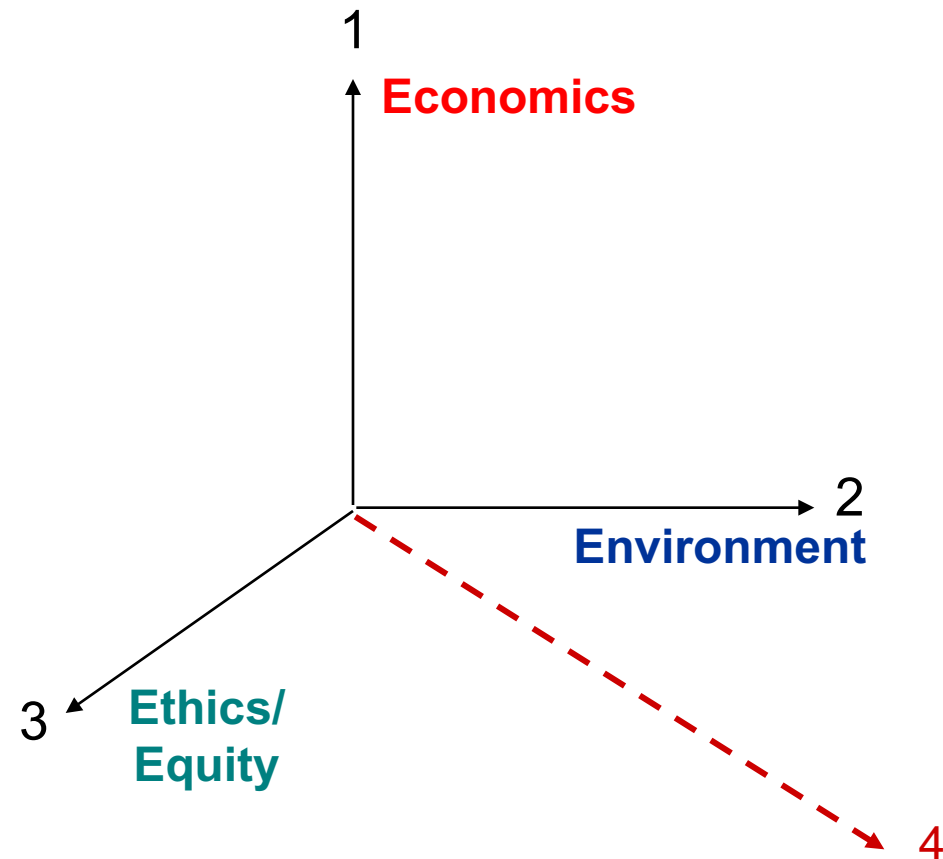


Sustainability issues in Water Supply and Sanitation Services in Europe

Spain Italy Netherlands
Germany, England, Belgium
and France

Bernard Barraqué
AgroparisTech

The 4 Dimensions of Sustainability in the EAU&3E Project



- **1** – Cost recovery including renewal of the infrastructure?
- **2** – How much more to meet sanitary and environmental standards? (EU directives, national policy, water conservation policies etc.)
- **3** - If 1 and 2 are met, is water price still socially acceptable ?
- **4** - And politically ? Here a 4th axis is needed on multi-level governance, and on new authority – operator – users relationships

El agua de Barcelona

Configuración del sistema hídrico en el entorno del área metropolitana de Barcelona



Barcelona

A Two-Tier supply system

- ATLL : Public regional bulk water company
- AGBAR : private company, produces and supplies water to Barcelonan + 17 suburban cities (buys 40% of its water to ATLL)
- The rest: small direct utilities and mixed companies

AGBAR also responsible for sanitation and stormwater

In a Mediterranean Regime ...

August 2006



February 2008





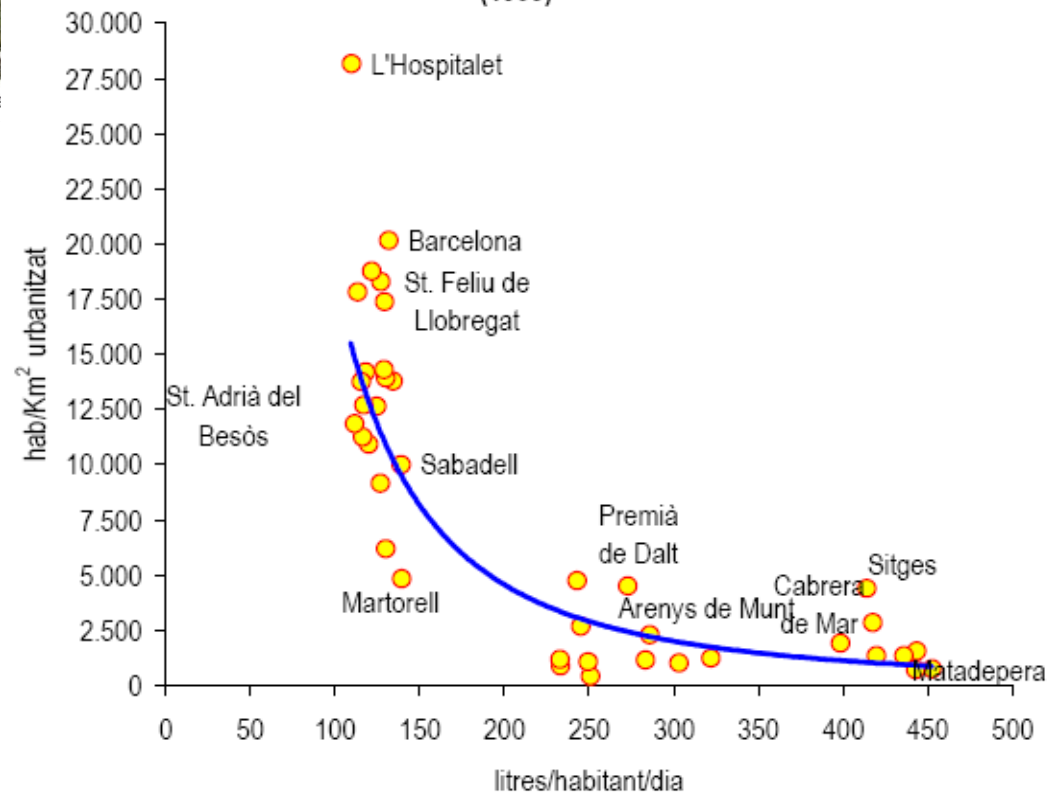
Mostra de piscines a Sant Andreu de Llavaneres

