



**HAL**  
open science

## Water Resources: what part of natural flow do they represent?

Vazken Andréassian, J. Margat, Guillaume Thirel, Pascale Hubert, Charles Perrin

► **To cite this version:**

Vazken Andréassian, J. Margat, Guillaume Thirel, Pascale Hubert, Charles Perrin. Water Resources: what part of natural flow do they represent?. 11th Kovacs Colloquium, Jun 2014, Paris, France. pp.19, 2014. hal-02600761


**HAL Id: hal-02600761**

**<https://hal.inrae.fr/hal-02600761>**

Submitted on 16 May 2020

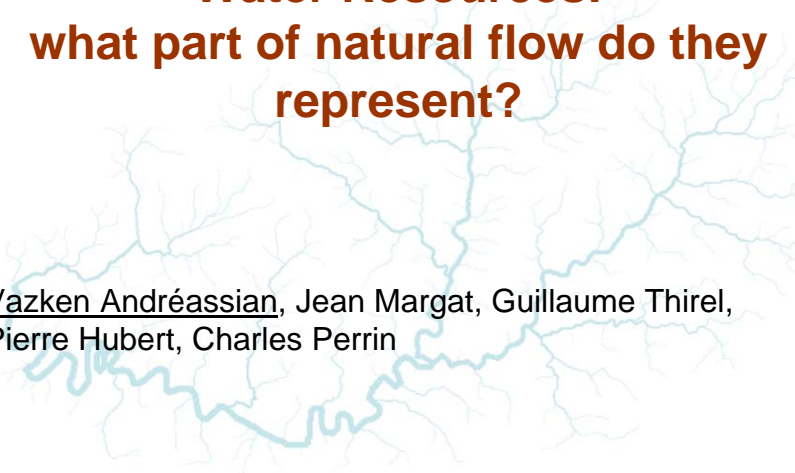
**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.




## Water Resources: what part of natural flow do they represent?

Vazken Andréassian, Jean Margat, Guillaume Thirel,  
Pierre Hubert, Charles Perrin

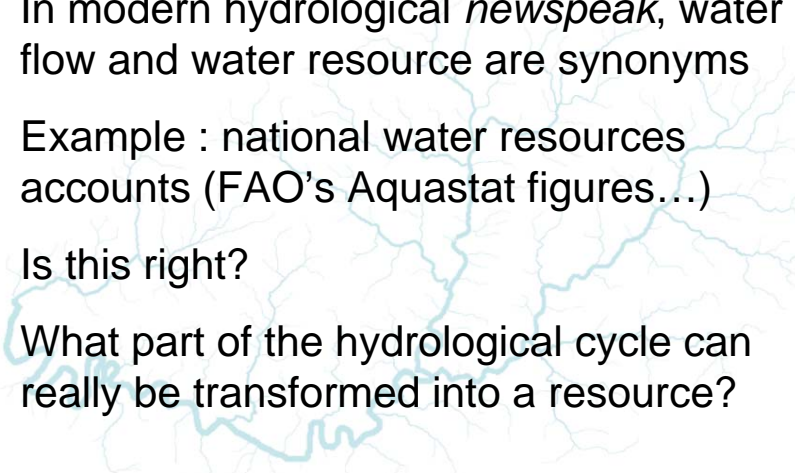


1




## What are water resources?

- In modern hydrological *newspeak*, water flow and water resource are synonyms
- Example : national water resources accounts (FAO's Aquastat figures...)
- Is this right?
- What part of the hydrological cycle can really be transformed into a resource?

