

# **EAU&3E : Data Issues for Sustainable Urban Water Services**

**Bernard Barraqué, DR CNRS emer.**



# Learning to swim in the troubled waters of impure public goods

# Water as an impure public good

(from P. Samuelson, 1954 & V. & E. Ostrom, 1977)

## Rivalry between Users

		Yes	No
Possibility of Exclusion	Yes	<p><b>Private or Market Goods</b></p> <p><i>Chile / Murray Darling mineral water</i></p>	<p><b>Toll or Club Goods</b></p> <p><i>Public Services in developed countries</i></p>
	No	<p><b>Common Pool Resources</b></p> <p><i>Common property</i> <i>Ex. overexploited aquifer</i></p>	<p><b>Fully Public Goods</b></p> <p><i>Lighthouse / navigable rivers / Water in developing countries ?</i></p>

# Two different types of impure public goods

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**CPR**

**WSS**

# From CPR to Club goods to Public Services

Replacing constraining  
Communities (small)  
under Feudal order ...

**Rivalry between Users**

Yes

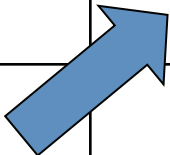
No

First by closed clubs  
Based on freedom  
And equality ...

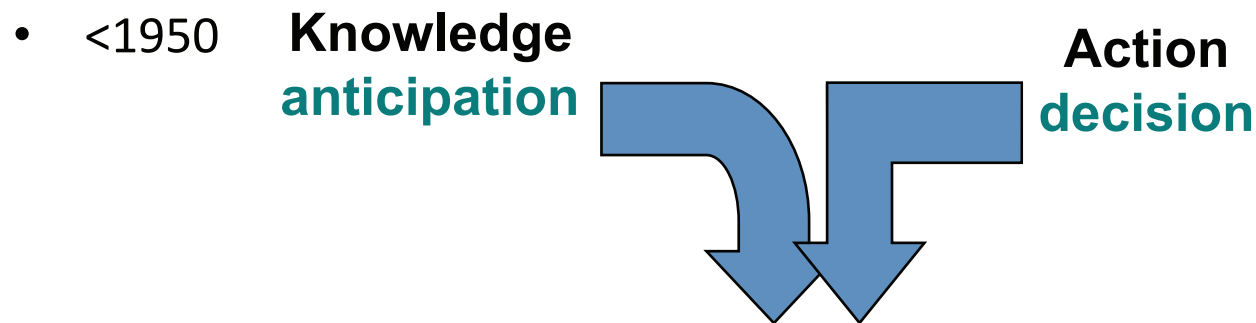
**Possibility  
of Exclusion**

And in 20th century  
By 'open' clubs  
Based on metering/  
Billing to fund big  
infrastructure

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# Environmental Policies' Specificity



**What is at stake and who are the Stakeholders?**

- >1975 **Preliminary Situations Analysis**  
**Correspondence analysis**  
**Hybrid Forums**  
**Advocacy Coalition Framework**

**All are 'poachers & gamekeepers' (?),  
objectivation through mutual learning  
After setting up the double representation system**

## Here I do not focus on water resources

- **Dave Huitema just covered it**
- **I just want to mention one issue: are modern and very large River Basin Institutions (RuhrVerband, Dutch Waterboards, French Agences de l'eau) still 'ostromian' communities ?**
- **And recall that water management today requests a vast amount of data, on water quantity and water quality**
- **A thesis made on IWRM implementation in Brazil showed that there were good data on quantities of water resources but not on their quality**
- **And conversely poor data on water services quantities, better on their quality.**
- **Worst: not felt as a problem by the water policy community!**

## I focus on the sustainability of public services

- **Therefore on the issues and data for cities of developed countries: Huge capital maintained by professionals under control of our elected representatives, paid by customers**
- **However remember that even in Europe, not everybody is connected to public potable water (e.g. Galicia, Ireland ... not talking about sewage collection & treatment)**
- **Today there are ecology-minded people and also individualists who wish to 'unplug' from the networked public service**
- **More generally, the decrease of water volumes sold in down-town European cities creates a new crisis, and illustrates the need for managing the 3 axes of sustainability simultaneously: **the 3 Es****



