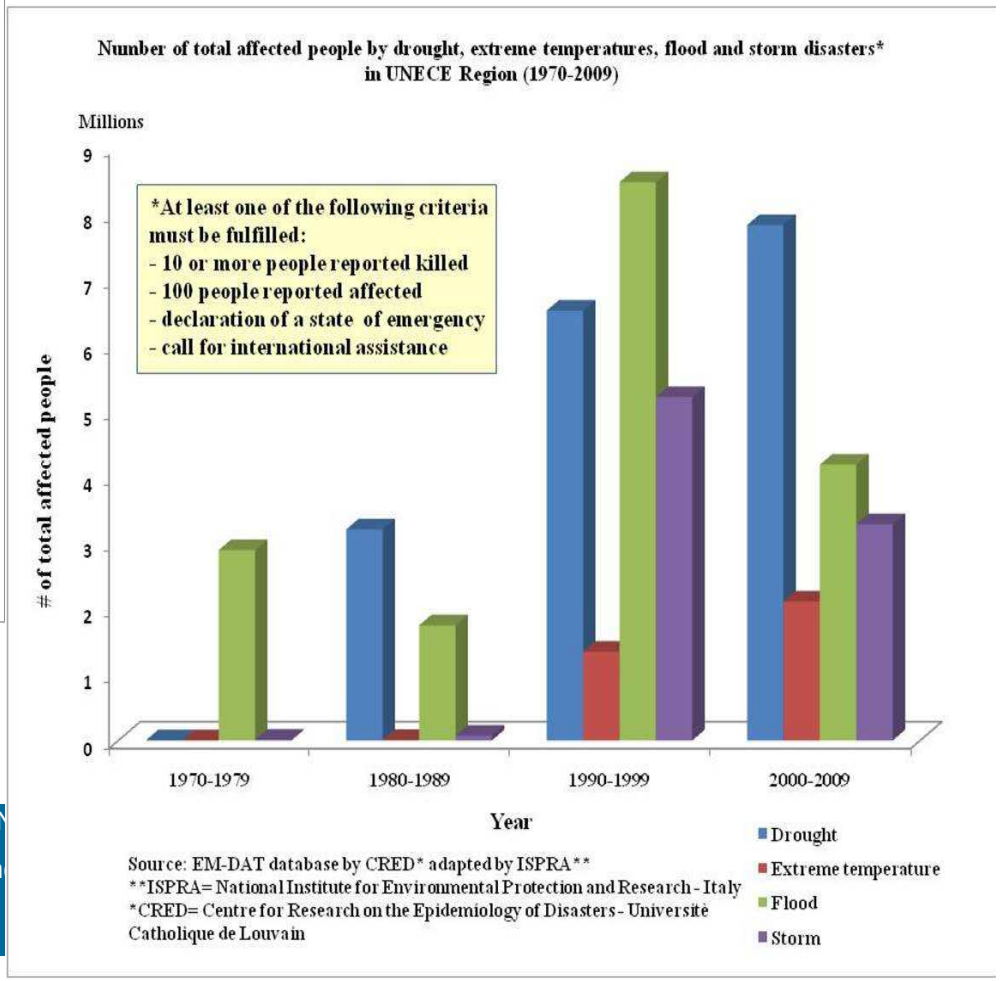
PROTOCOL ON WATER AND HEALTH

Water supply and sanitation in extremes: THE ISSUE

- Extremes such as floods, droughts and thermal anomalies are more & more recurrent worldwide and are a significant pressures on healthy environments
- Water and waste water utilities are very vulnerable to extremes and in the Region WSS performance is still an issue
- Under critical meteoclimatic water supply and sanitation services aren't anymore an healthy delivery services, but a significant source of contamination, sometimes irreversible and that goes beyond local and national border.
- Health risk are not only related to direct damages, supply disruption but also to contamination of water and biota

