



FLANDERS HYDRAULICS RESEARCH



Freshwater Management in Flanders, Belgium

S. Michielsen, K. Van Eerdenbrugh, J. Baetens

“Coping with Drought and Water Deficiencies: from Research to Policy Making”

Cyprus, May 12-13



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The frog does not drink up the pond in witch he lives.

North American indian saying



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FLANDERS, WATER SHORTAGE?



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FLANDERS, WATER SHORTAGE?



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European Environment Agency:

< 2000m³/ jp is very little

United Nations Conference on Environment and Development:

< 1000m³ /jp is a strong shortage



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FLANDERS, WATER SHORTAGE?



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| Country | 1950 | 1960 | 1970 | 1980 | 1990 | 1995 | 2000 | 2010 | 2025 |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Albania | - | - | - | 7900 | 6460 | 5840 | 5150 | 4410 | 4210 |
| France | 4130 | 3770 | 3370 | 3250 | 3070 | 3060 | 3030 | 2990 | 2860 |
| Italy | - | - | - | 2840 | 2770 | 2770 | 2730 | 2740 | 3020 |
| Poland | - | - | - | 1380 | 1290 | 1240 | 1200 | 1130 | 1090 |
| Portugal | - | - | 3670 | 3220 | 3150 | 3140 | 2840 | 2710 | 2910 |
| Spain | - | - | 2740 | 2380 | 2260 | 2190 | 2060 | 1970 | 2060 |
| Sweden | 24100 | 22700 | 21100 | 20400 | 19800 | 20200 | 20700 | 20200 | 19800 |
| Flanders and Brussels | - | - | - | - | - | - | 1480 | 1442 | 1417 |
| Europe | 5510 | 4990 | 4530 | 4170 | 3990 | 3960 | 3930 | 3890 | 3920 |