Important Suburban Growth

development inadapted to climate
Reverse link between density
And water consumption

Source : Rivera, Capellades, Sauri, 2001

Relació entre el consum facturat d'aigua domèstica i la densitat urbana
en una mostra de municipis de l'àrea metropolitana de Barcelona
(1999)



Median demand in **dense area**: 130 lcd

Barcelona down to 109 lcd in 2010

Median demand in **suburbia** : > 200 lcd,
up to 500 lcd

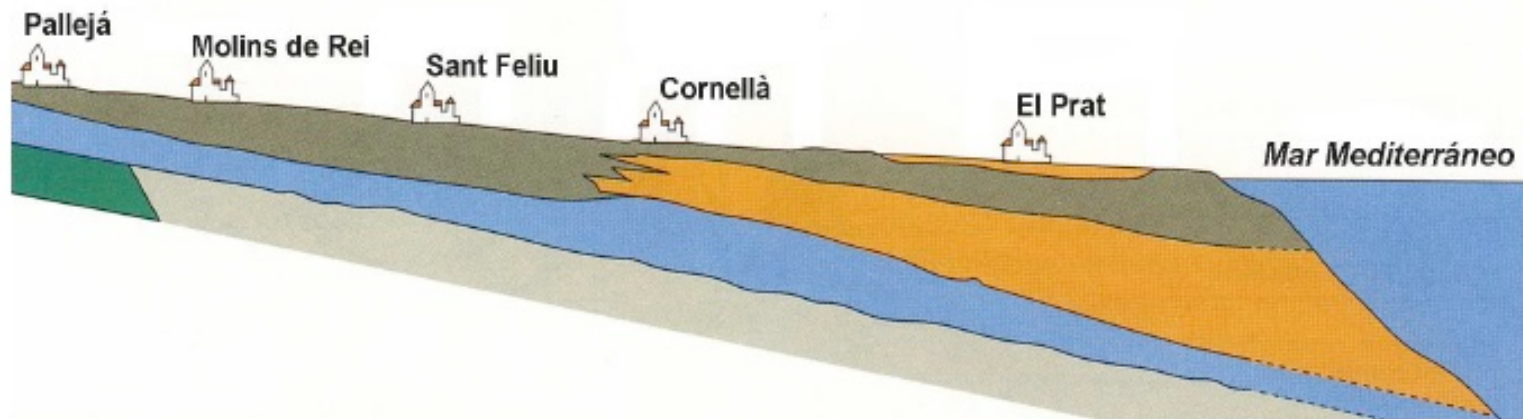
Chosen option: new Infrastructure and Technology

- In 1997, dream to transfer water from the Ebro or Rhone, but shelved
- In 2008, 100-yr drought : tankers from Tarragona and Marseilles, and new disputes; then it rained ...
- In 2009, Desalination & WW reuse : High OPEX, relatively low CAPEX (compared with additional dams & transfers)

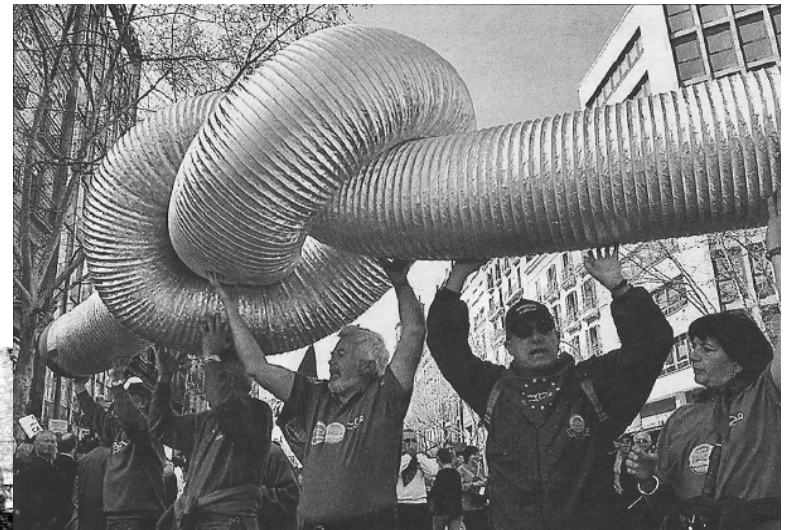


But also, Aquifer recharge

- Llobregat Delta aquifer: early case of integrated management with users participation
- Agbar develops the 'conjunctive use' surface – ground; both aquifer and river recharge



Prices, droughts, water wars



Against
The
transfers

And ...