# Urban Water Sustainability Issue

A more analytic vision

## Are European WSS sustainable?

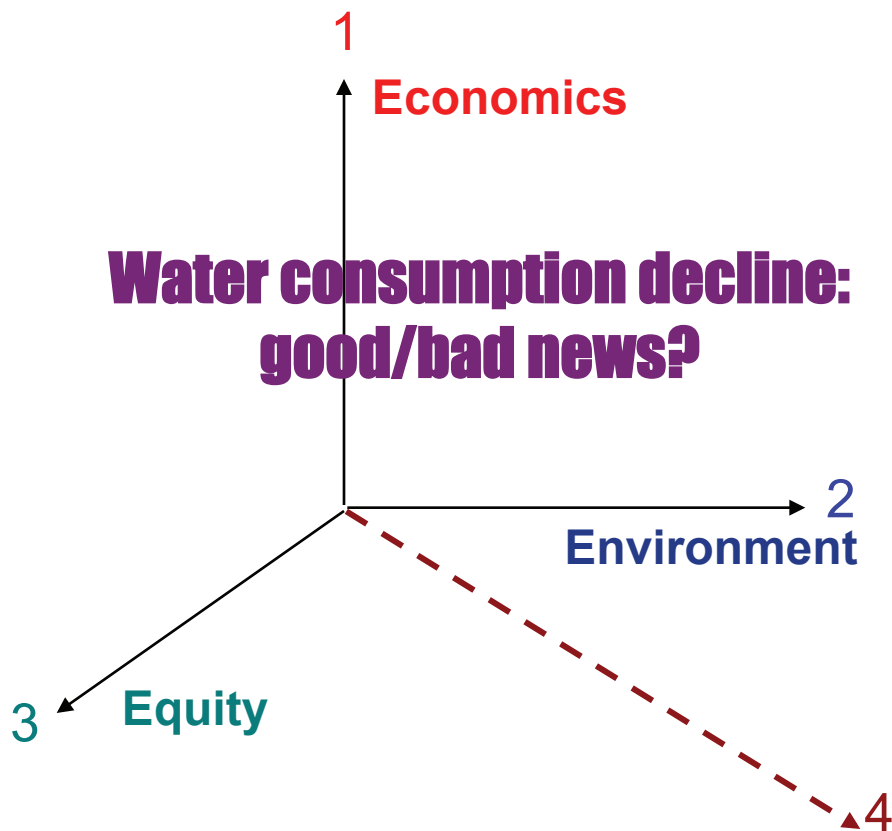
Europe has some of the best WSS in the world. High connection rates, moderate consumption, pollution control; **Yet looming crisis**

**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 return to citizens (taxes) on top of sole consumer-pays?

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



## Are European WSS sustainable?

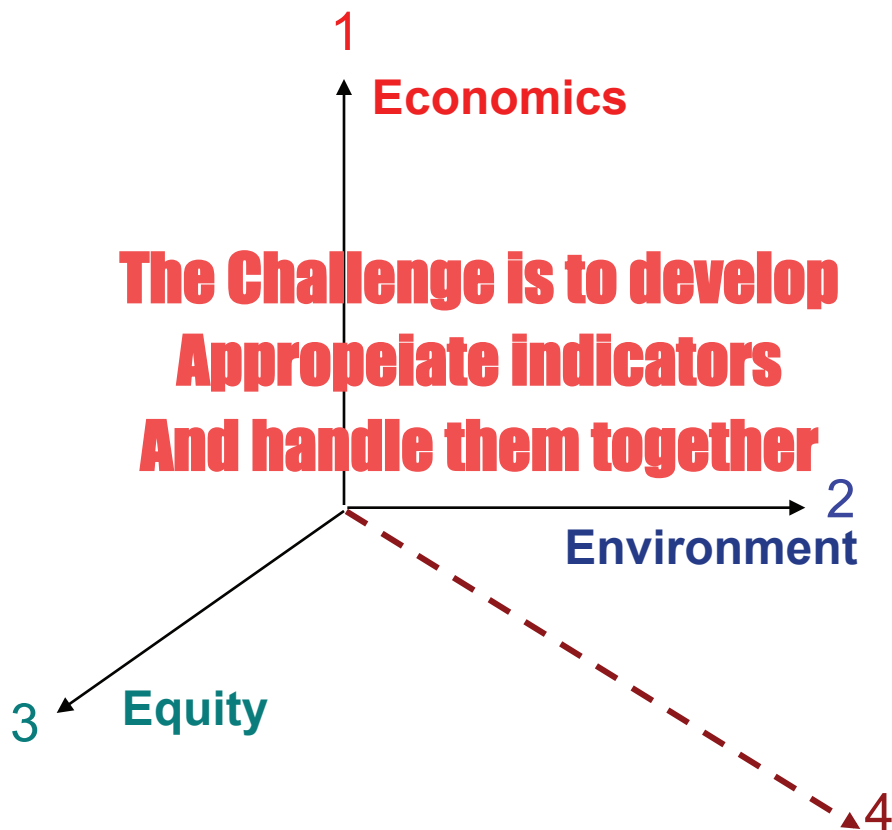
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# Italy : from 8000 communes to 91 ATO