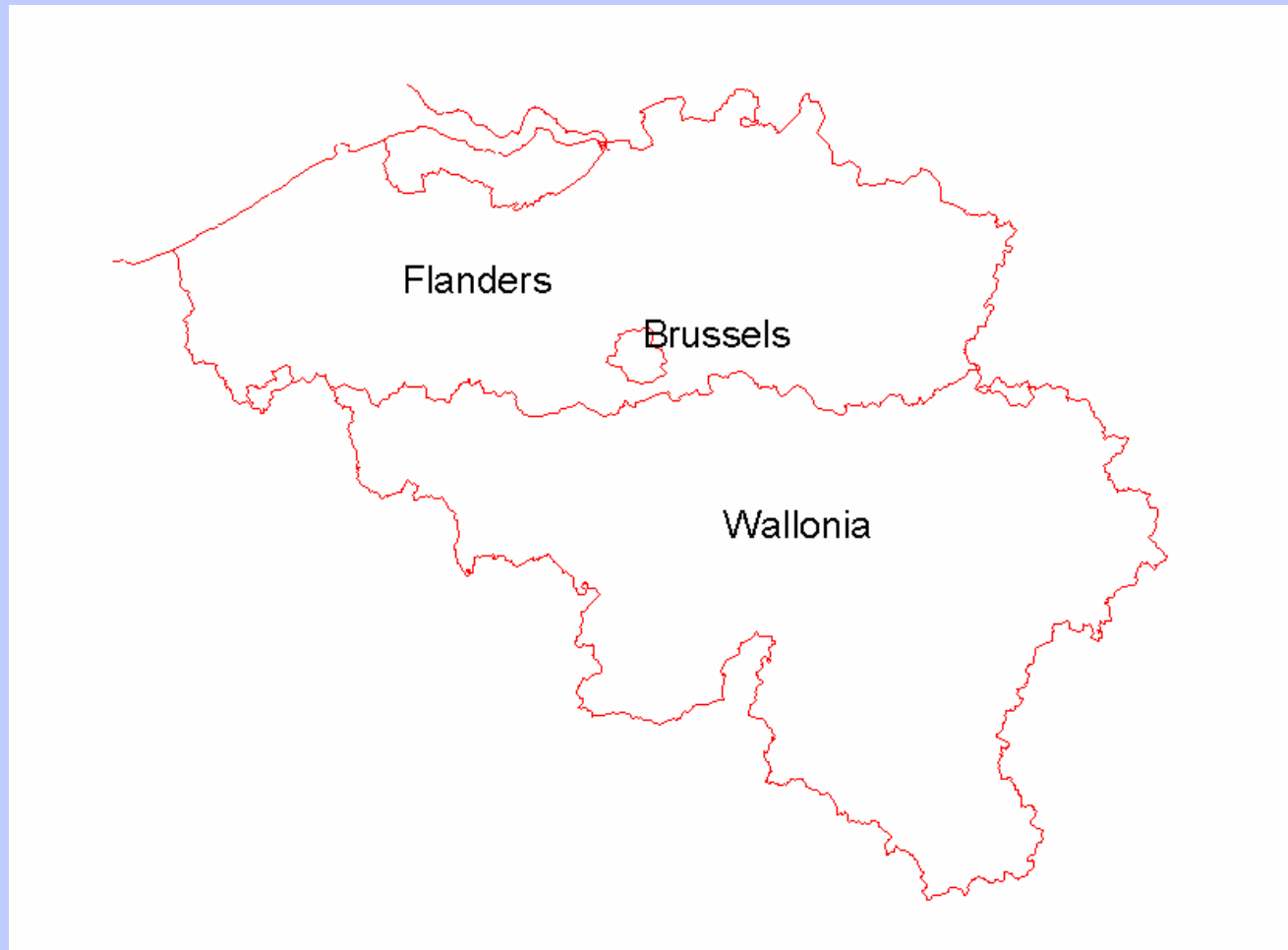


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THE FLEMISH REGION

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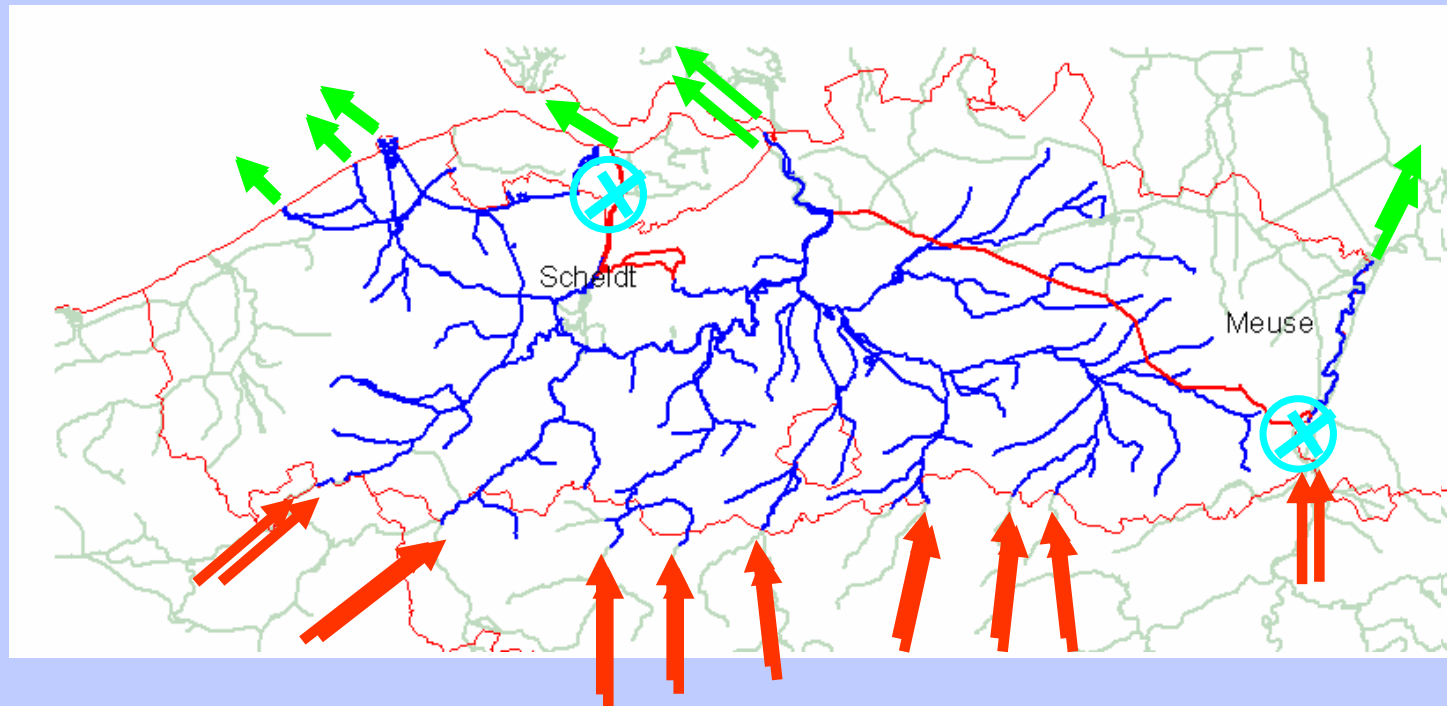
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FLANDERS, DEPENDENT ON WATER



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LOW FLOW STRATEGY:

The choice of an effective set of measures (permanent and operational) to avoid acute water shortages and to use the available amount of water as efficiently as possible and with maximal acceptance.