Against
more levies
And IBTs



Barcelona and sustainability

- The long tradition to transfer water from long distance and subsidize the service (civil engineering / quantity issue) is out
- Replaced by a problematique of quality (sanitary/chemical engineering) with sophisticated technology, implying little public participation, and no territorial conflicts
- The consumer equity issue plus social tariffs: dealt separately
- Control of the local aquifer needs to be extended

Italy : a Governance Reform, Galli Law (1994)

- Before: 14000 WSS management units for 8000 communes, uncomplete infrastructure (sewage works), EU Directives not met
- The reform: concentrate water and wastewater utilities together at supra-local (optimal) level, and price services closer to full cost
- While water resources are public, utilities cannot be kept under direct labour, must have commercial status, and are regulated with same formula as in UK ($r_{pi} + k - \text{efficiency gains}$)
- After 10 years' debate, the concentration in the ATOs took place at the level of provinces, not catchments.

The 91 ATO



Regione	n° ATO	n° Comuni	Popolazione
ABRUZZO	AB 1 - Aquilano	36	102.066
	AB 2 - Marsicano	35	131.090
	AB 3 - Pelicciolo Alto	37	75.167
	AB 4 - Pescara	64	439.009
	AB 5 - Teramo	61	256.678
	AB 6 - Chieti	62	276.634
BASILICATA	BA 1 - Unico	131	810.300
CALABRIA	CL 1 - Cosenza	100	761.618
	CL 2 - Catanzaro	60	356.480
	CL 3 - Crotone	27	177.547
	CL 4 - Vibo Valentia	50	178.613
	CL 5 - Reggio Calabria	67	678.221
CAMPANIA	CA 1 - Alta Capua	193	732.313
	CA 2 - Napoli Volturno	136	2.821.640
	CA 3 - Salerno Vesuviano	144	788.021
	CA 4 - Salerno	78	1.054.825
EMILIA ROMAGNA	ER 1 - Piacenza	48	186.363
	ER 2 - Parma	67	362.013
	ER 3 - Reggio Emilia	45	419.865
	ER 4 - Modena	67	692.722
	ER 5 - Bologna	80	963.838
	ER 6 - Ferrara	28	265.341
	ER 7 - Ravenna	18	349.997
	ER 8 - Forlì/Cesena	30	390.198
	ER 9 - Rimini	20	205.253
FRIULI VENEZIA GIULIA	FV 1	61	177.179
	FV 2	136	520.444
	FV 3	25	138.119
	FV 4	8	291.620
LAZIO	LA 1 - Nord	61	788.631
	LA 2 - Centrale RM	111	3.868.097
	LA 3 - Centrale FI	81	173.030
	LA 4 - Meridionale LT	36	666.292
	LA 5 - Meridionale FR	66	678.803
LIGURIA	LI 1 - Spezzino	32	278.285
	LI 2 - Genova	67	933.137
	LI 3 - Savona	69	783.105
	LI 4 - Imperiese	67	216.986
	LI 5 - Rapallo	244	998.729
LOMBARDIA	LO 1 - Brescia	200	1.106.373
	LO 2 - Lecco	60	311.122
	LO 3 - Bergamo	119	536.037
	LO 4 - Como	103	637.046
	LO 5 - Lodi	62	288.674
	LO 6 - Mantova	78	378.128
	LO 7 - Pavia	190	498.751
	LO 8 - Sondrio	79	176.582
	LO 9 - Varese	141	816.806
	LO 10 - Provincia di Milano	186	2.312.557
	LO 11 - Milano	1	1.301.551

Regione	n° ATO	n° Comuni	Popolazione
MARCHE	MA 1 - Marche nord	67	340.830
	MA 2 - Marche centro AN	65	381.882
	MA 3 - Marche centro MC	66	326.991
	MA 4 - Marche sud Alto Fiume	27	113.051
	MA 5 - Marche sud AP	56	287.824
MOLISE	MO 1 - Unico	136	331.468
PIEMONTE	PI 1 - Verbania	165	592.692
	PI 2 - Biella	165	446.477
	PI 3 - Turin	309	2.308.729
	PI 4 - Cuneo	190	656.349
	PI 5 - Asti	106	296.406
PUGLIA	PU 1 - Unico	253	4.082.823
SARDEGNA	SA 1 - Unico	377	1.680.701
SICILIA	SI 1 - Palermo	82	1.240.762
	SI 2 - Messina	104	688.915
	SI 3 - Trapani	24	434.038
	SI 4 - Enna	20	186.146
	SI 5 - Catania	56	1.088.323
TOSCANA	TO 1 - Arezzo/Grosseto	65	758.668
	TO 2 - Firenze/Rapenna	33	703.944
	TO 3 - Livorno nord	28	631.497
	TO 4 - Livorno sud	62	766.179
	TO 5 - Prato/Varese	60	1.107.368
UMBRIA	UM 1 - Perugia	37	297.497
	UM 2 - Terni	34	370.612
	UM 3 - Foligno	62	364.160
VALLE D'AOSTA	VA 1 - Unico	22	162.008
VENETO	VE 1	66	208.060
	VE 2	115	897.939
	VE 3	24	661.663
	VE 4	63	286.129
	VE 5	95	788.120
	VE 6	146	1.048.628
	VE 7	72	473.301
	VE 8	10	50.655