**Legenda:**  
 - ATO (Ambiti Territoriali Ottimali)  
 - Dgm. ex-ante (IUPP)  
 - ATO (gestione, trattamento, salvaguardia) con metodo  
 Non affidato

Regione	n° ATO	n° Comuni	Popolazione
ABRUZZO	AB 1 - Agulone	36	162.898
	AB 2 - Marsano	35	191.898
	AB 3 - Primo Alto Sarno	37	79.167
	AB 4 - Pescara	64	439.009
	AB 5 - Teramo	61	254.478
AB 6 - Chieti	62	270.631	
BASILICATA	BA 1 - Unico	131	810.200
	CL 1 - Cassino	105	761.919
CALABRIA	CL 2 - Calabria	60	334.483
	CL 3 - Crotona	27	177.647
	CL 4 - Vibo Valentia	30	178.619
	CL 5 - Reggio Calabria	67	678.221
	CA 1 - Alto Casertano	199	732.213
CAMPANIA	CA 2 - Napoli Volturno	136	2.821.649
	CA 3 - Salerno Vesuviano	144	788.027
	CA 4 - Salerno	76	1.654.885
EMILIA ROMAGNA	ER 1 - Piacenza	48	285.363
	ER 2 - Parma	47	362.919
	ER 3 - Reggio Emilia	45	479.869
	ER 4 - Modena	47	429.722
	ER 5 - Bologna	60	965.838
	ER 6 - Ferrara	29	265.241
	ER 7 - Ravenna	18	349.992
	ER 8 - Forlì/Cesena	30	320.258
ER 9 - Rimini	20	265.293	
FRIULI VENEZIA GIULIA	FV 1	62	277.279
	FV 2	136	520.444
	FV 3	25	138.119
	FV 4	9	291.828
LAZIO	LA 1 - Nord	61	288.431
	LA 2 - Centrale RM	111	3.669.097
	LA 3 - Centrale FI	81	173.088
	LA 4 - Meridionale LT	36	666.292
	LA 5 - Meridionale FR	66	478.803
LIGURIA	LI 1 - Spezzino	32	225.286
	LI 2 - Genova	67	933.127
	LI 3 - Genova	69	763.109
	LI 4 - Imperiese	67	216.996
LOMBARDIA	LO 1 - Bergamo	244	969.723
	LO 2 - Brescia	200	1.106.373
	LO 3 - Lecco	60	311.122
	LO 4 - Cremona	119	334.837
	LO 5 - Cremona	103	637.646
	LO 6 - Leff	62	185.474
	LO 7 - Mantova	79	372.739
	LO 8 - Pavia	190	489.731
	LO 9 - Sondrio	79	176.569
	LO 10 - Varese	141	816.906
	LO 11 - Provincia di Milano	196	2.812.557
	LO 12 - Milano	1	1.301.251