Water supply and sanitation in extremes: THE FACTS





€m damages floods/storms in central Europe

Europe
The most expensive flood events in Central Europe for the economy

Period	Affected Area	Losses (original values, in €m)	
		Overall losses	Insured losses
1993	France, Italy, Switzerland	1,245	415
	of wich northeast Italy	520	
	Switzerland	350	200
1993	Rhine (Germany, Belgium, Netherlands, Luxembourg, France)	1,765	705
	of wich Germany	530	160
1994	Northern Italy	7,470	50
1995	Rhine (France, Germany, Belgium, Luxembourg, The Netherlands)	2,700	700
	of which Germany	270	100
1997	Oder (Poland, Czech Republic, Slovakia, Germany, Austria)	5,500	745
	of which Poland	3,205	410
	Czech Republic	2,020	165
	Germany	330	32
1999	Northern Alps and northern foothills of the Alps (Germany, Switzerland, Austria)	460	120
	of wich Germany	340	70
	Switzerland	80	50
2000	Italy, Switzerland	10,000	560
	of which Italy	8,000	350
	Switzerland	390	210
2002	Elbe, Danube	16,825	3,465
	of which Germany	11,600	1,800
	Austria	2,445	410
	Czech Republic	2,445	1,225
2005	Austria, France, Germany, Hungary, Slovenia, Switzerland	2,685	1,430
	of which Switzerland	1,950	1,300
	Germany	175	40
	Austria	515	105
	Hungary	40	No details
	Slovenia	4	No details
2006	Elbe, Danube	390	40
	of wich Germany	85	17
	Austria	21	3

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Source: 2010 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE
Notes: * Original values, not adjusted for inflation; converted into € at month- and year-end exchange rates.

Significant Events between 1990 and 2009: C:Meteorological
Europe

The most expensive storm events in Central europe for the economy

Year	Period	Event	Affected Area	Losses (original values, in €m)	
				Overall losses	Insured losses
1990	25.-26.1.1990	Winter Storm Daria	Germany	1,000	690
	3.-4.2.1990	Winter Storm Herta	Germany	500	250
	25.-27.2.1990	Winter Storm Vivian	Germany	1,000	435
			Austria	100	66
			Switzerland	80	50
	28.2.-1.3.1990	Winter Storm Wiebke	Germany	1,000	450
			Austria	100	66
			Switzerland	80	50
			Italy	20	No details
1992	21/07/1992	Severe weather event	Switzerland	76	40
	28/08/1992	Hail	Germany	90	72
1994	04/07/1994	Hail	Germany	425	325
		Winter Storm Lore	Germany	340	220
			Austria	5	3
			Switzerland	10	No details
1995	21-23.7.1995	Winter Storm Emily	Germany	400	300
1999	3.-4.12.1999	Winter Storm Anatol	Germany	300	100
	26.12.1999	Winter Storm Lothar	Germany	1,600	650
			Switzerland	1,500	800
			Northern Italy	50	No details
2000	3-4.7.2000	Hail	Austria	100	90
2001	5-7.7.2001	Severe weather event, tornado	Czech Republic	17	6
	7-8.7.2001	Severe weather event, tornado	Northern Italy	200	35
2002	26-27.2.2002	Winter Storm Anna	Germany	580	350
	24/06/2002	Hail	Switzerland	220	170
	05/08/2002	Hail	Northern Italy	70	51
	26.-30.10.2002	Winter Storms Jeanett, Irina	Germany	1,700	1,200
			Czech Republic	20	10
	16-17.11.2002	Severe weather event, windstorm	Austria	100	70
	15-28.11.2002	Severe weather event, landslides	Switzerland	170	50
2003	2.-3.1.2003	Winter Storm Calvann, floods	Germany	280	90
	29-31.8.2003	Severe weather event, landslides	Northern Italy	455	5
2004	09/08/2004	Hail	Slovenia	15	No details
	20/11/2004	Winter storm	Slovak Republic	200	8
2005	7.-9.1.2005	Winter Storm Erwin (Gudrun)	Germany	210	150
2006	16-17.8.2006	Hail, severe weather event	Austria	80	55
	28-29.6.2006	Hail, severe weather event	Germany	390	230
2007	18.-20.1.2007	Winter Storm Kyrill	Germany	4,200	2,400
			Austria	310	200
			Czech Republic	150	100
	20-21.6.2007	Severe weather event	Switzerland	85	60
2008	1.-2.3.2008	Winter Storm Emma, storm surge	Germany	750	400
			Austria	350	200
	28.5.-2.6.2008	Severe Storm Hilal, hailstorms, flash floods	Germany	1,100	800
	23.-24.7.2009	Severe storms, hailstorms	Switzerland	700	480
			Austria	350	220

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Source: 2010 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE
Note: * Original values, not adjusted for inflation; converted into € at month- and year-end exchange rates.