Legenda:
 Affiliamento a società gestita
 Spa unica (IPSP)
 Consorzio a tutti
 Altre (partecipazioni, transazioni, salvaguardia) con metodo
 Non affiliato

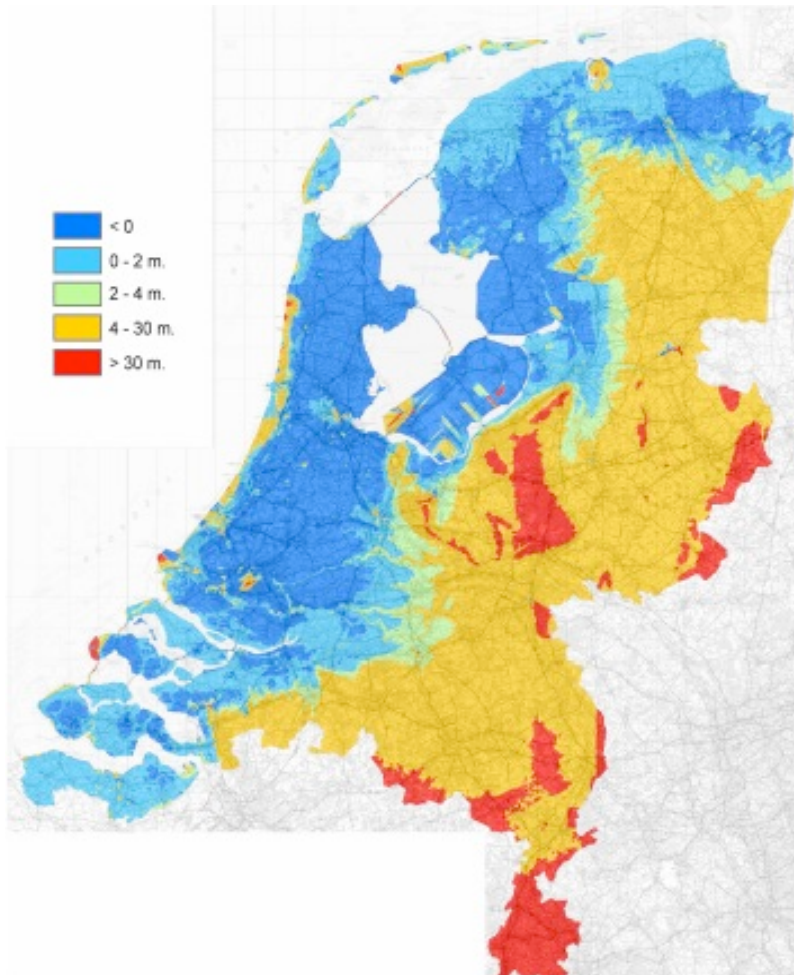
A too ambitious reform?

- Strong tradition of autonomous municipalities and weak State
- It is the relationship between local authorities and utilities which is regulated, not private companies like in England
- large delays in the designation of operators and in investments
- For investors, risks poorly spread, information asymmetry, complexity of regulation ... Not very attractive
- The reform advantages the traditional municipal enterprises of cities (the Aziende)
- There are indeed efficient water utilities (e.g. Torino, Milano, Bologna)

Sustainable failure?

- Behind schedule for WFD and other Directives' implementation
- Focus on catching up with collective systems, while decentralised systems would be better solution (e.g. France's septic tanks)
- Implementing the law implies to treble the price of water! Politically impossible
- November 2009 law: County (ATO) authorities compelled to tender within 2 years for the operator's choice: might push a privatisation of the water sector
- Mediatic-populist reply (Aqua Publica Europea): organise a national referendum to stop all reform and impose public water services management
- **Lesson: water price reforms are slow ones ...**