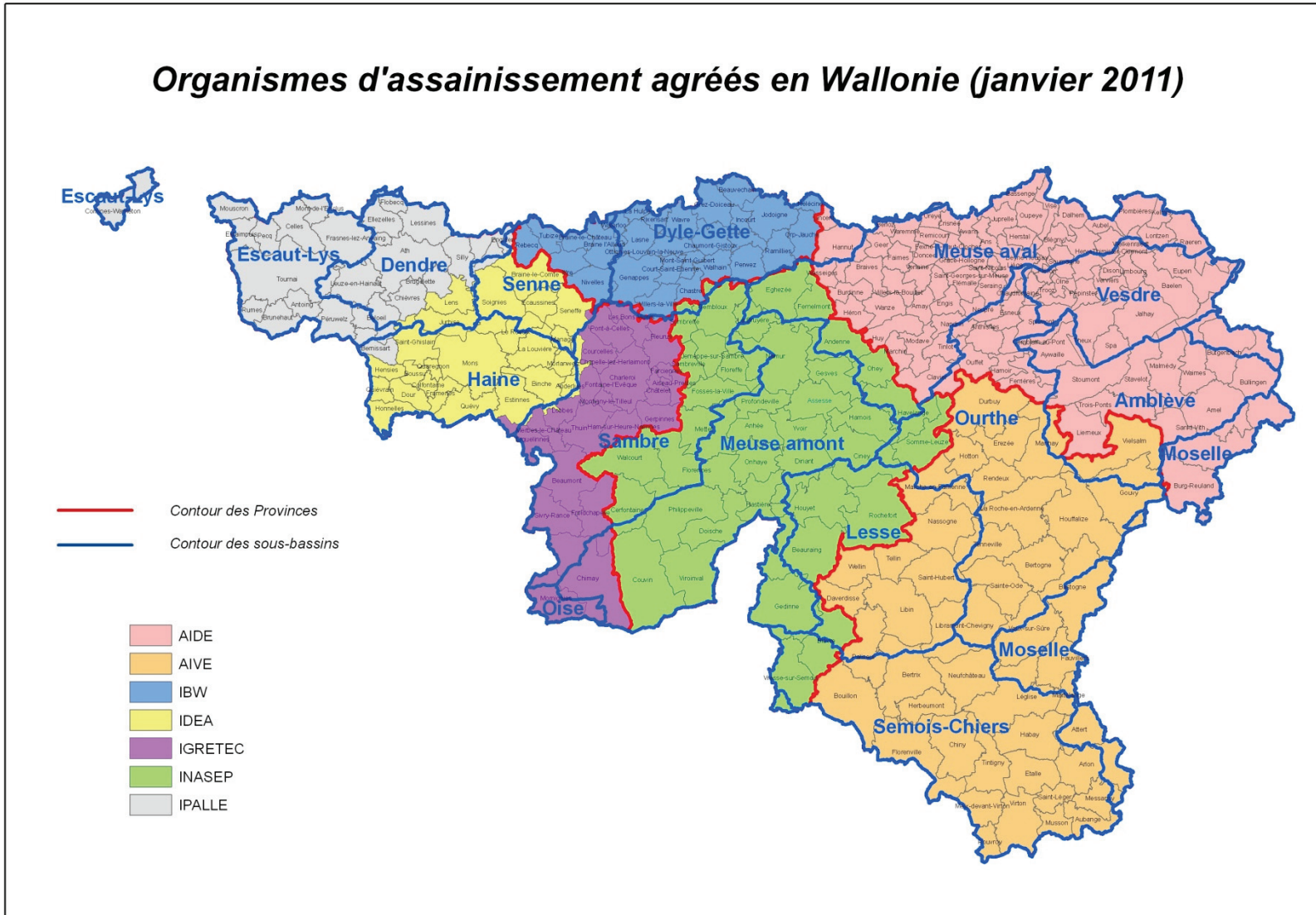
Regione	n° ATO	n° Comuni	Popolazione
MARCHE	MA 1 - Marche nord	67	340.830
	MA 2 - Marche centro AN	45	391.982
	MA 3 - Marche centro MC	46	326.991
	MA 4 - Marche sud Alto Fiume	27	113.821
	MA 5 - Marche sud AP	56	287.824
MOLISE	MO 1 - Unico	136	331.446
	PV 1 - Verona	165	592.669
PIEMONTE	PI 2 - Biella	185	449.477
	PI 3 - Turin	309	2.304.729
	PI 4 - Cuneo	160	664.349
	PI 5 - Asti	126	296.486
	PI 6 - Alessandria	147	322.782
	PI 7 - Unico	258	4.062.829
SARDEGNA	SA 1 - Unico	377	1.660.791
	SI 1 - Palermo	82	1.240.262
SICILIA	SI 2 - Messina	108	688.319
	SI 3 - Trapani	24	434.093
	SI 4 - Catania	29	184.146
	SI 5 - Catania	26	1.088.323
	SI 6 - Agrigento/Syracusa	65	798.666
TOSCANA	SI 7 - Grosseto/Rapina	33	793.944
	TO 1 - Toscana nord	52	631.497
	TO 2 - Basso Valdarno	62	766.179
	TO 3 - Medio Valdarno	60	1.187.368
	TO 4 - Alto Valdarno	37	297.497
	TO 5 - Toscana Ovest	34	376.612
	TO 6 - Grosseto	62	364.160
UMBRIA	UM 1 - Terni	36	492.977
	UM 2 - Todi	32	221.217
VALLE D'AOSTA	VA 1 - Unico	22	162.006
	VA 2 - Unico	1	178.366
VENETO	VE 1	66	208.060
	VE 2	119	897.939
	VE 3	24	661.863
	VE 4	53	286.129
	VE 5	95	788.128
	VE 6	145	1.048.828
	VE 7	72	473.301
	VE 8	10	50.655