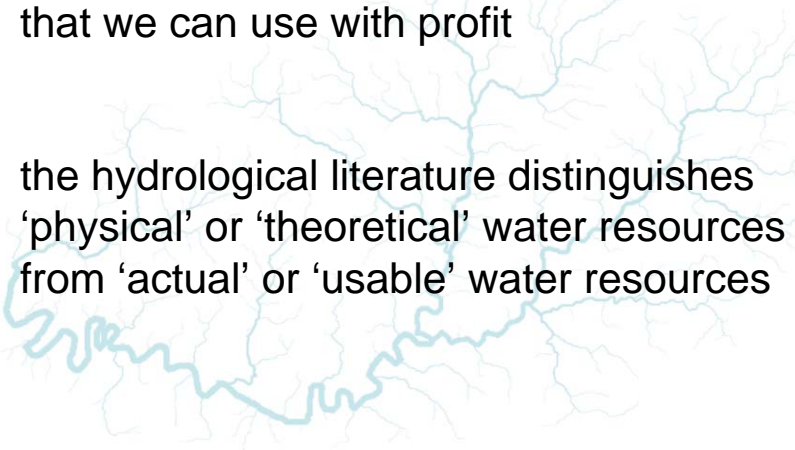


2

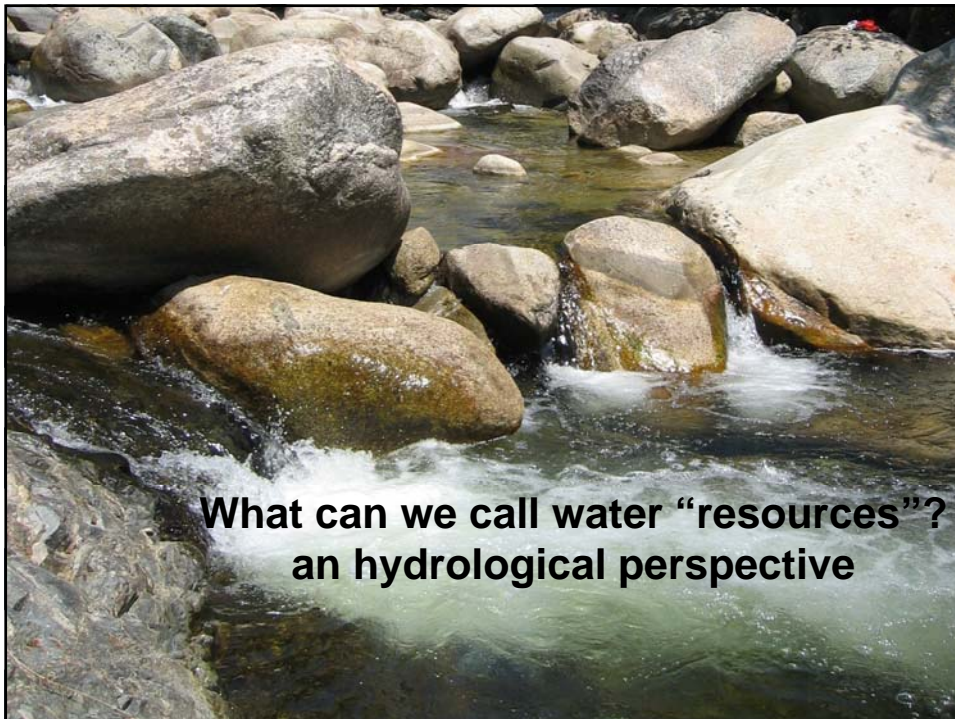


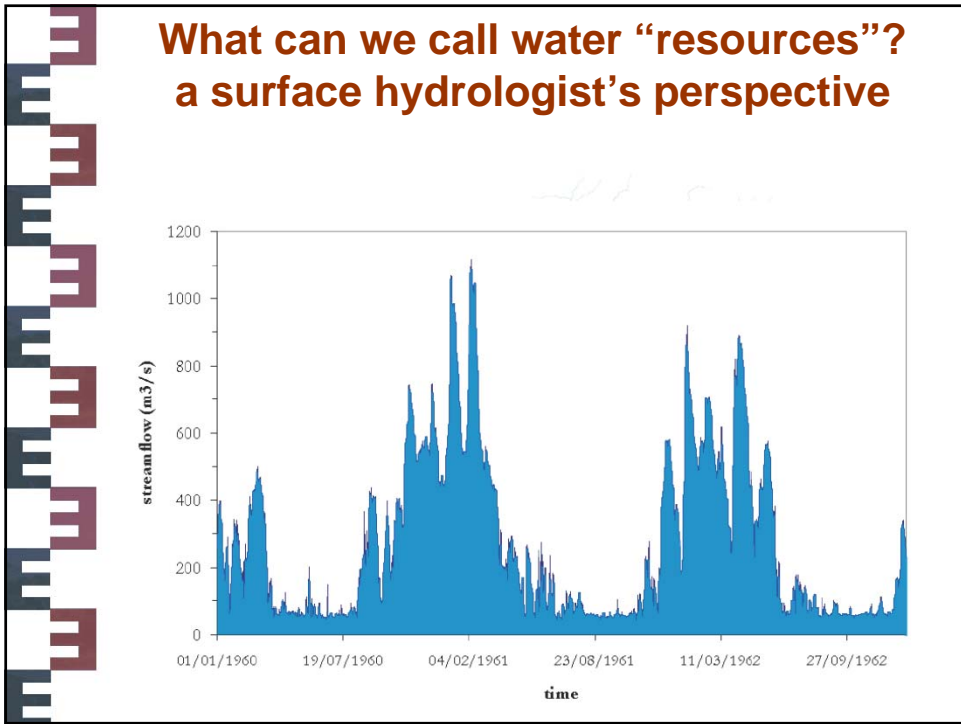
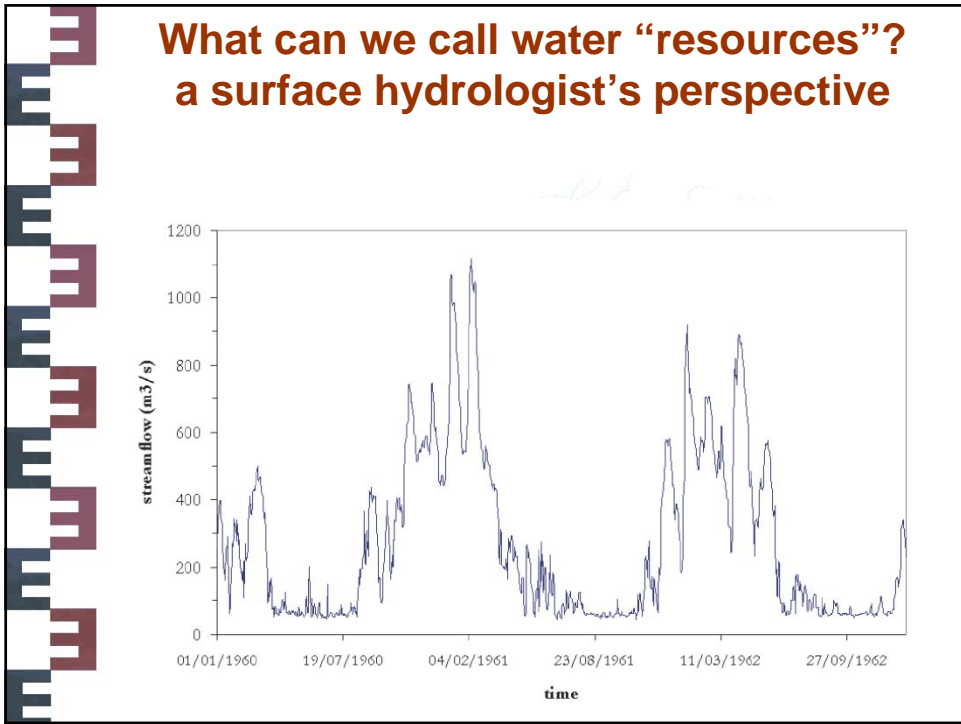
## What can we call water “resources”?

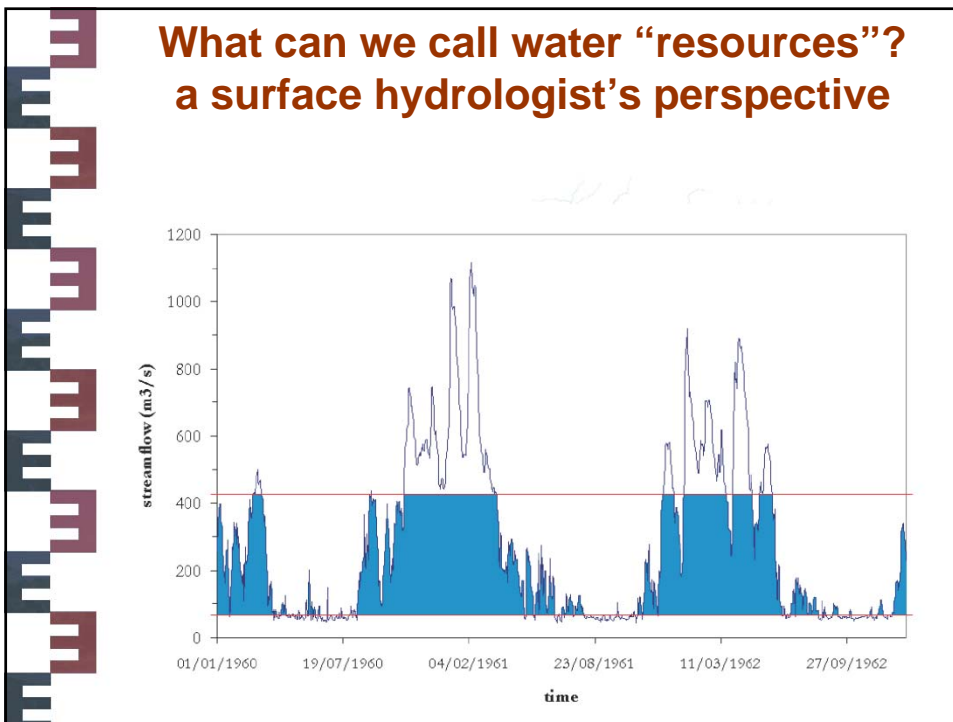
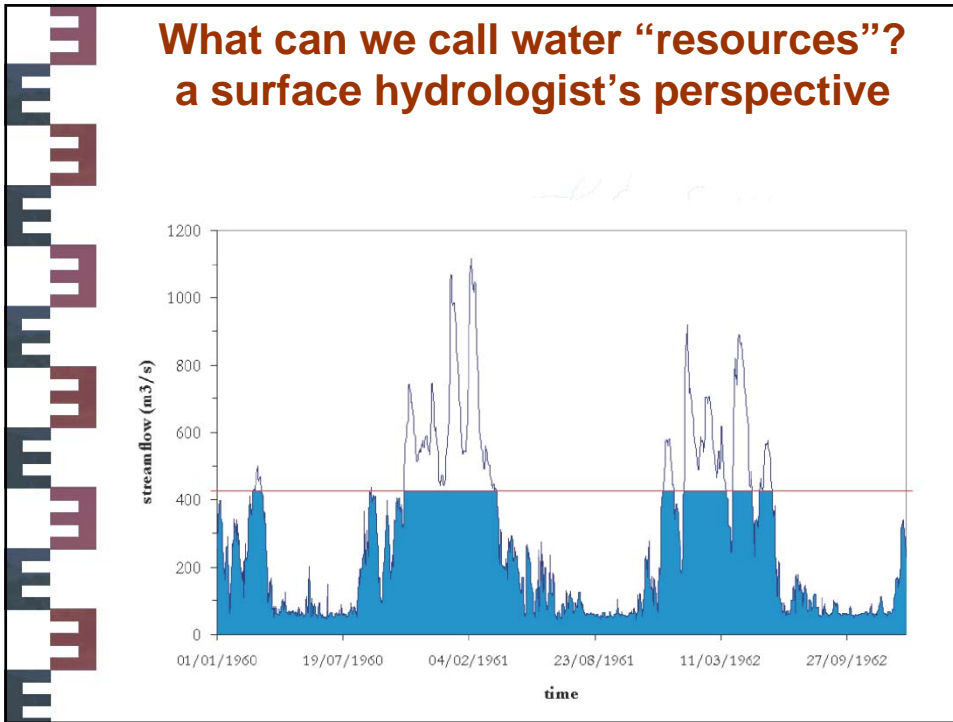
- resource = the part of the water cycle that we can use with profit
- the hydrological literature distinguishes ‘physical’ or ‘theoretical’ water resources from ‘actual’ or ‘usable’ water resources




3

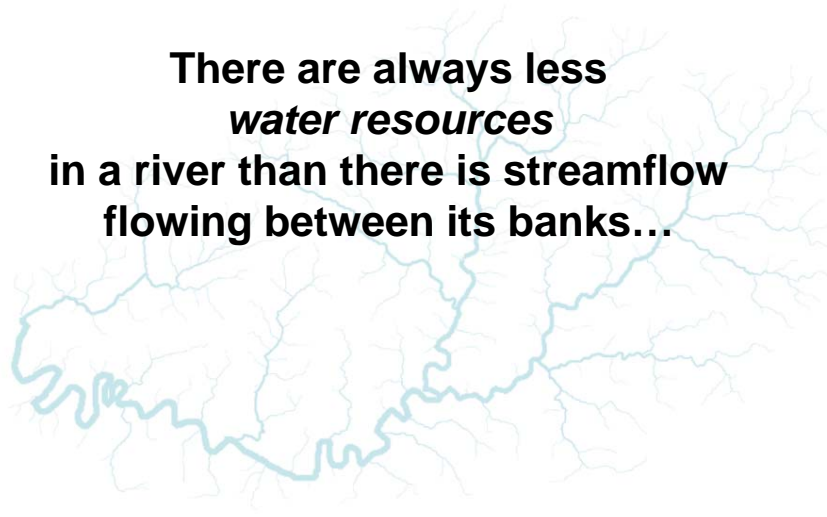









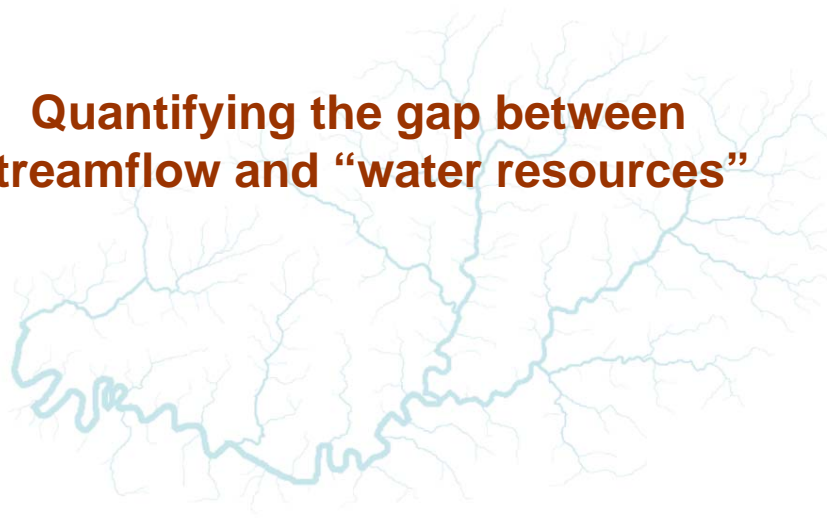
**There are always less  
*water resources*  
in a river than there is streamflow  
flowing between its banks...**