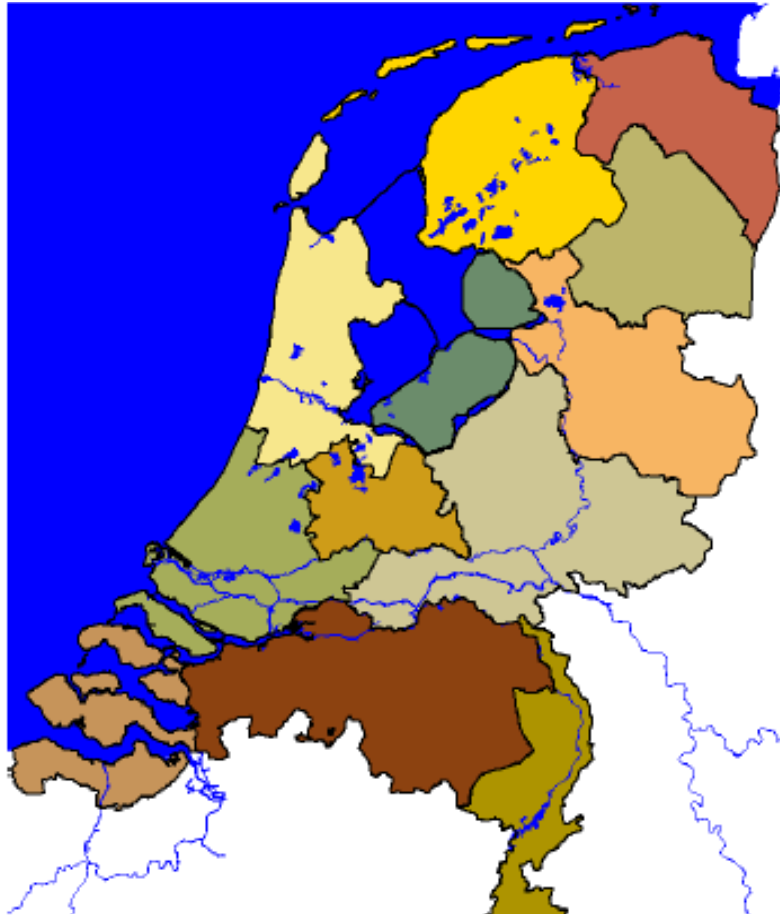
Netherlands



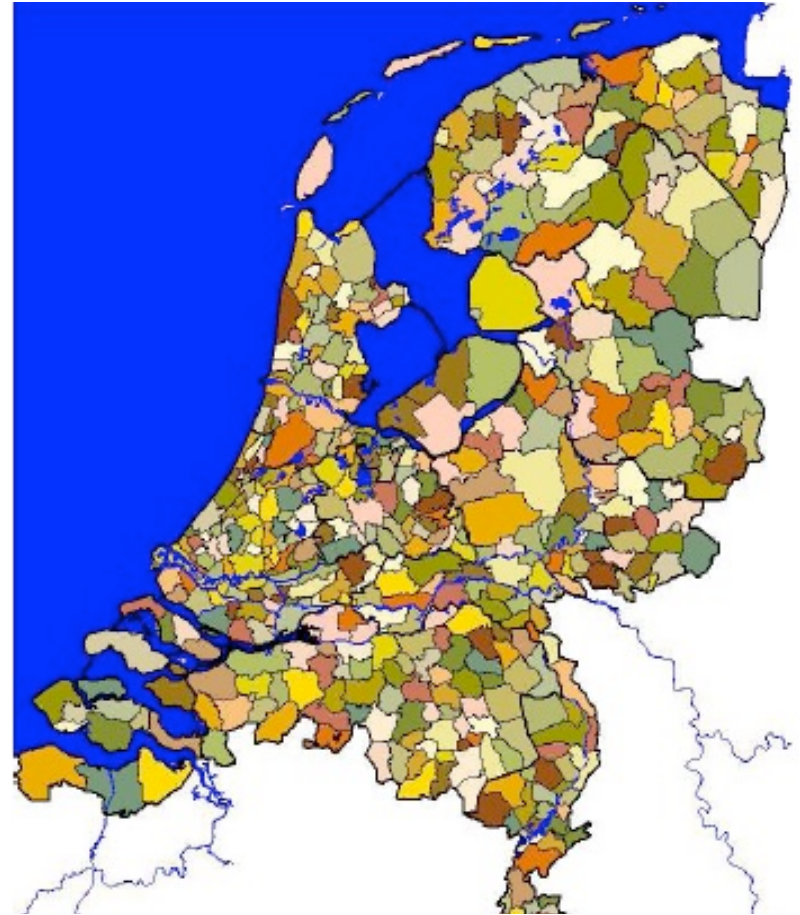
- Half of country and 2/3 population below high tide level
- Very ancient local water institutions
- A strong tradition of subsidiarity and multi-level governance
- But water wastewater and sewage works separate policies



Decentralised water management



12 provinces (water resources planning)



441 municipalities (sewers)

Waterschappen & waterleidingbedrijven:

Voluntary concentration, complex governance



26 waterboards (user-based) : payment per family

10 water supply companies (publicly owned): payment by meters

Transforming 'no-alternative' into sustainability



- Subsidiary governance & mixed payment schemes -> good cost recovery (internal cross-subsidization)
- Waterboards resisted projects to merge them with water companies
- Ecology-minded society now: give more space to water + decentralised schemes (water reuse)
- Sanitation paid through taxes: a form of social tariff? Split water charges better accepted.