DW supply

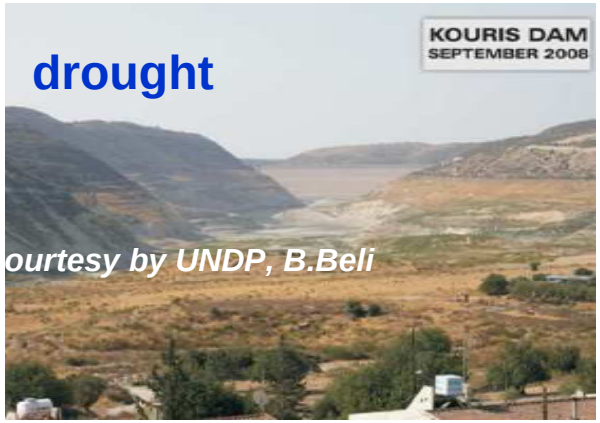
sea level rise

Courtesy by

PROTECT WHAT YOU HAVE

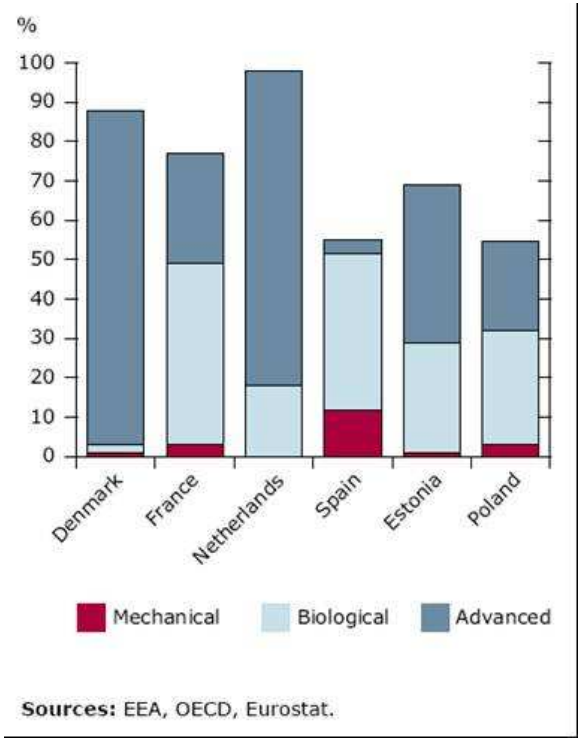
	Adaptation activity	Example of adaptation measures
Source water quality	Enhanced monitoring to detect deterioration in drought (or when drought conditions are predicted)	Enhanced monitoring of: • Turbidity/physical quality • Indicator organisms (pathogen loading) • Algal species and counts • Broad chemical screens (e.g. GC/MS scan) for emerging contaminants • Limnology – risks of low draw-down, storage reservoir inversion (use of bubblers, forced currents etc.) • Vector-borne diseases (open reservoir management) • Emerging risks – suggested chemicals/pathogens, viruses etc. [link to chapter on emerging health risks]
New sources	Use of alternative/ standby sources	• Knowledge of quality of sources • Pre-event trials/experimentation into impact of mixing water matrices