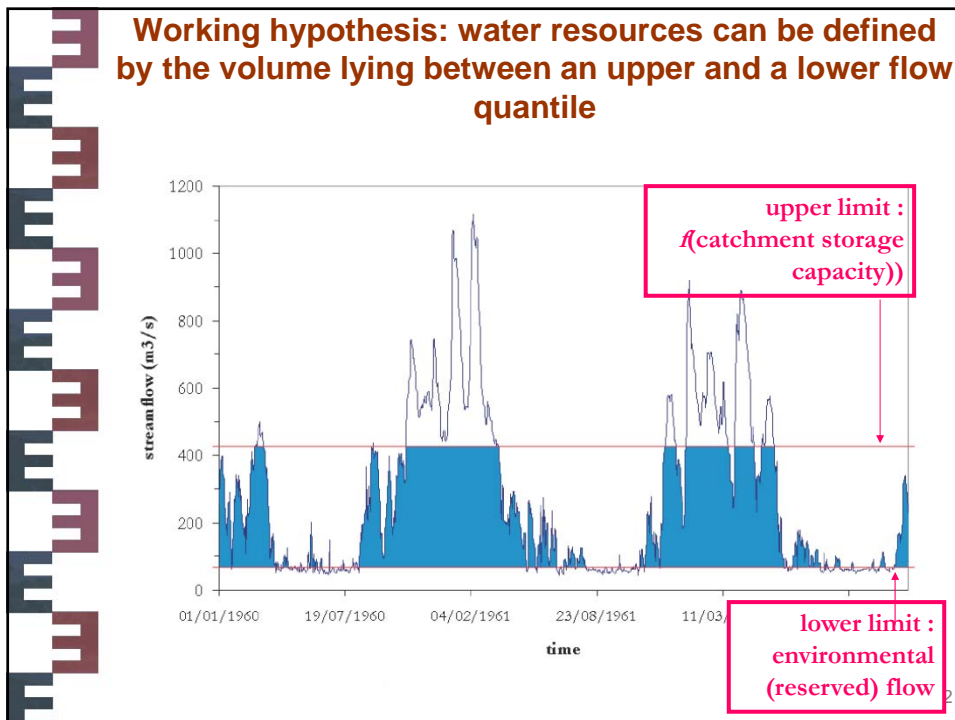
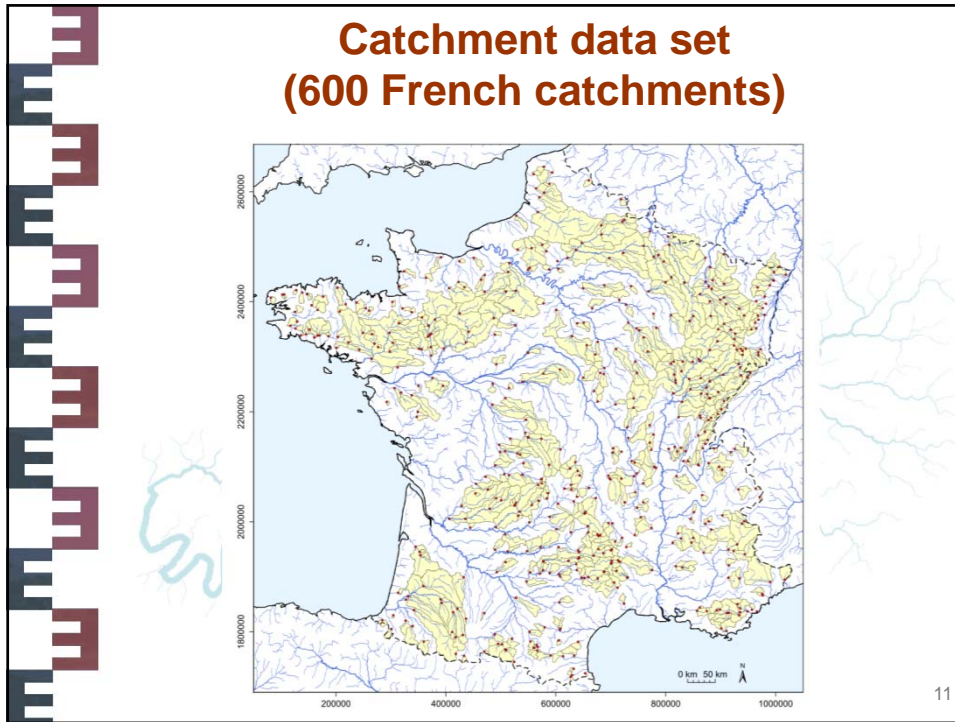
9

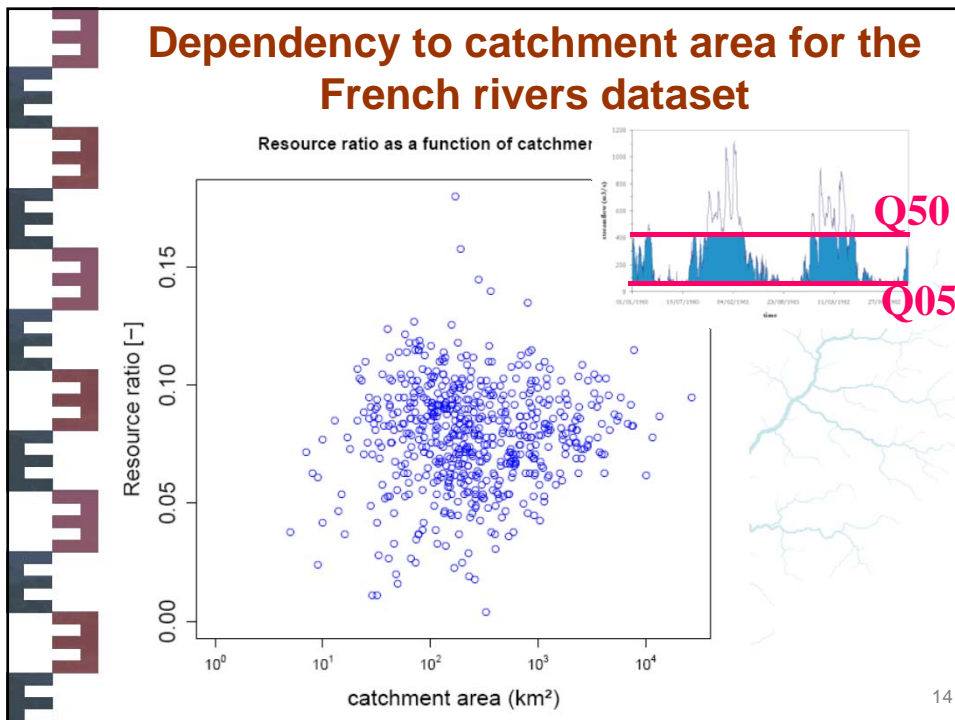
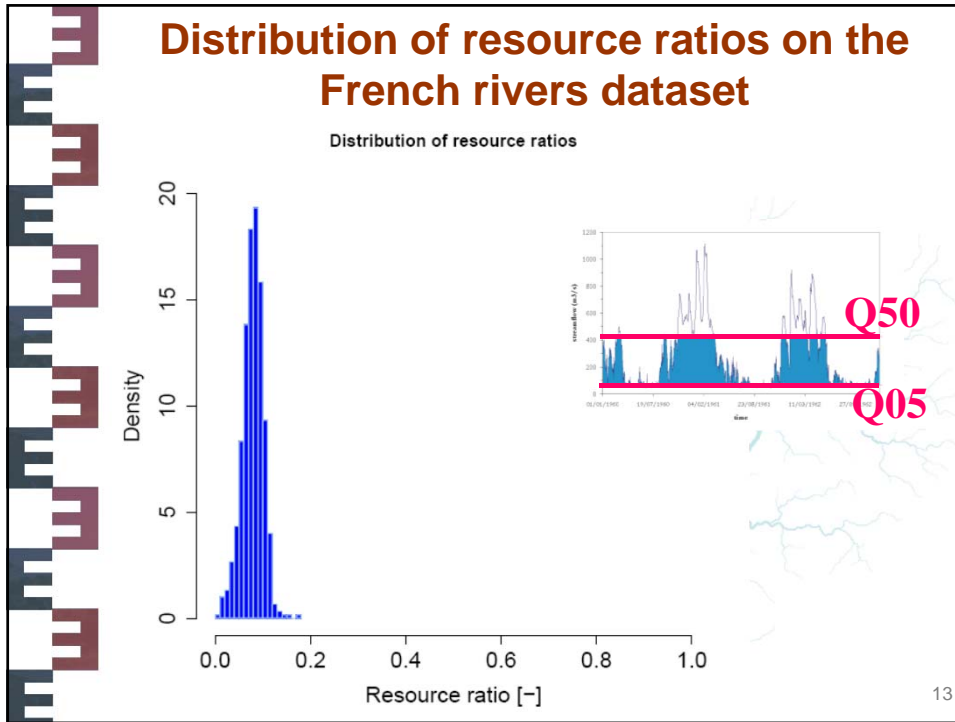