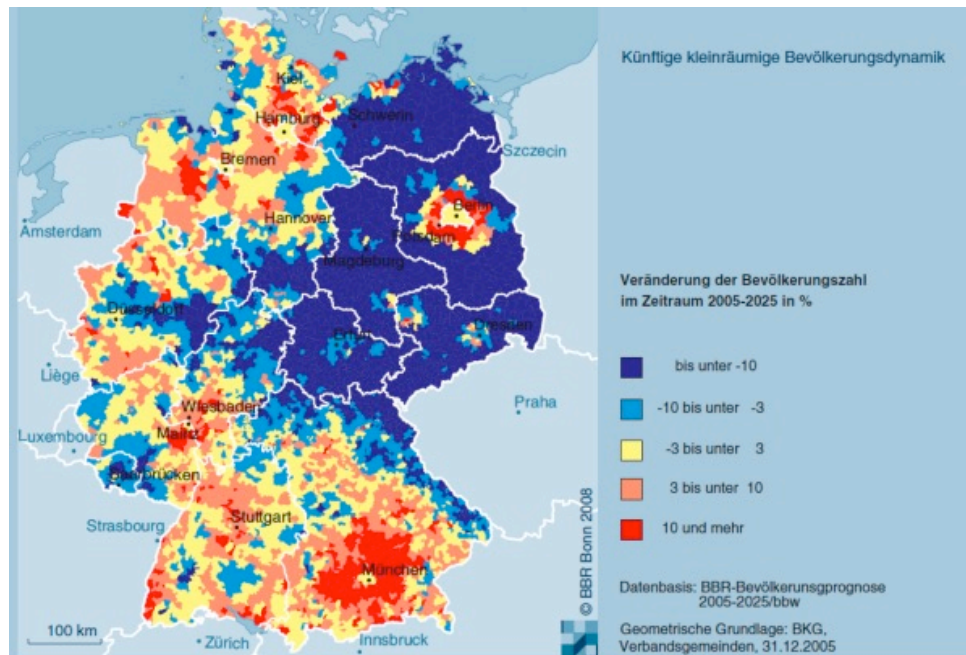
... But growing pressure of globalisation and climate change and sea level issue

Germany: a dramatic fore-runner?

Demographic Change



Population dynamics at a small scale

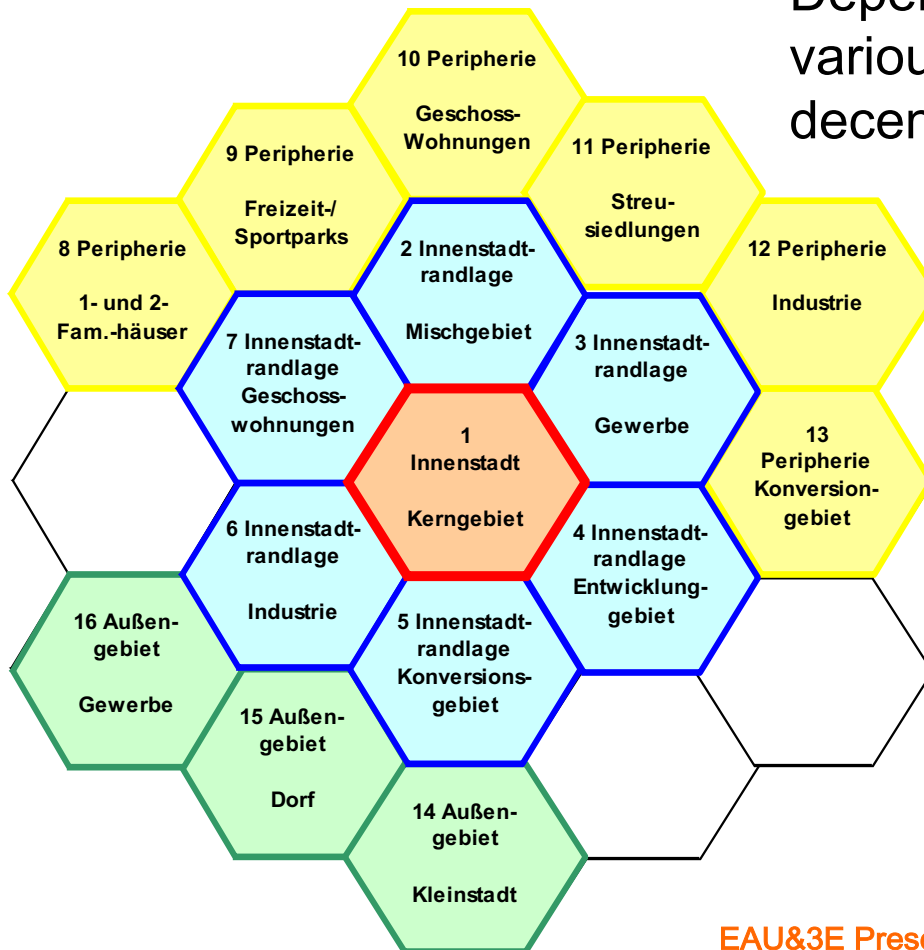


‘Stadtwerke’ facing Sustainable development

- German tradition is to integrate public services (water-gas-electricity-district heating-public transport) in municipal enterprises: stimulate local economy, resist Prussian control
- Growing evolution towards formal privatization and partial integration at regional scale (concentration): *impenetrable?*
- Presently allows to face serious financing issues due to consumption collapse: **Typically in new Eastern Länder**
- Oversized systems push some urban ecologists to propose a radical shift combining reduced public services and decentral systems. Diwn to 45 lcd ...**Paradox??**

Model City „netWORKS“

Depending on urban density, experiment various innovations in decentral. Or semi-decentral systems.