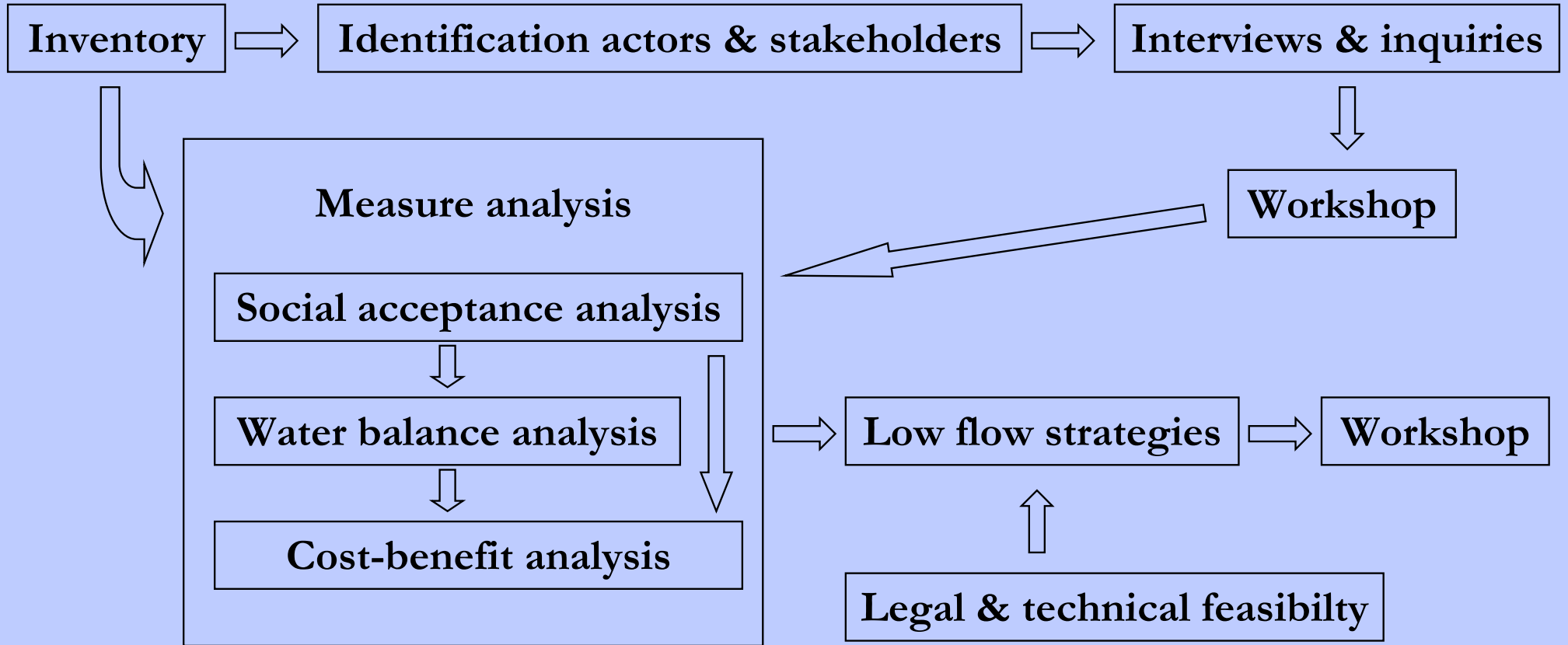




METHODOLOGY - scheme



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COST-BENEFIT ANALYSIS



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What is it?

Expressing the advantages and disadvantages of the measures in the same unit (currency).

How to do it?

- Define the zero-strategy (no measures taken) and the potential measures.
- Identify the effects (financial, direct/indirect & external).
- Express the effects monetarily.
- Actualise the costs & benefits.
- Compare the costs & benefits