**1994: Galli Law**

## Italy : a too fast and rigid reform ?

- The reform left no role for local authorities, except fight for one !
- No more direct management, but public enterprises or concessions with a price revision like in England & Wales
- But with heavy investments to do : WFD + sewage works to be completed + ageing pipes => **treble** the water price? Berlusconi government pushed a more liberal interpretation (Ronchi decree)
- But the reform was blocked by supporters of public procurement: a referendum gave massive support to public procurement + Zero interest on loans.
  - **As a consequence, investment collapse ...**

# Wallonia wastewater: concentration to Face UWWWD

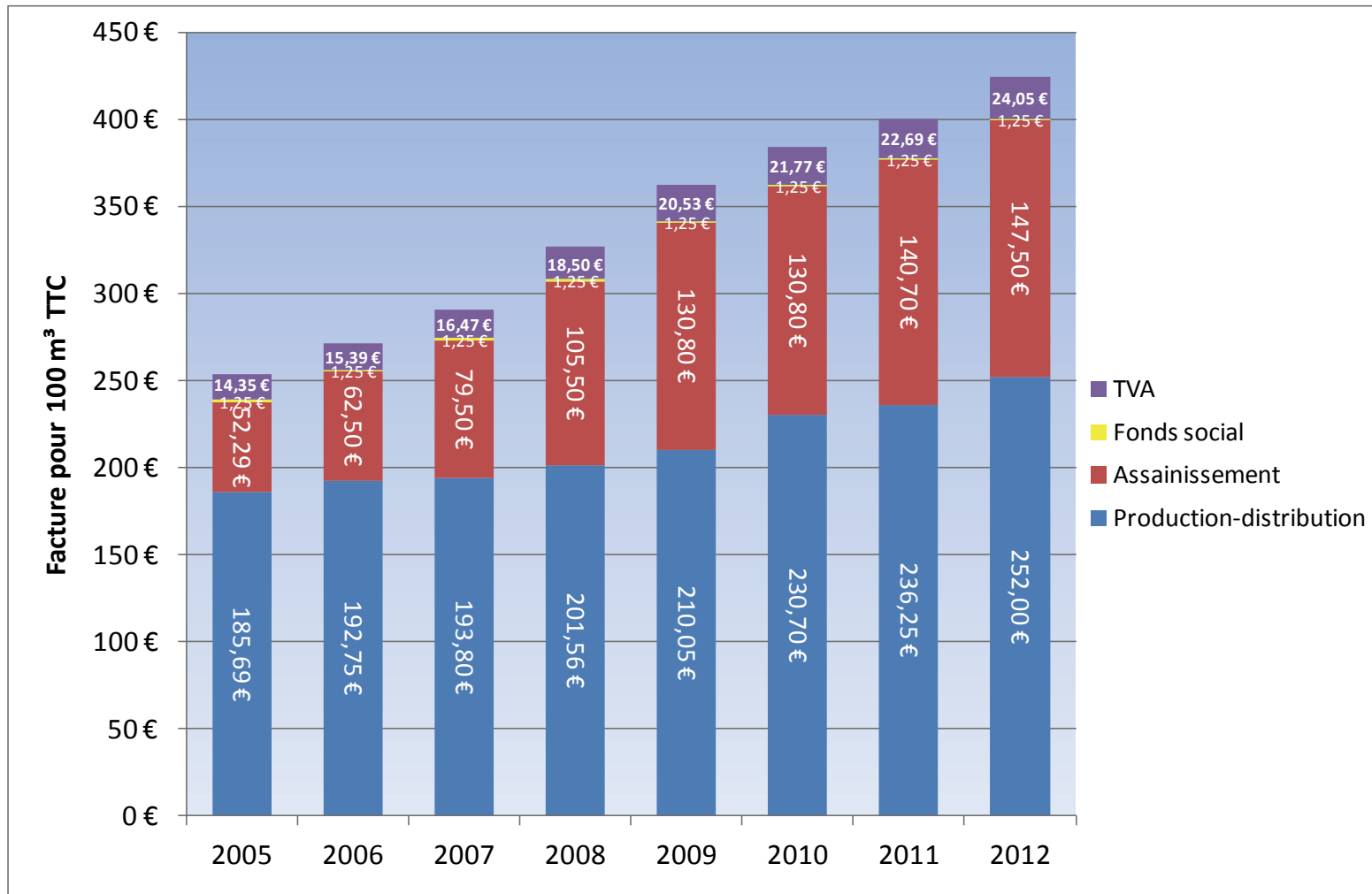


## New Water Tariff closer to Full Cost

Pricing structure with fixed part and growing blocks

Fixed Charge	20 CVD + 30 CVA
From 0 to 30 m <sup>3</sup>	0.5 CVD
From 0 to 5 000 m <sup>3</sup>	CVD + CVA
From 5 000 to 25 000 m <sup>3</sup>	0.9 CVD + CVA
Beyond 25 000 m <sup>3</sup>	aCVD + CVA with $0.5 \leq a \leq 0.9$
+ Water Social Fund	0.0125 €/m <sup>3</sup>
It applies to households, industries and farmers as well	

# Resulting Water Bill : +70 % in 7 years !





## Alternative water sources use: Exiting ?

Use of alternative source for indoor use	Average (m <sup>3</sup> /y)	consumption (l/capita.day)
Yes	59.1	71.6
No	80.6	105.0

Estimated total rainwater used for indoor uses : **11 million m<sup>3</sup>.**

→ **Loss of 10 million € for wastewater treatment.**

## France: contesting 'privatisation' and new data needs

- **A few corruption affairs during a drought period and within the U.N. water decade put water services on the political agenda**
- **In the 1990's a law (Sapin) mandated opening to tender at the end of each delegation contract**
- **This stirred the development of performance indicators after the british example (OFWAT)**
- **They were combined with our '3Es' approach**
- **It reinforced our idea that one must pay attention to the 4 dimensions of sustainability together, if only to check inconsistencies between them.**

## Just a few paradoxes

- **Claiming water as a Common good but advocating the generalization of individual metering and billing (which is going towards more market)**
- **Like the economists, they forget the notion of transaction costs, which is precisely the cost of the data for the billing**
- **Ignoring the difference between consumer justice and social justice: increasing block tariffs frequently have regressive effects on large and poor families**
- **Opposing smart meters for their supposed intrusion in privacy, while they are an indispensable asset for our analyses (real time info)**
  - **Nobody checks the redistributive effects in the end, Because when they do, they find that prices have little impact**