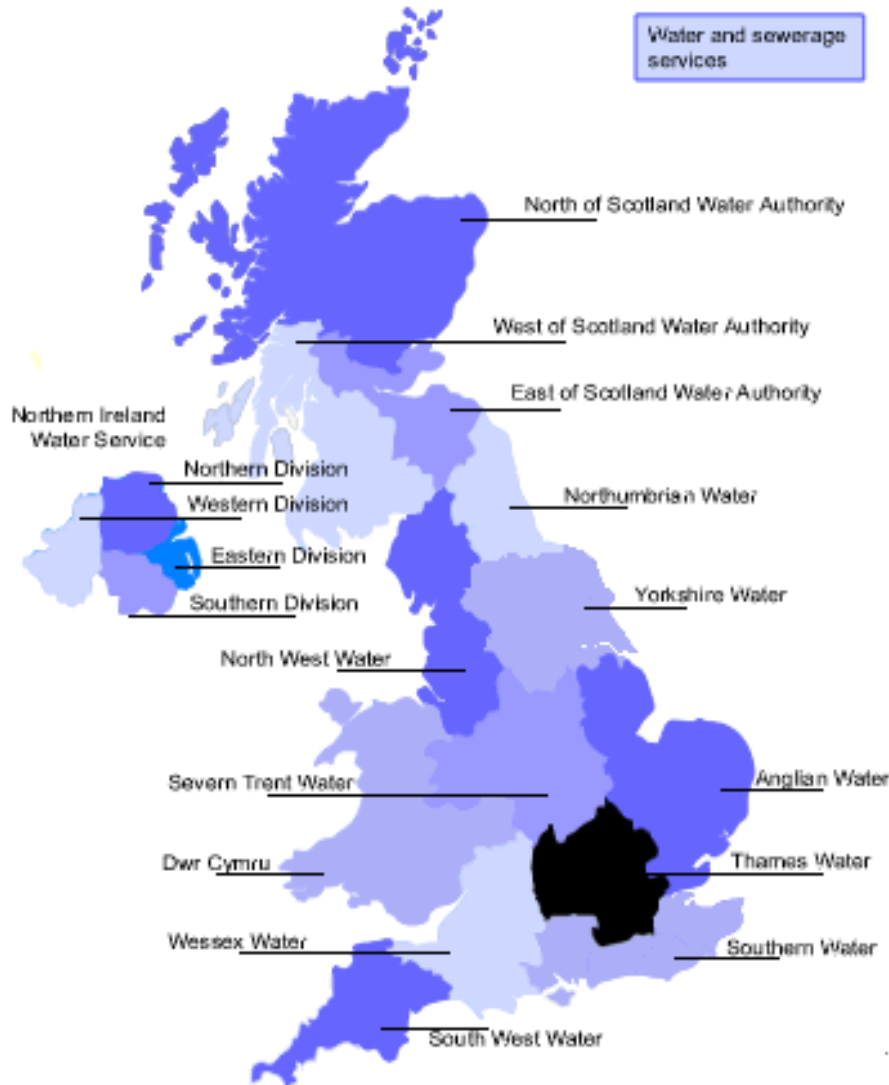


Neighbourhood level projects (e.g. IBA Hamburg) + assessment models comparing central. vs decentral.

Material and energy balances, (indirect consideration of climate change), costs/recipes ...

Social dimension mentioned, but no tariff/charges impact study yet

England - Wales



Privatisation created a peculiar situation of confrontation between companies and customers (bills in arrears up)

Despite investments in leaks control, still companies must face growing Scarcity in the South East.

Encourage customers to conserve, thru Refurbishing/harvesting-> *Waterwise UK*

But companies complain: no bonus from OFWAT while they lose money ...

A continuing metering issue ...



- To meter or not to meter? Very high initial cost (£1.4 bn in 1990)
- Private companies would like to universalize metering and push water conservation in homes,
- But they want their recipes to stay the same, and to improve trust with customers
- Today more than 25% customers have above 6 months' overdues; UK first country to study the 'water poor' issue

Belgium

- Water services in municipal hands, with unfinished sewage collection & treatment. New context of full cost pricing (WFD art. 9, taken seriously)
- Public water supplies concentrate quickly and sewerage is now regionalised, to compensate price impacts thru cross-subsidies
- Various (2-part) tariff structures with IBTs, not for conservation but for social reasons. **Results are disappointing in Flanders**
- Water companies fear spiraling down effect: large industrial customers quit, but they drill wells. So do residents with rainwater harvesting => consumption goes down (mean 91 lcd), prices go up (40% in 5 years – should continue), socially unacceptable ...

... and France?

- The most heterogeneous situation, with very tiny and very large utilities (more than 10000 for water supply alone, Paris 2.2 million; 900 000 km of water mains, more than 17000 sewage works)
- Difference with the US: revolving fund is our *Agences de l'eau*, which get their money from water bills (16% of total, sewerage incl.); metering widespread, but one bill per property (submetering in half of condominiums)
- Finishing water pollution control from cities while pipe renewal was increasingly needed => average prices double 1991-2004
- Water policy became a hot issue: water consumption down, prices up, a few corruption affairs, water a planetary issue, diffuse pollution from agriculture ... We need tools to address the global picture !

Conclusion

- In most European countries, concentration/centralisation of water utilities at supra-local level is taking place, but not really evaluated in the 4 dimensions of sustainability.
- Many software tools available to support long term infrastructure management, but use limited by lack of prioritization
- Few foresight tools for future water demands, while coupling with asset management might lead to partly re-design water systems
- A few models take other criteria than money into account (carbon; materials, energy ...)
- The social sustainability dimension is still in infancy.