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WATER BALANCE ANALYSIS

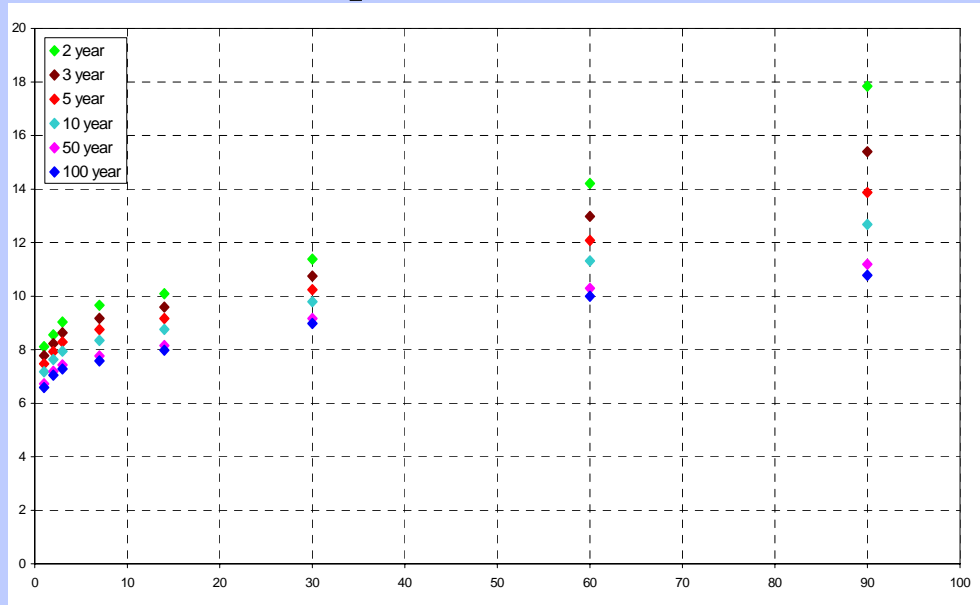


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STATISTICAL ANALYSIS

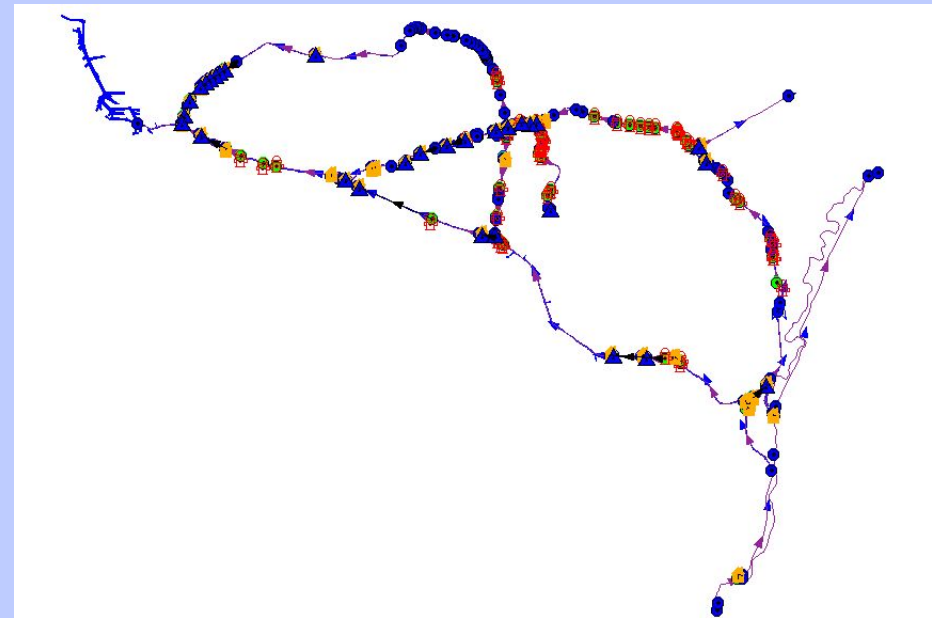
- Return period of low flows
- QDF relationships

Average discharge [m^3/s]



MODELLING

- Testing & evaluating the impact of measures



Aggregation level [days]

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INVENTORY



WATER SYSTEM (natural):

- Hydrology
- Topography
- (Hydro-)geology
- Soil

WATER CHAIN (anthropogenic) :

- Structures
- Withdrawals & discharges
- Wastewater
- Land use
- Demands
 - navigation
 - industry
 - water supply
 - agriculture
 - nature
 - recreation

...



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PROSPECTS



FORECASTING

When does it become critical given the fact that it stops raining during a certain period?

CLIMATE CHANGE

Examine the impact of climatic changes on the water balance and study which problems are to be faced under these possible future conditions.



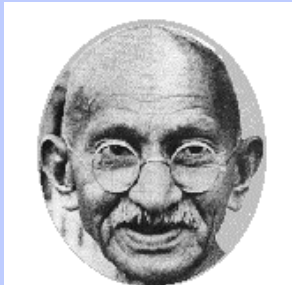
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FRESHWATER MANAGEMENT



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M. Ghandi

**We may utilise the gifts of nature
just as we choose but in her
books the debits are
always equal to the credits.**



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