**Quantifying the gap between  
streamflow and “water resources”**

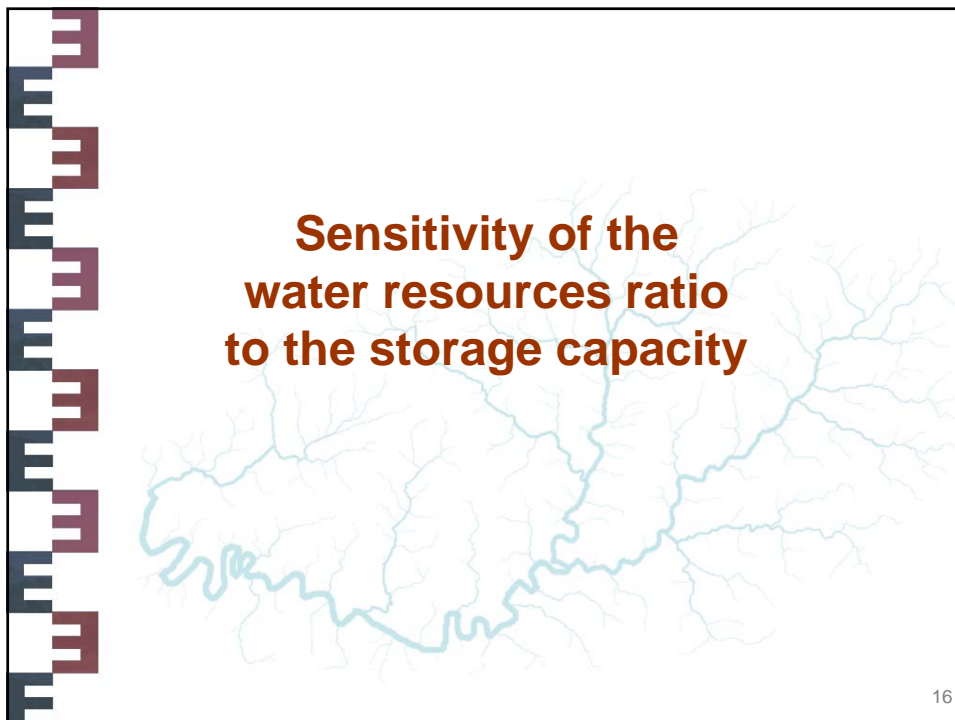
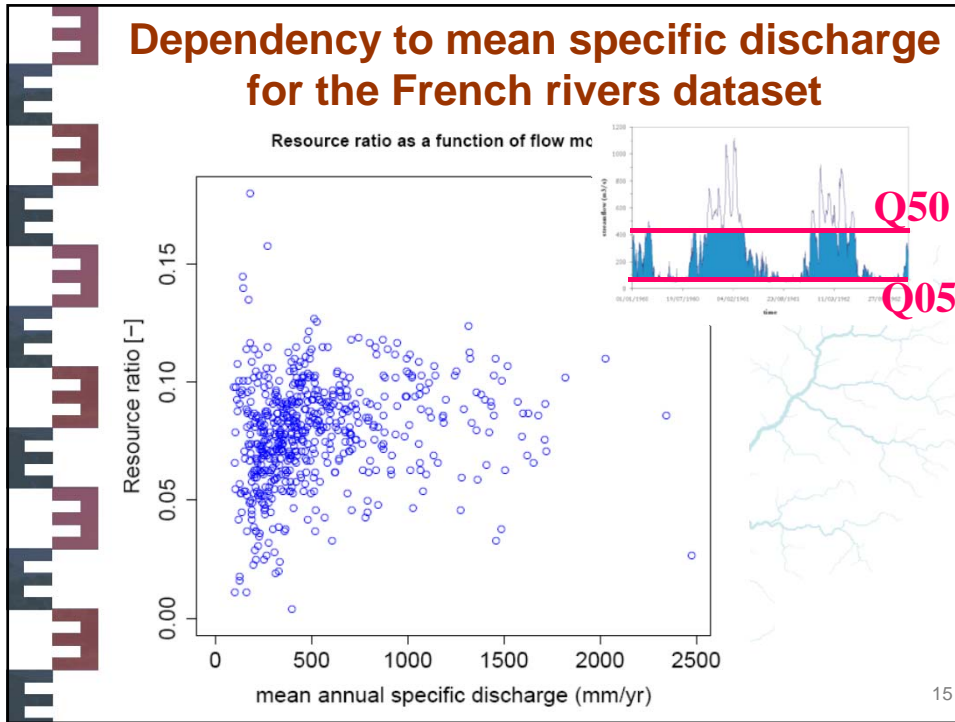


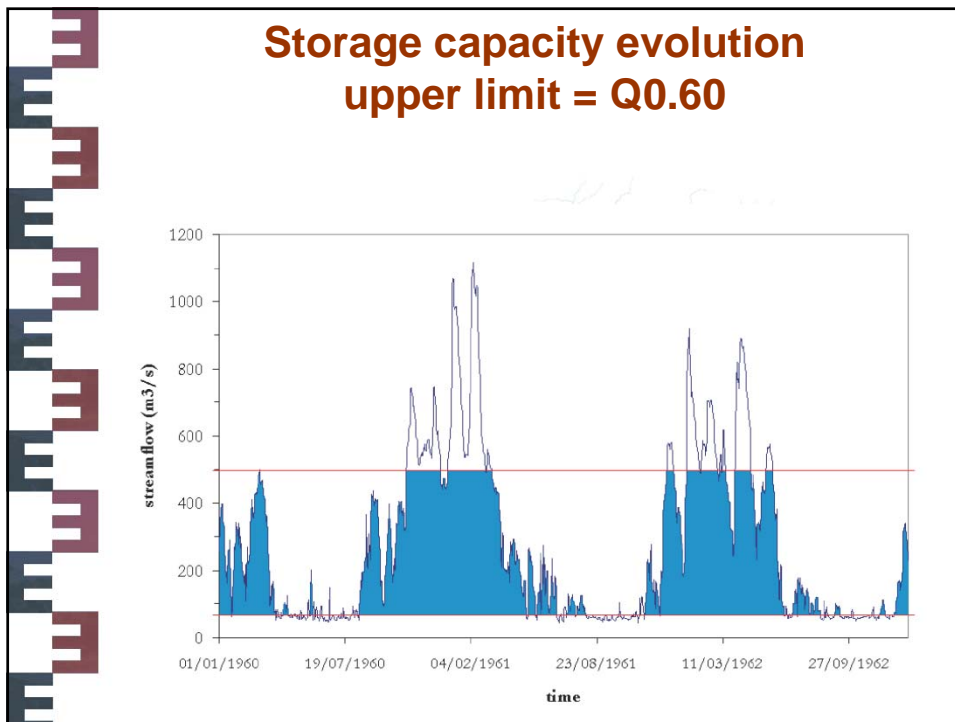
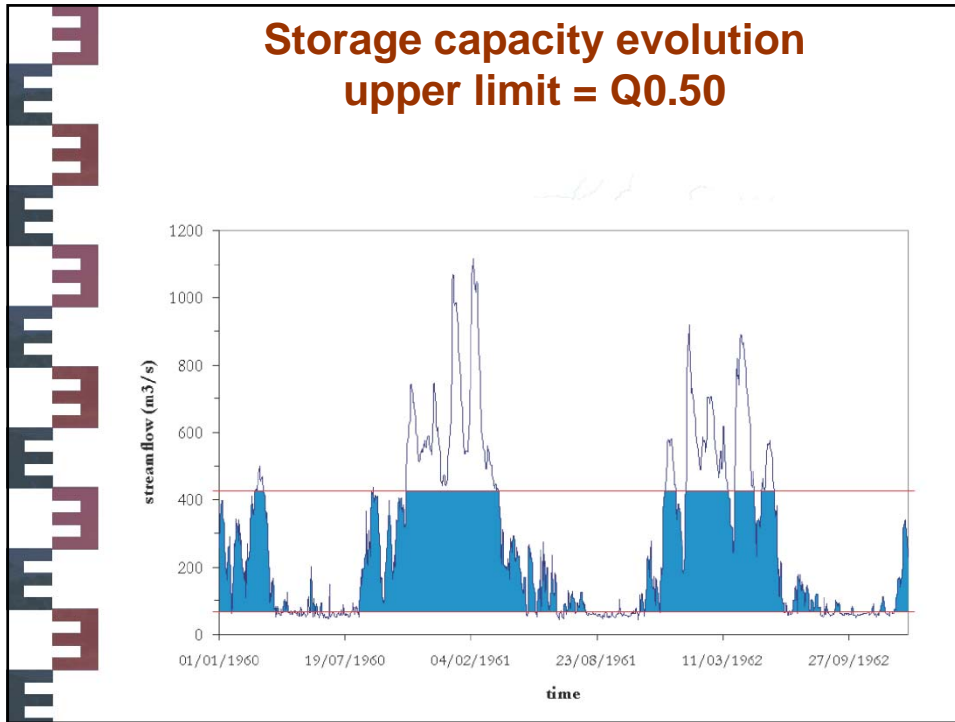
10