drought

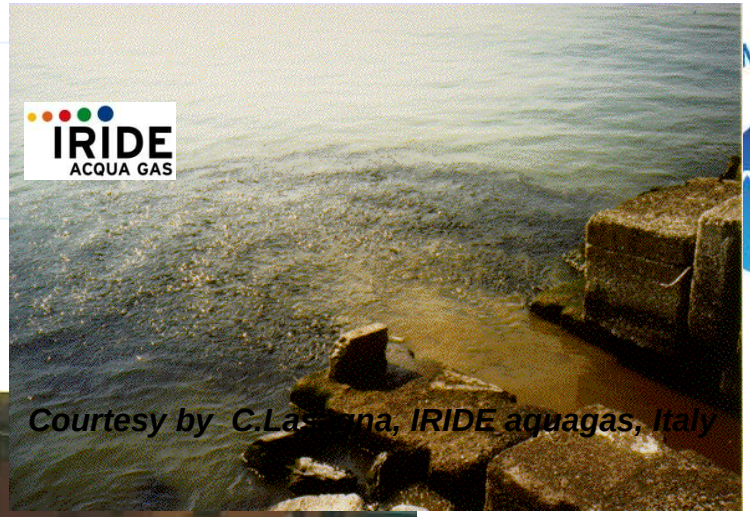


Improve what you're doing

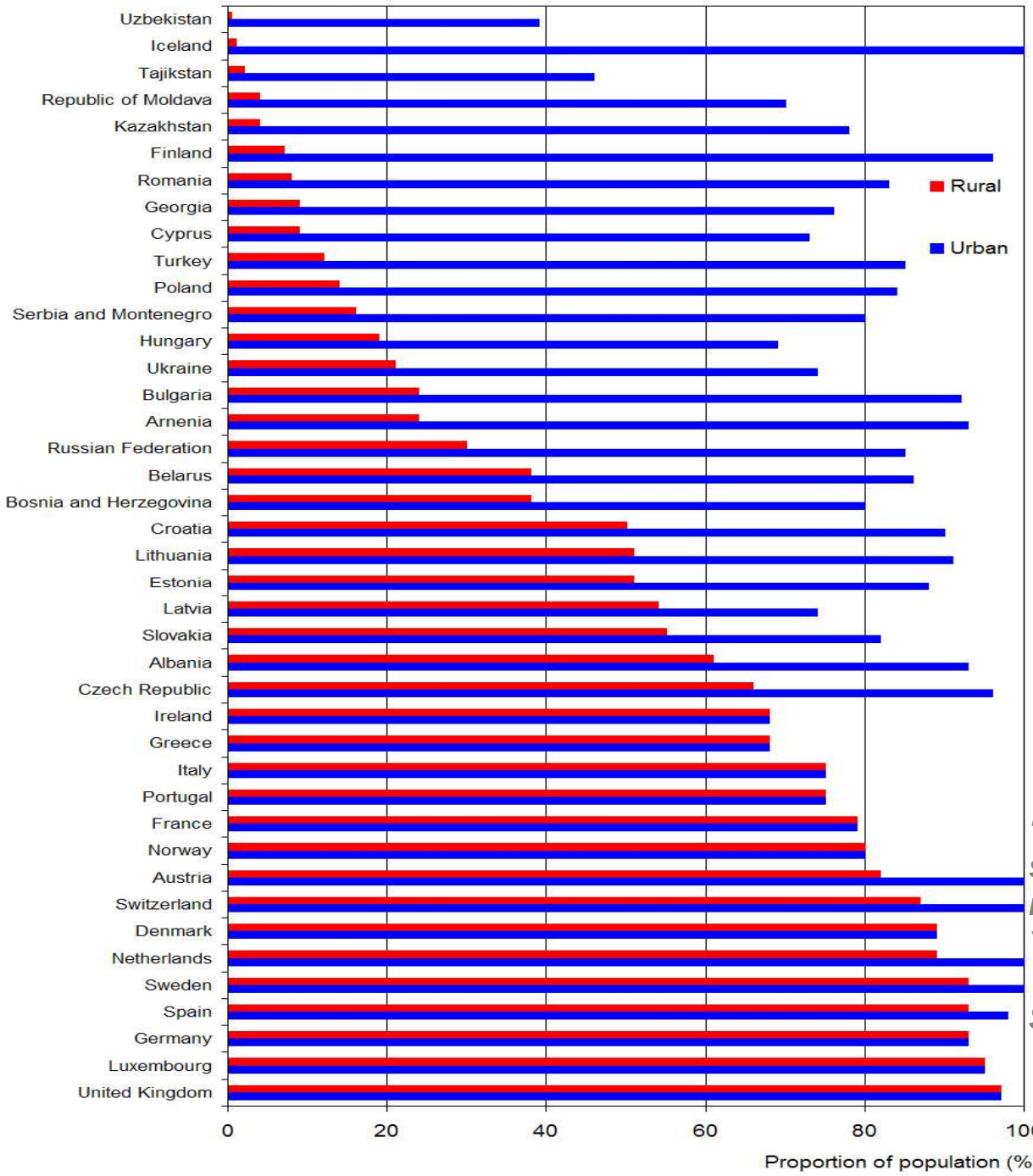
WWTP & sewerage: higher vulnerabilities



Effectiveness of urban wastewater treatment policies in selected countries: an EEA pilot study ", EEA, 2005