## Next challenge: who wants these data public?

- **Pascal Arnac (ex-Veolia) wanted to set up a wiki-water budget tool to help citizens put their water utility under scrutiny**
- **I joined him and a municipal-support NGO in a project submitted to Ile de France Region's PICRI tender, but turned down**
- **Pascal also was excluded of the Socialist Party taskforce preparing the presidential election water theme, even though he was a member, and the leaders of the taskforce were not.**
- **Arnac is close to *arnaque*, i.e. swindle (*estafa* in spanish), and they made that bad joke public ...**
  - **When they guillotined Lavoisier, they said:  
*La République n'a pas besoin de savants***

## Analytical Framework

- **Specificity of water assets** hard to grasp by usual economic toolbox: e.g., antinomy between water conservation and cost recovery under volumetric tariffs => tools to improve knowledge of infrastructure and operator's management performance
- Need to develop **New tools** to analyse **water consumption factors** : « macro » surveys are insufficient (cf. work by Jay Lund & coll.)
- **Redistributive effects** of tariff formulas end up being **counter-intuitive** : need for socio-economic «before-after» field surveys
- Future WSS services resilience tends to imply **multi-level governance** relying on a double evolution : « up-scaling » & « down-scaling »
- **Governance plus WFD** : new mix of **technologies/territories**

## Methodology

- **2 first years : a survey** on other developed countries' practices (Europe, USA, Australia)
- **Contribute to improve knowledge in each of 4 dimensions considered:**
  - What makes water consumption change?
  - Designing 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 (-30% since 1991)
  - Bordeaux : deep aquifer overexploitation => re-allocation of water resources
  - Languedoc-Roussillon : thirsty urban sprawl + drilling fever (?)
- **General difficulty to obtain the appropriate data**

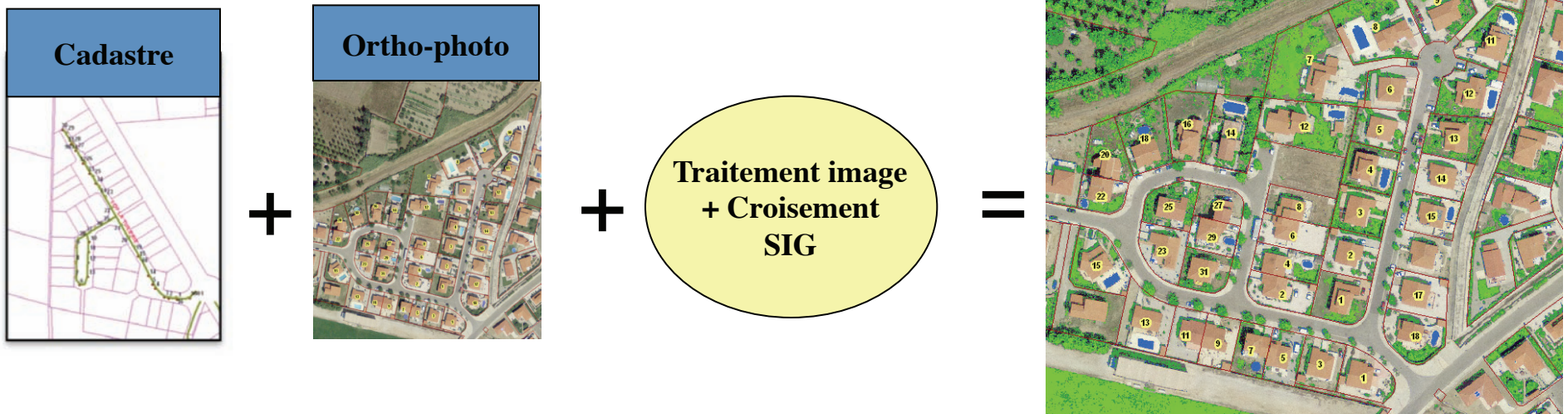
## Demand forecasts

### Micro-analysis of water consumption factors beyond traditional price / income elasticity studies

#### Paris & Languedoc-Roussillon + Los Angeles

- Trying to make use of smart metering to work at census tract level
- Econometric analysis including climate and housing types
- Impact of individual solutions (well drilling, water harvesting)