EAU&3E

Sustainable WSS Management in Large Cities

Are WSS sustainable, even in Europe?

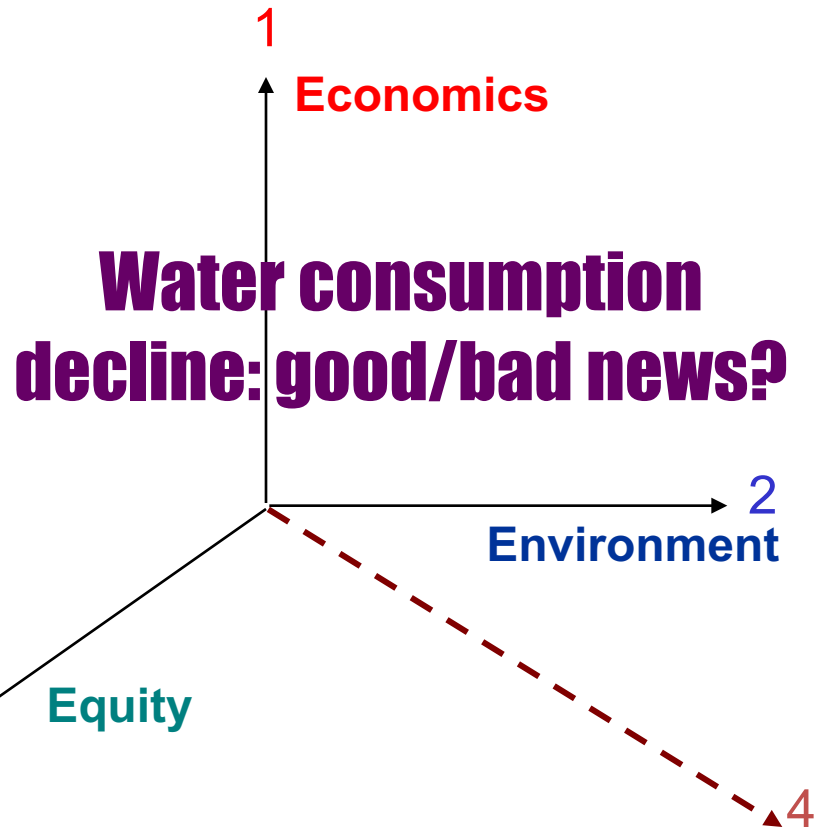
Europe has some of the best WSS in the world. High connection rates, moderate consumption, pollution control; Yet looming crisis

1 – Enough investment to renew the decades' old heavy infrastructure?

2 – How much more needed to improve environmental performance (EU Directives, national laws, etc.)

3 - If 1 and 2 are met, is water price still socially acceptable? Social tariffs? Why not re-mobilise citizen on top of sole consumer payment?

4 – And politically? Need of a 4th axis, on governance and re-territorialization



Analytical Framework

- **Specificity of water services** hard to grasp by usual economic toolbox: e.g., antinomy between water conservation and cost recocery
- Need to develop **New theoretical tools** to analyse water consumption decline : « macro » surveys are insufficient (cf. recent work by Jay Lund & coll.)
- **Redistributive effects** of tariff formulas result being **counter-intuitive** : need for socio-economic «before-after» field surveys
- Future WSS services resilience nécessite une **multi-level governance** relying on a double evolution : « up-scaling » & « down-scaling »

Methodology

- 2 first years : **a survey** on other developed countries' practices (Europe, USA, Australia)
- Contribute to improve knowledge in the **4 dimensions** considered:
 - What makes water consumption change?
 - How to make systematic & long term infrastructure management/renewal?
 - What sustainable management of the social dimension / right to water?
 - Which new governance formulas could be imagined?
- **Case studies**
 - Paris : important consumption decline (-25% in 15 yrs)
 - Bordeaux : deep aquifer overexploitation
 - Languedoc-Roussillon : water greedy urban sprawl
- Development of **prospective scenarios**

Major results (1)

- Evolution of institutional and functional territories of WSS services in **Europe, USA and Australia**
 - Concentration of utilities at supra-communal scale
 - Emerging « *decentralized* » solutions, alternatives to networks
- In **France** : growing role of the *départements* (counties)
 - Le département : services rationalisation / securing resources
 - County council: actor which could (?) play a key role in WSS and resource governance
 - Issue of controlling water resources by cities and water services?
- **Paris** : decrease in consumptions, redistributivity debate
- **Dimension sociale** : a simulation tool to assess the effects of tariff changes

Chief results (2)

- In **Languedoc-Roussillon** : Forecast drinking water demand in cities with large periurban growth :
 - Statistical analysis at communal (148), neighbourhood (100) and household (500) scale
 - Modelling future water demand: module démographie & housing types, elasticity to price, individual well-drilling, Climate change impacts...
- In **Bordeaux** : deep aquifer overdraft under increasing water demand due to urban sprawl and out-migration
 - Infrastructure sizing and adaptation of the water levies of the Agence de l'Eau
 - Modelling water consumption in public housing (single family vs condominiums)

Future Perspectives

- EAU&3E : only drinking water: include sewage coll. & treatment
 - Collaborations to maintain and develop
 - Testing new tools on other areas in France and elsewhere
 - A final EAU&3E seminar scheduled in 2013: communication and discussion of results
- Thanks for attention