Impact of the storms and heavy rains on the sanitation system



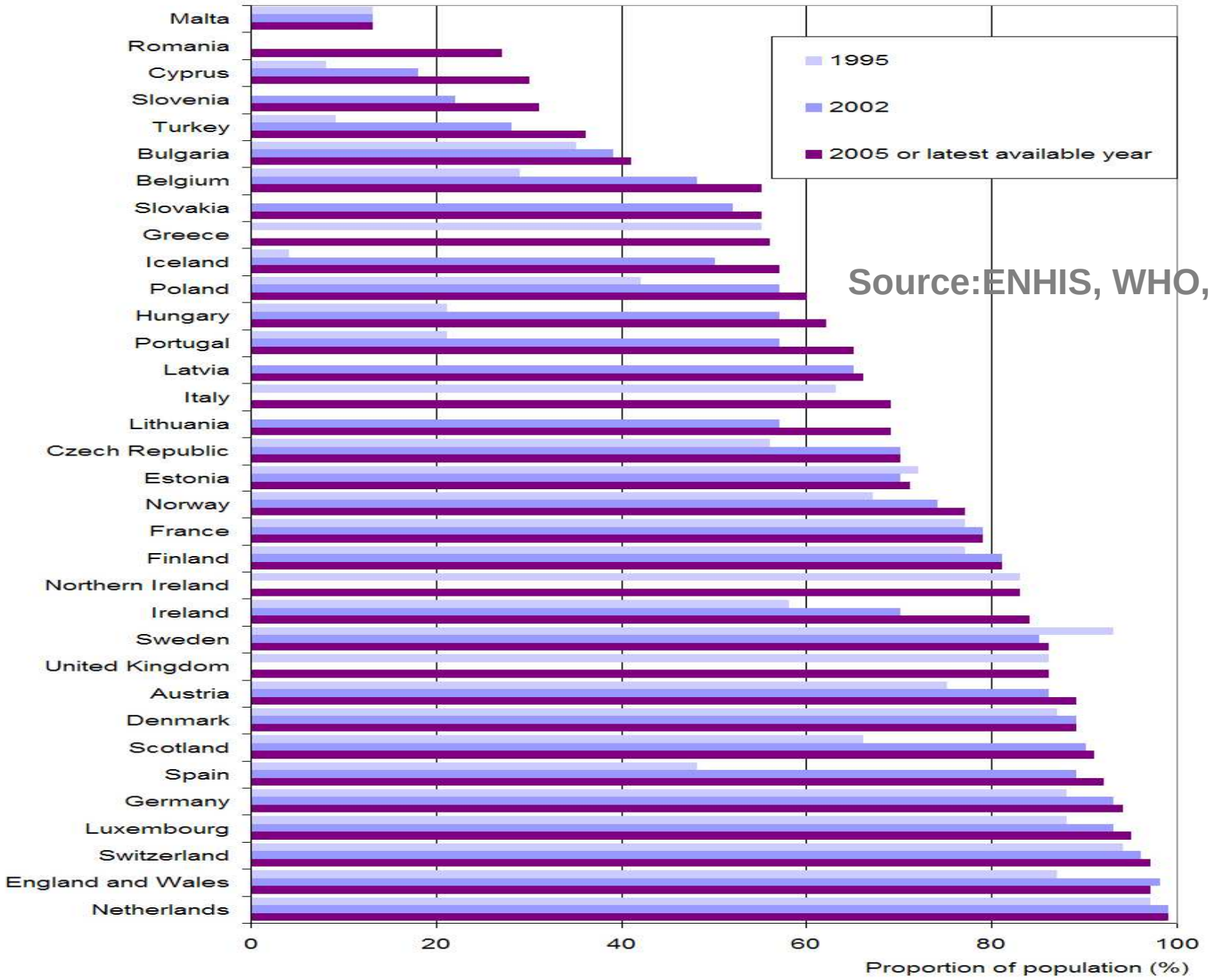
PROTOCOL ON WATER AND HEALTH

Many vulnerabilities in the Region are still there

"home connection to improved sanitation facilities in urban and rural areas
Year 2006 or latest"