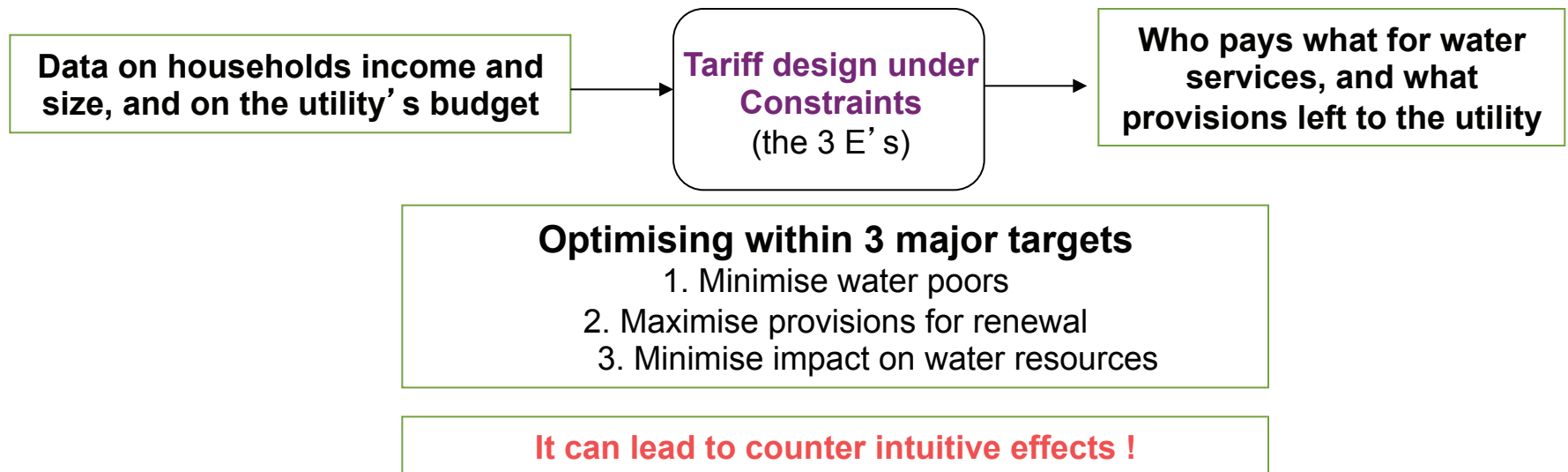
**Example** : typical consumption by lot size  
Confronted with real purchase to find wells



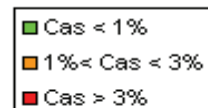
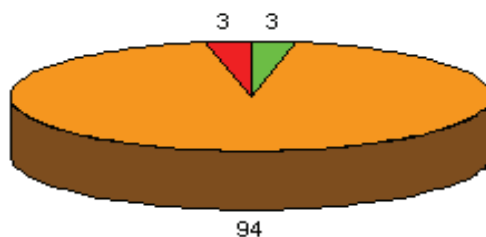
# Social tariff design

We develop a tool to evaluate the distributive effects of any tariff system, based on 'water poverty index' :

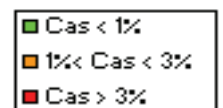
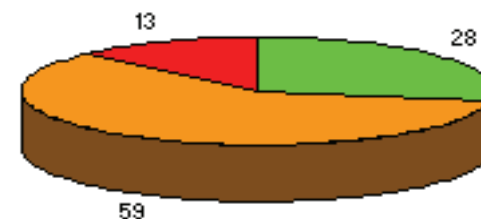
## Multi-purpose solidarity model (TSMO)



Water poverty before



Water poverty after





## Recommendations/conclusion

- **WSS services need to build new knowledge together with consumers/ citizens**
- **It is possible to combine territorial scales where water is a common good, and others where it is a public service**
- **Cost recovery through sole water bills is unsustainable in most cases. Local taxes should be used everytime no obvious service is rendered**
- **In developing countries and low density areas of Europe, can we imagine alternative technology WSS run under the public service ideal (equality-freedom) ?**

## A tribute to Evan Vlachos

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- **Thanks for your attention**
- **<http://eau3e.hypotheses.org>**

(Follow the link **ATHENS** to view presentations in English)