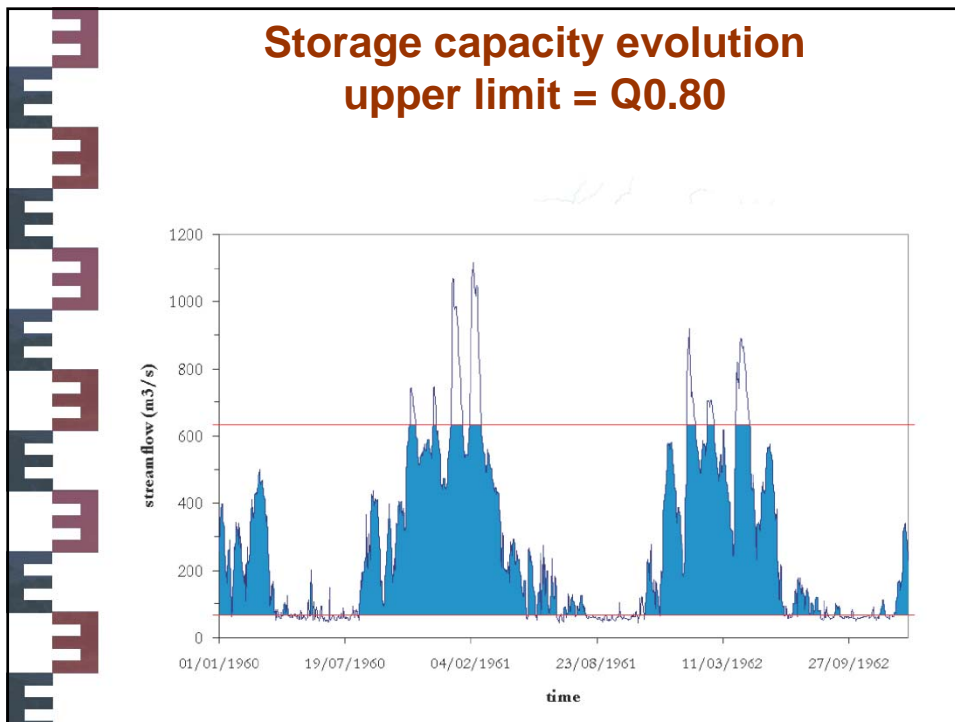
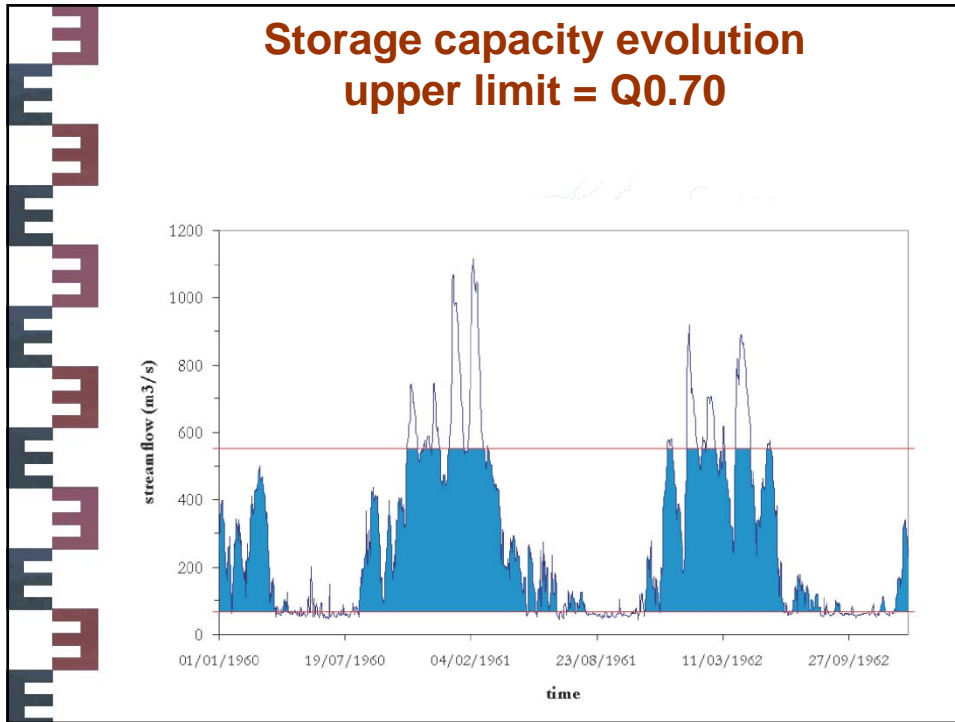


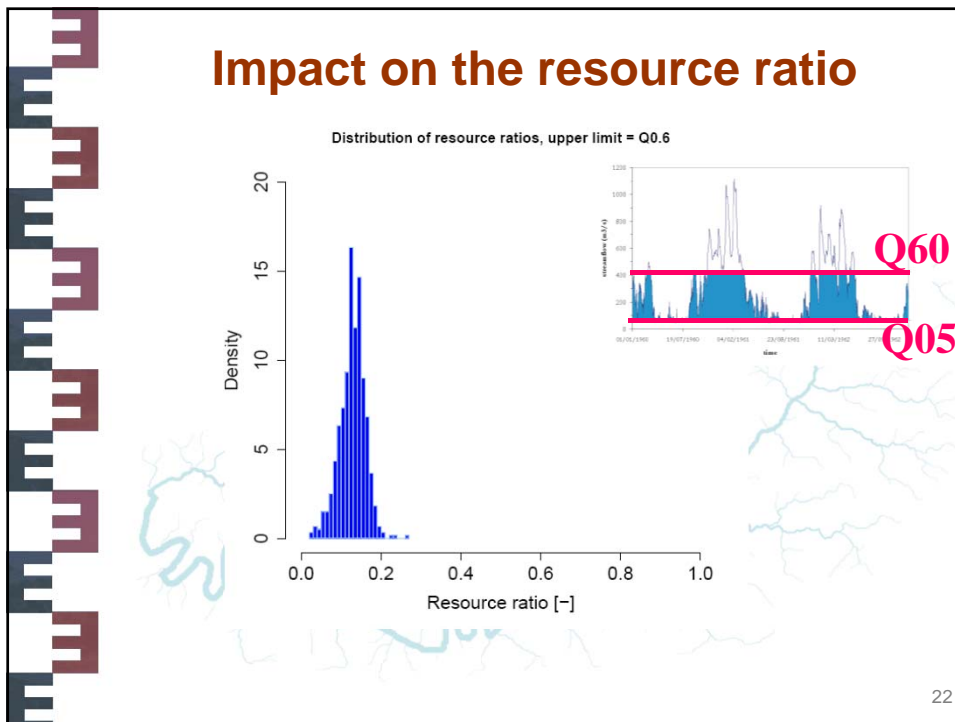
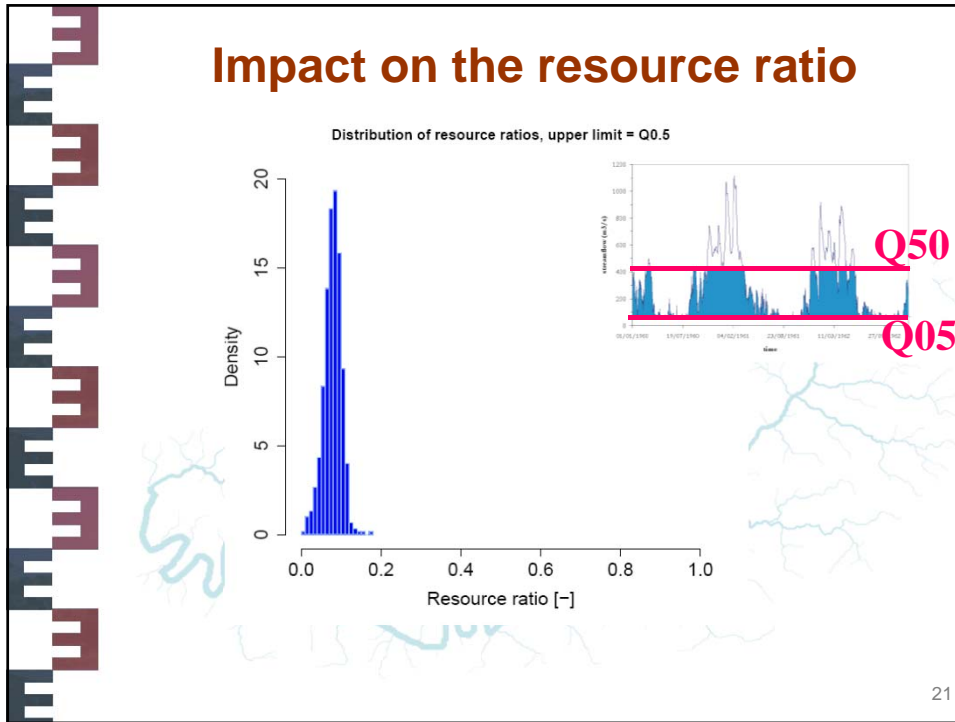