Sources: ENHIS, WHO Euro

population connected to wastewater treatment facilities



Source:ENHIS, WHO, 2010

COPYING WITH FACTS

Water cycle and climate change

↓

Increase in the number of extremes

↓

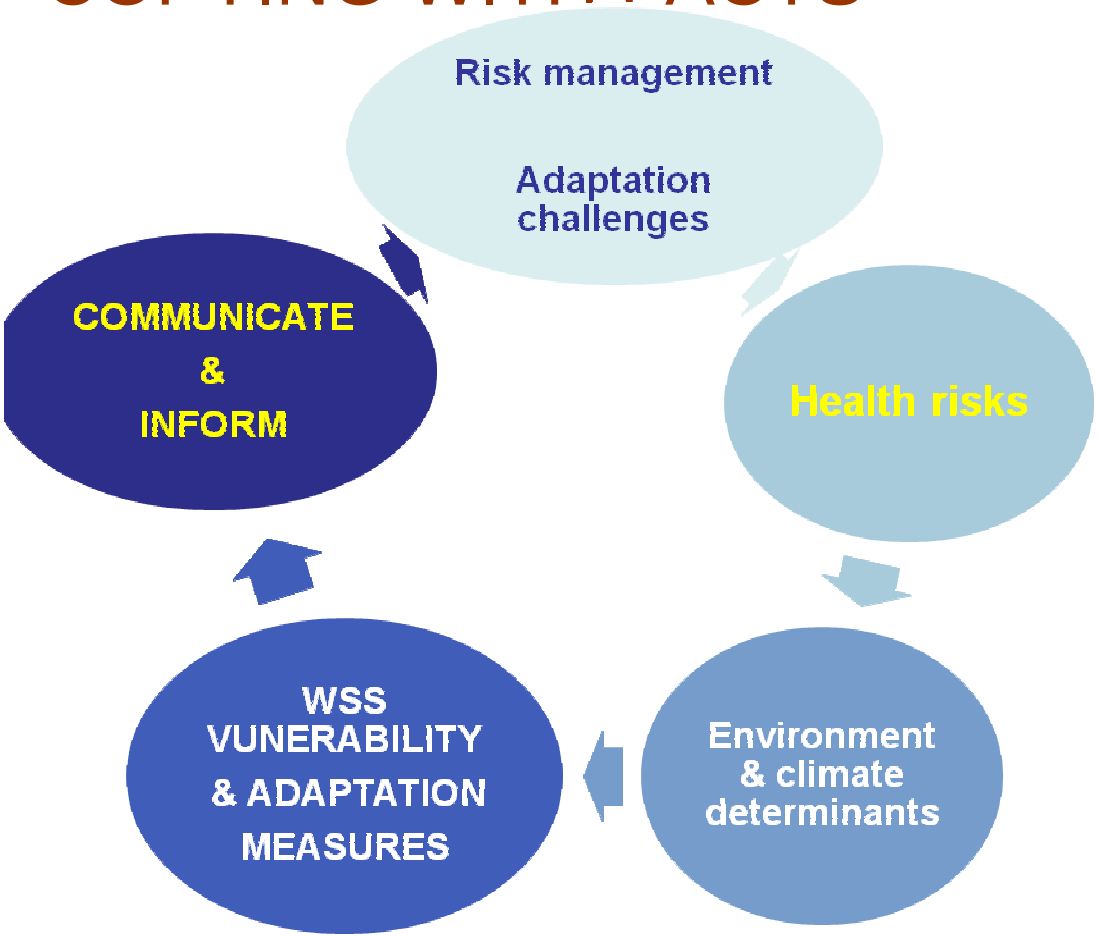
Increase in short & long term impacts

people's health & well being , infrastructures & assets, safety of natural resources

↓

1. **Increase in demand of safe water in emergencies**
2. **Increase in water/soil contamination from water and waste water services**
3. **Higher demand of risk reduction strategies and recovery cost**
4. **Resilience WSS Utilities**

Extremes challenges and the Protocol: COPYING WITH FACTS



HOW WE DID: PARTNERSHIP

(GUIDANCE CONTRIBUTORS: Azerbaijan, Czech Republic, Georgia, Hungary, Italy, Netherland, Romania, Slovakia, UK, Ukraine, Armenian Women for Health and Healthy Environment, EUREAU, Federutility, UNDP, World Meteorological Organization, WHO Euro, WHO Int)

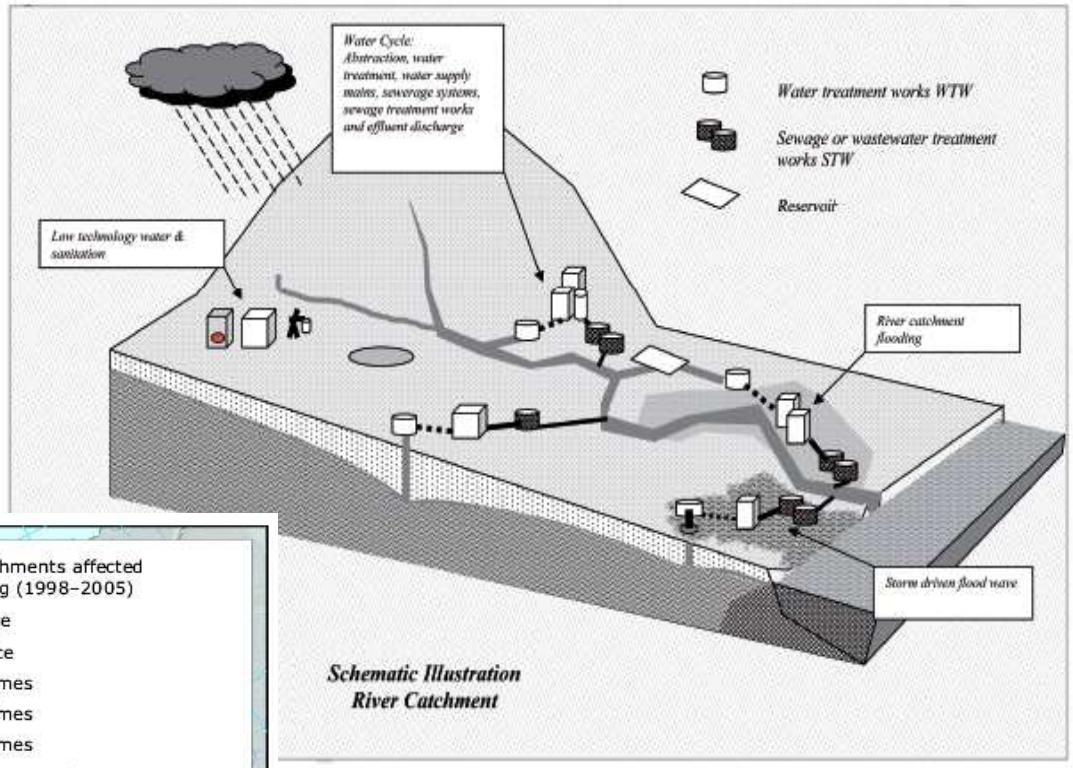
Climate & env determinants: impacts on WSS

Climate change risks	Potential Risks and Opportunities		
	Freshwater resources	Waste water	Land-related processes
Increase in summer temperatures	Increased demand for potable water, increased pressures on groundwater Increased demand on reverse osmosis plants Increased evapotranspiration rates	Increased sewer dry weather flow, increased dry weather treatment volumes Increased treated effluent volumes	Reduction in groundwater recharge, more aggressive regime for agriculture Ground shrinkage
Increasing winter temperatures	Increased demand for potable water, increased pressures on groundwater, increased demand on reverse osmosis plants, increased evapotranspiration rates	Increased sewer dry weather flow, increased dry weather treatment volumes, increased treated effluent volumes	Productive regime for agriculture with opportunities for premium products maturing early
Higher winter rainfall	Increased volumes for recharge, existing water storage volumes might be insufficient, increased storm water runoff.	Higher volume of storm water generated which may exceed infrastructure capacity, higher volumes of storm water entering sewers – surcharge events increase, increased volumes of waste water to treat at sewage treatment plants, increased volumes of treated effluent may remain unutilized	Increased flooding incidence, increased damage to infrastructure, increase in soil erosion
Lower summer rainfall	Lower recharge volumes, increase in demand from agricultural sector	Lower sewage volumes and consequent treated effluent volumes	Ground shrinkage
Higher intensity of rainfall	Higher proportion of total rainfall might end up as runoff and not contribute to recharge volumes. Higher level of pollutants in stormwater.	Higher peak flows in sewers, increased possibility of sewer surcharge and overflows.	Increased incidence of flooding damage to infrastructure, increased soil erosion.
SLR	Reduced volumes of groundwater, increased salinity of groundwater.	Increased seawater infiltration volumes (M) [?], more saline waste water and hence treated effluent.	Loss of land, increased flooding of coastal areas, increased need for flood defences, new methods of construction, insurance premiums may increase.

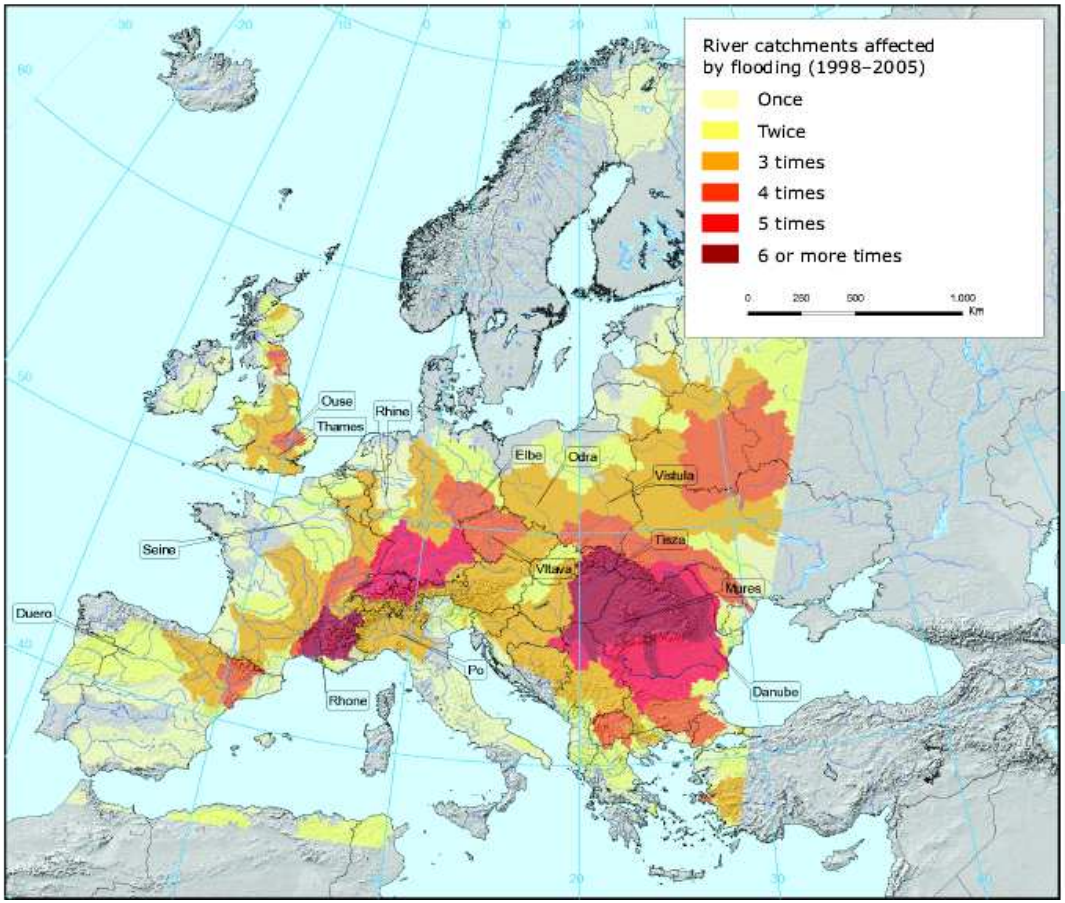
Source: Gatt, 2009.