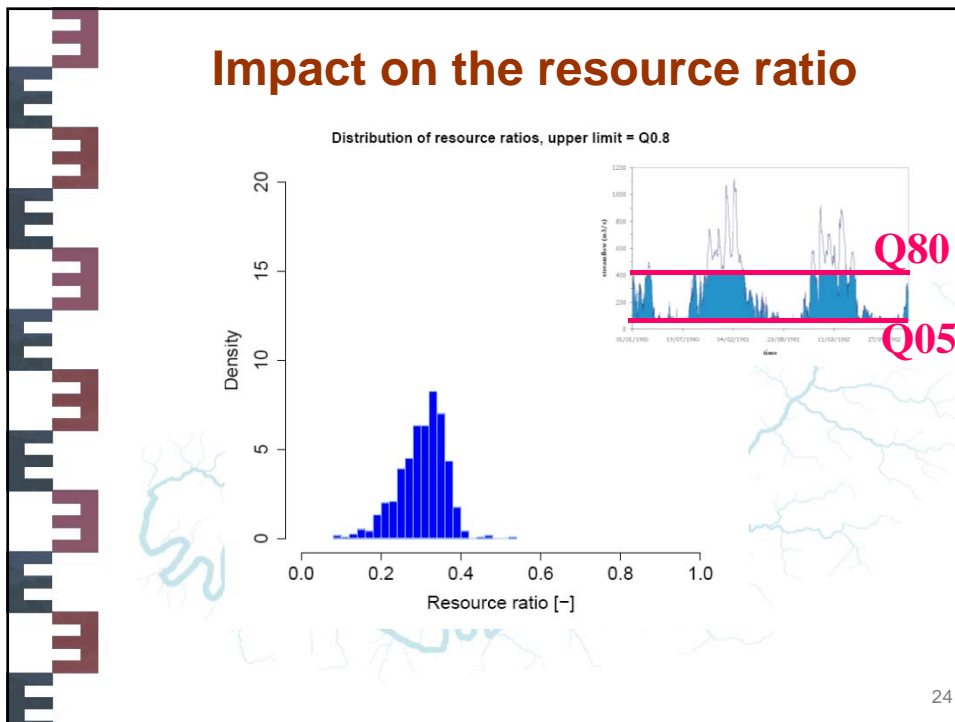
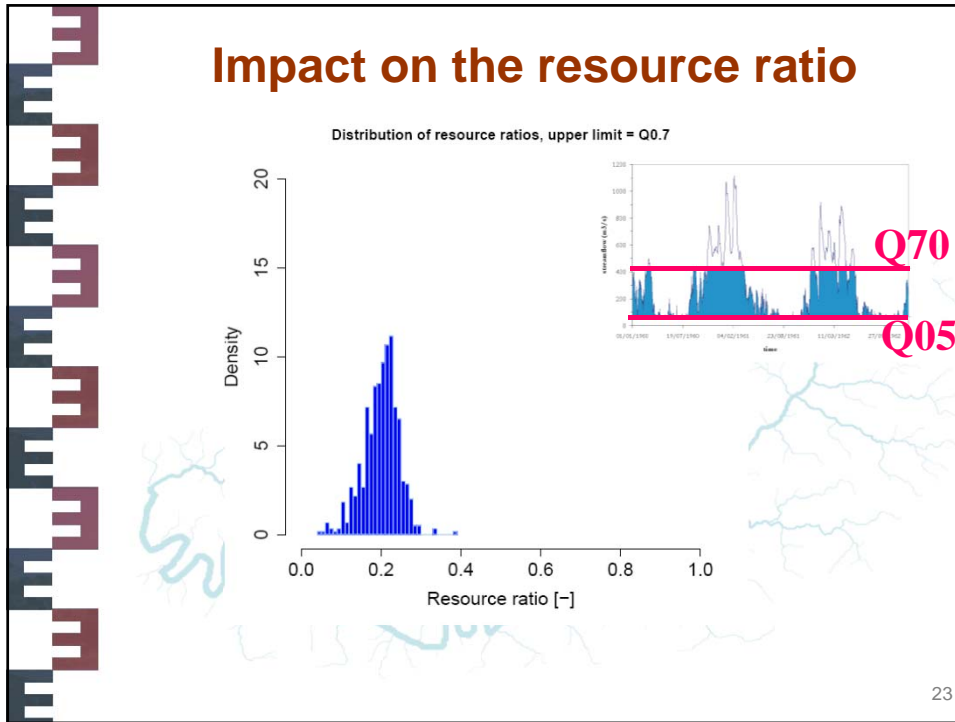


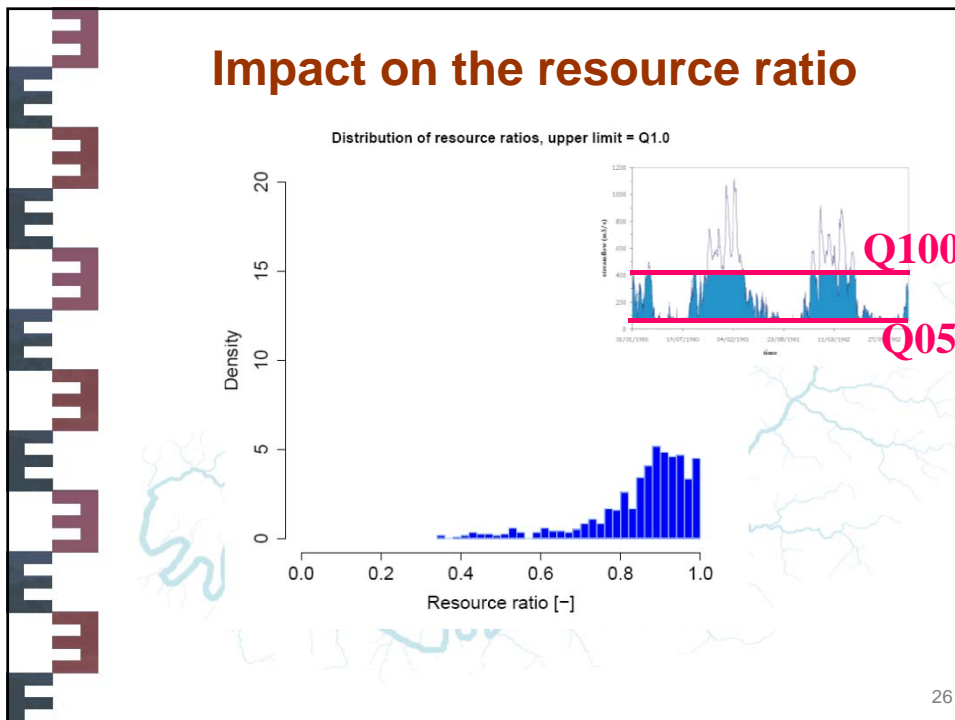
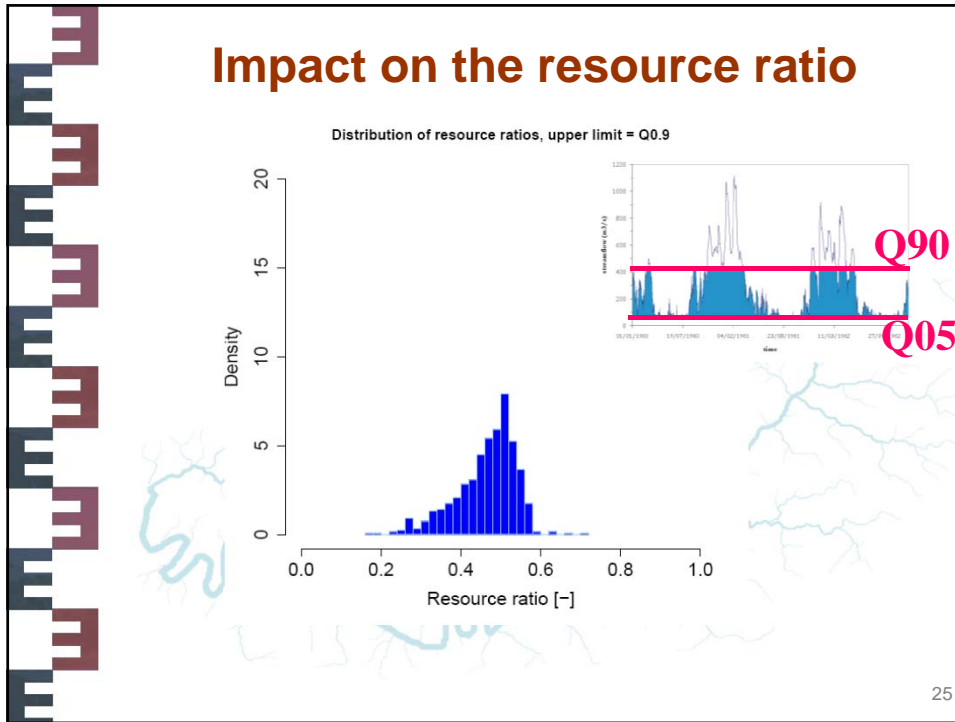