Adaptation challenges

IMPROVE THE LINK BETWEEN IWRM & UTILITIES MANAGEMENT



ıtal Health Engineering, Faculty of Engineering and Physical Sciences, University of Surrey, England.



INVOLVE UTILITIES MANAGERS IN RISK MANAGEMENT & ADAPTATION STRATEGIES

TALY

Health risks WSS utilities performance

- **Contaminated discharge in environment and water bodies**

Lack of available safe water

Higher pollutants concentrations and/ or overload

Impairment of waste water treatment performance

Unsafe use of new water sources

►Chemical and biological safety of

- **Drinking water**
- **Bathing waters**
- **Irrigated crops**
- **Food and sea food**

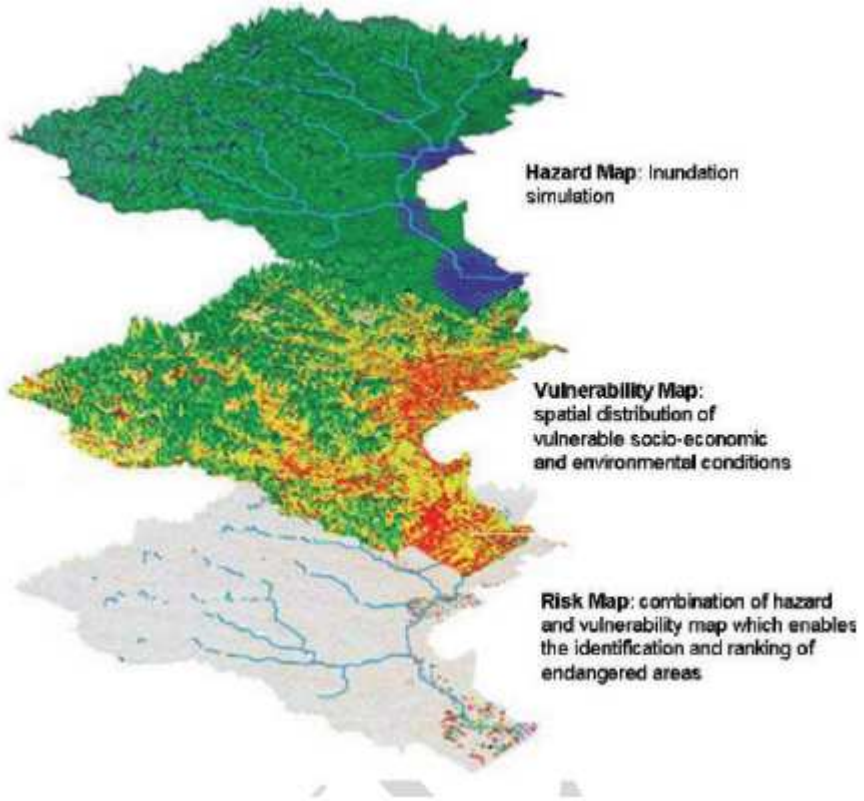
► Increase of vectors and rodents

►(Costly) impairment of effectiveness of environmental protection of healthy water resources

High vulnerability of WSS infrastructures in the Region

Communication and information

- The communication strategy, based on a multidisciplinary approach, should be part of the risk disaster management and adaptation plans for extreme weather events in order to share knowledge among different actors,
- Specific communication activities should be planned (before, during and after the event) and targeted at different groups at risk (e.g. the elderly, children, rural communities).
- Public authorities must be mainly responsible for elaborating and delivering the messages.
- The media are a key partner in communication.
- Communication should be a long-lasting and institutional process and not only a contingency tool.



MAIN CONCLUSIONS

- TASK FORCE cope with a new and challenging issue for Protocol Work Programme

- Guidance on WSS under extreme weather events will facilitate Protocol objectives copying with a changing environment

Many thanks to main authors

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THANK YOU VERY MUCH !

Getting together is a beginning,

Staying together is a progress,

but working together is a success

(H. Ford)