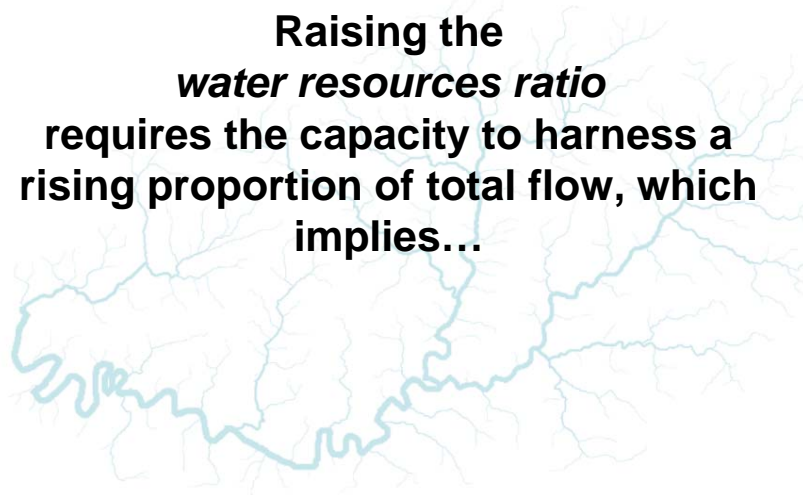










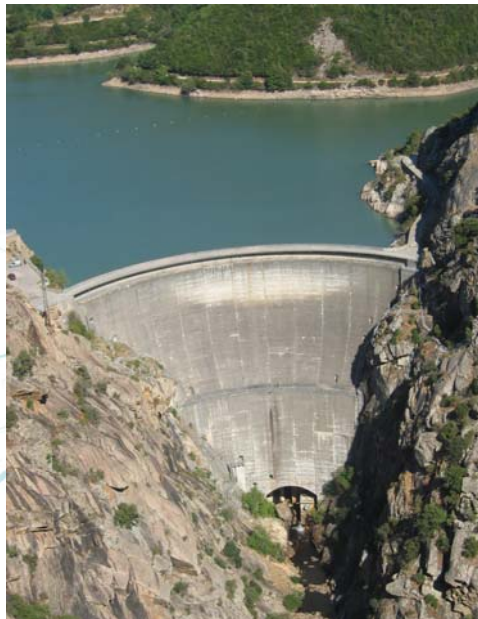
**Raising the  
*water resources ratio*  
requires the capacity to harness a  
rising proportion of total flow, which  
implies...**



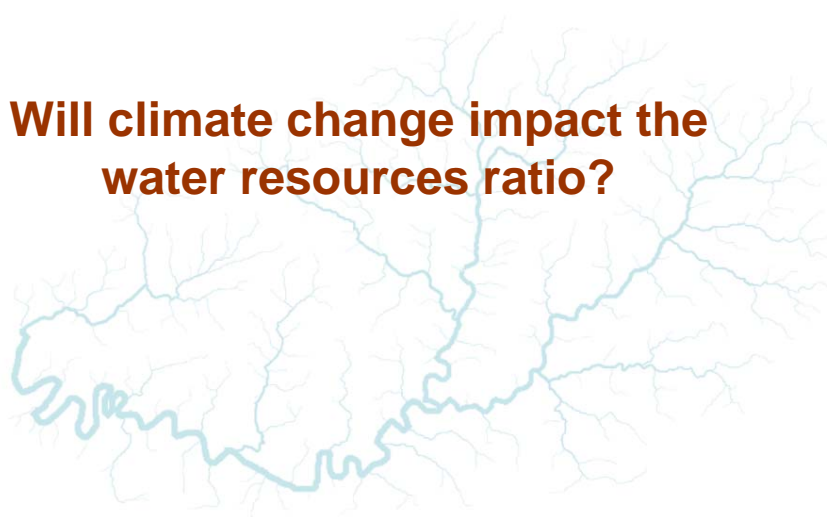

27



**... storage capacity**

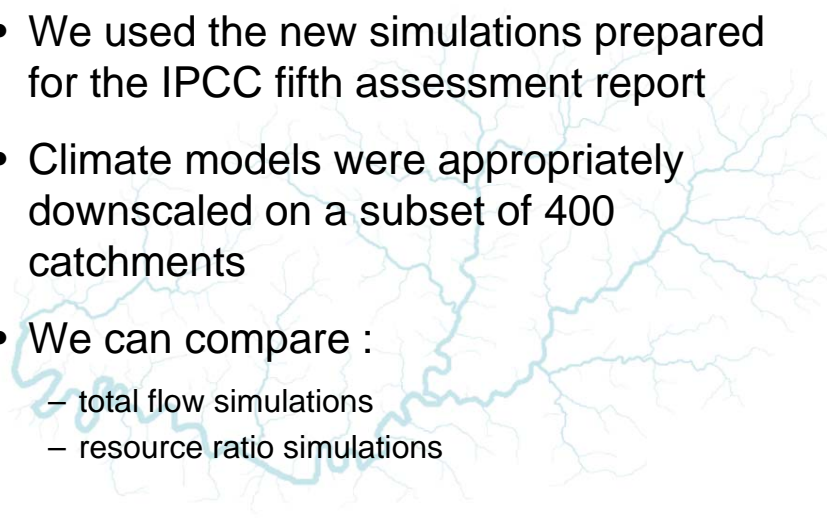



28



**Will climate change impact the water resources ratio?**

29

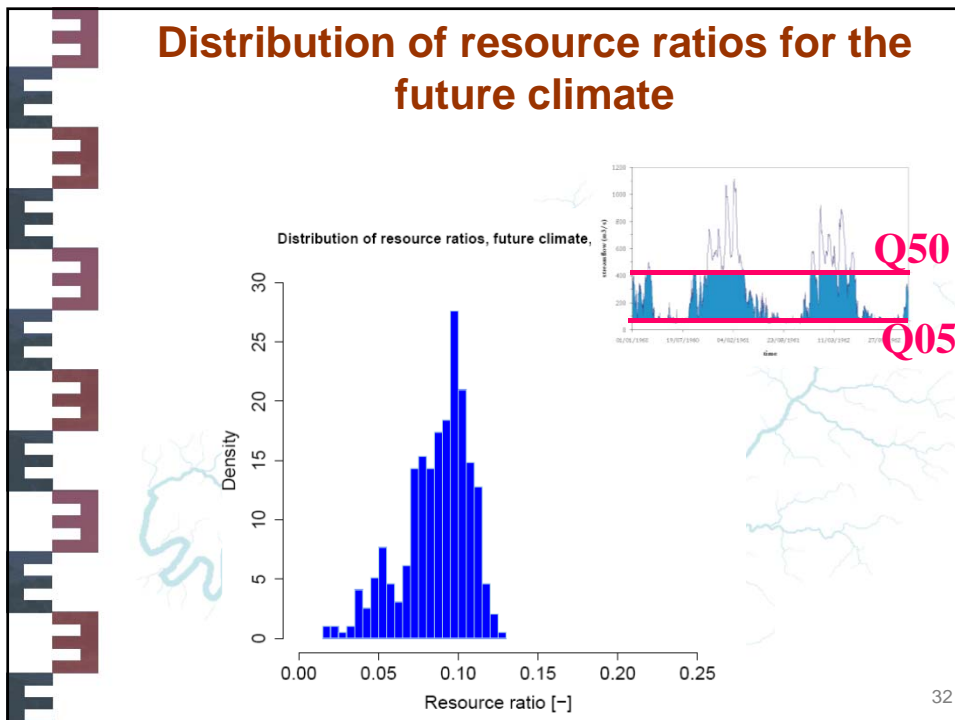
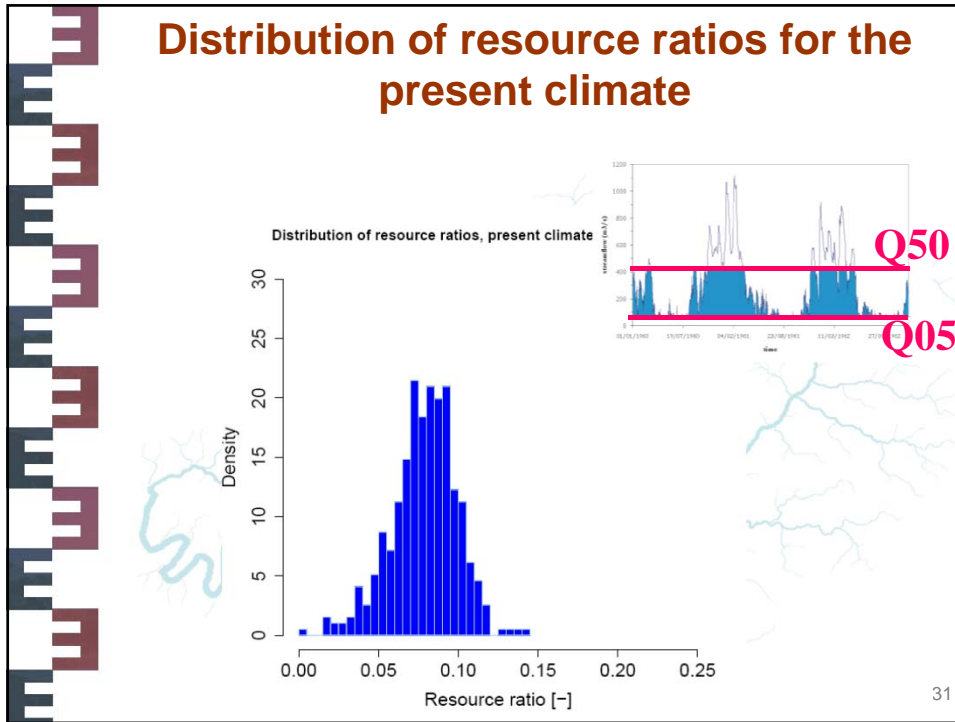


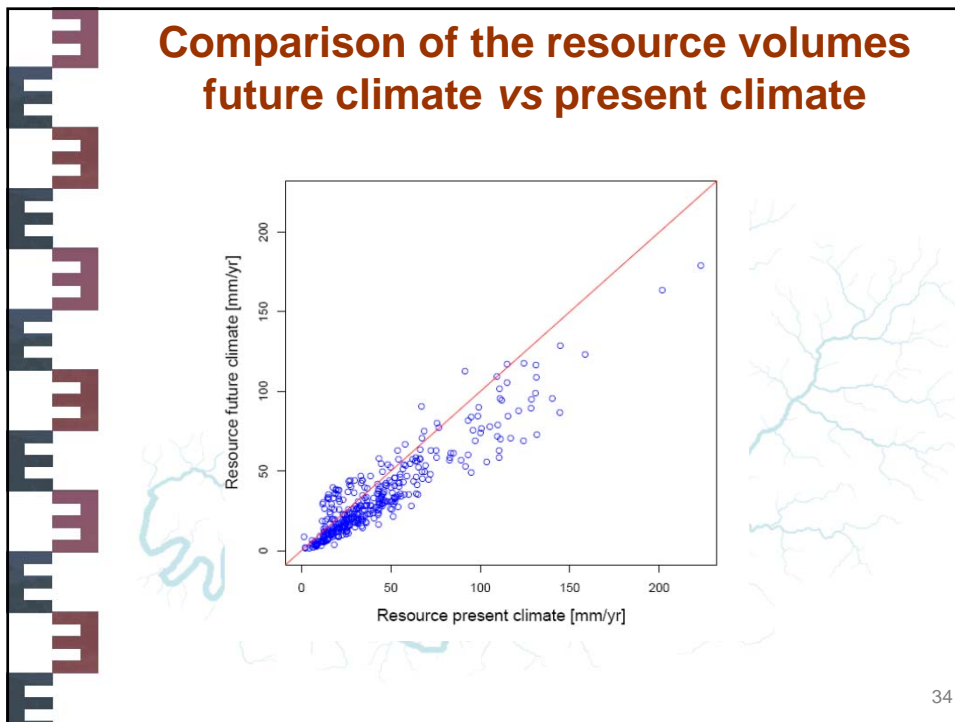
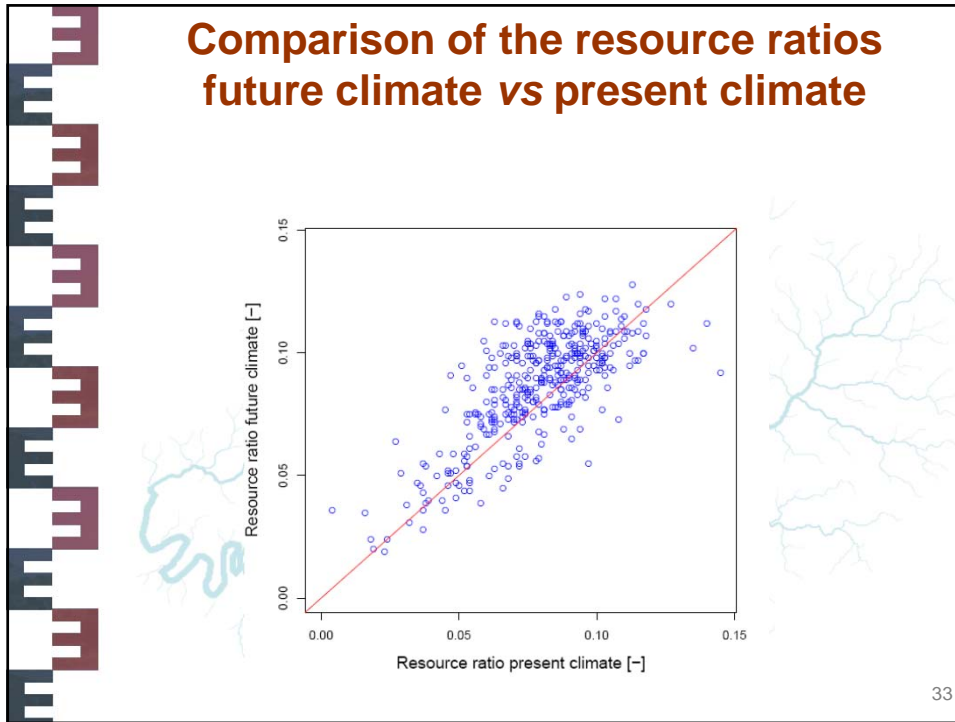
**Using IPCC's simulations for 2070-2100**


- We used the new simulations prepared for the IPCC fifth assessment report
- Climate models were appropriately downscaled on a subset of 400 catchments
- We can compare :
  - total flow simulations
  - resource ratio simulations

30



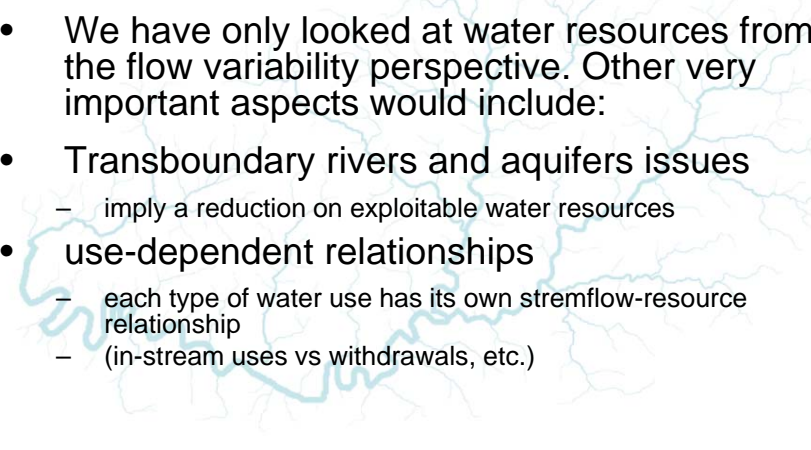







## Conclusion (1)

- Producing resource figure from flow figures is far from straightforward
- We have only looked at water resources from the flow variability perspective. Other very important aspects would include:
- Transboundary rivers and aquifers issues
  - imply a reduction on exploitable water resources
- use-dependent relationships
  - each type of water use has its own streamflow-resource relationship
  - (in-stream uses vs withdrawals, etc.)




35



## Conclusion (2)

- It would probably be easier to ban the expression 'water resources' from our vocabulary...



36

**Thank you**



The image is a collage. At the top center, the text "Thank you" is written in a bold, brown font. Below this, there are four portrait photographs of men. The top-left portrait shows an older man with glasses and a brown jacket. The top-right portrait shows a younger man with a beard and a grey sweater. The bottom-left portrait shows a man with glasses and a grey suit. The bottom-right portrait shows a man with a beard and a red sweater. To the left of the portraits is a vertical decorative border consisting of a series of 'E' characters in alternating colors (dark blue and maroon). The background of the collage features faint, light blue branching patterns resembling a river network or a dendritic structure.

37