Water Security, Risk and Society

Oxford, April 2012

Small probability events that could cause water supply collapse

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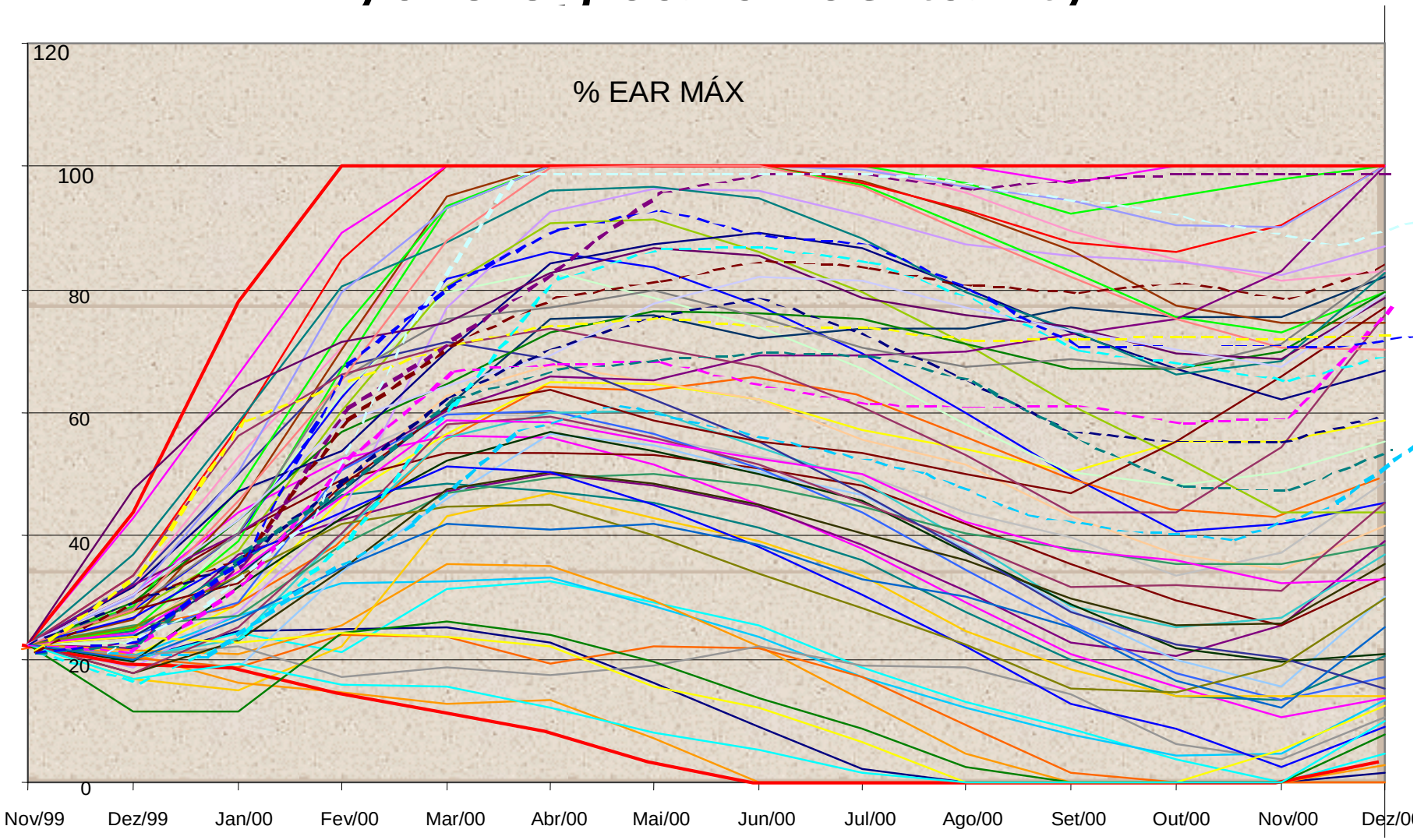
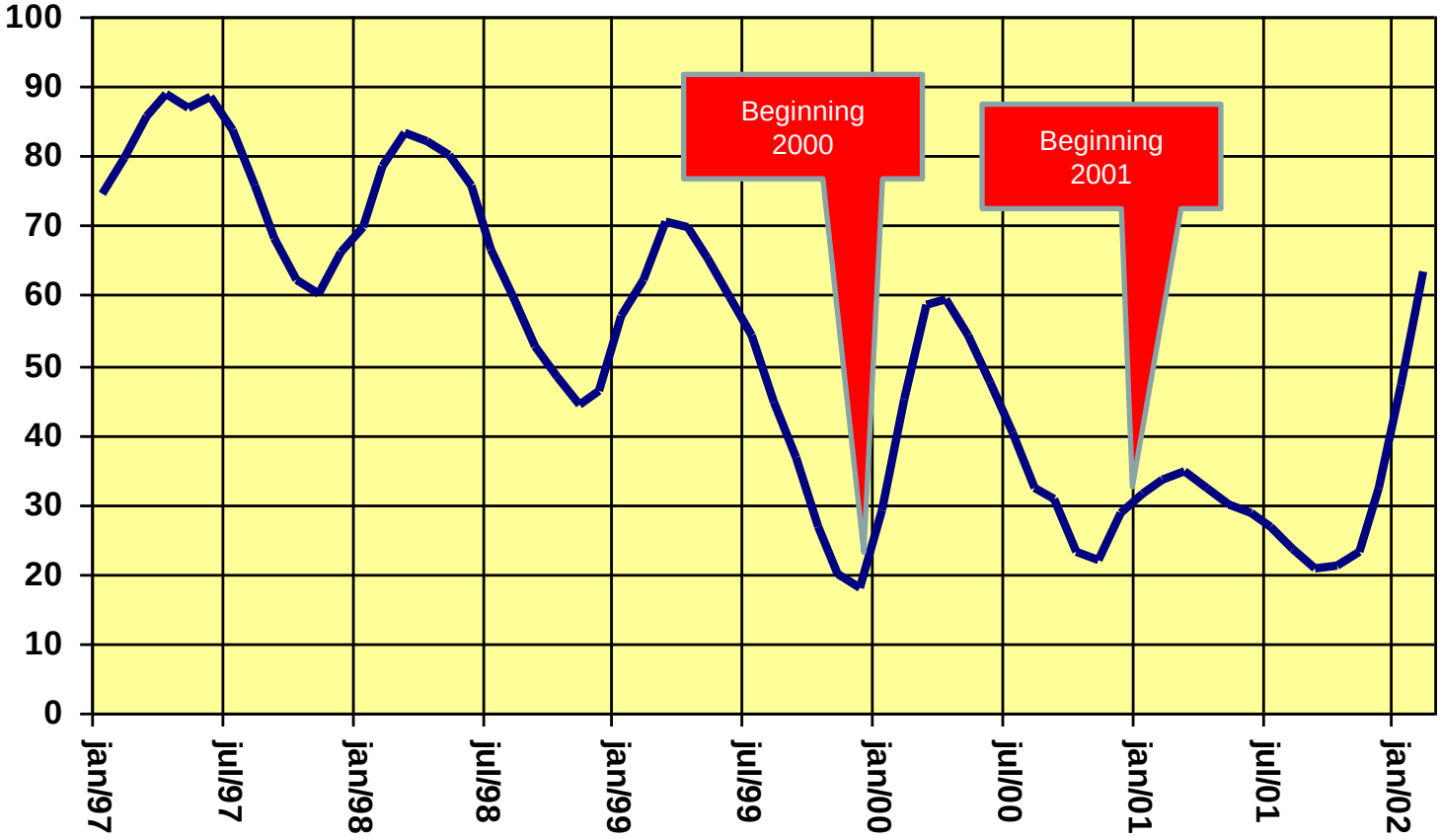
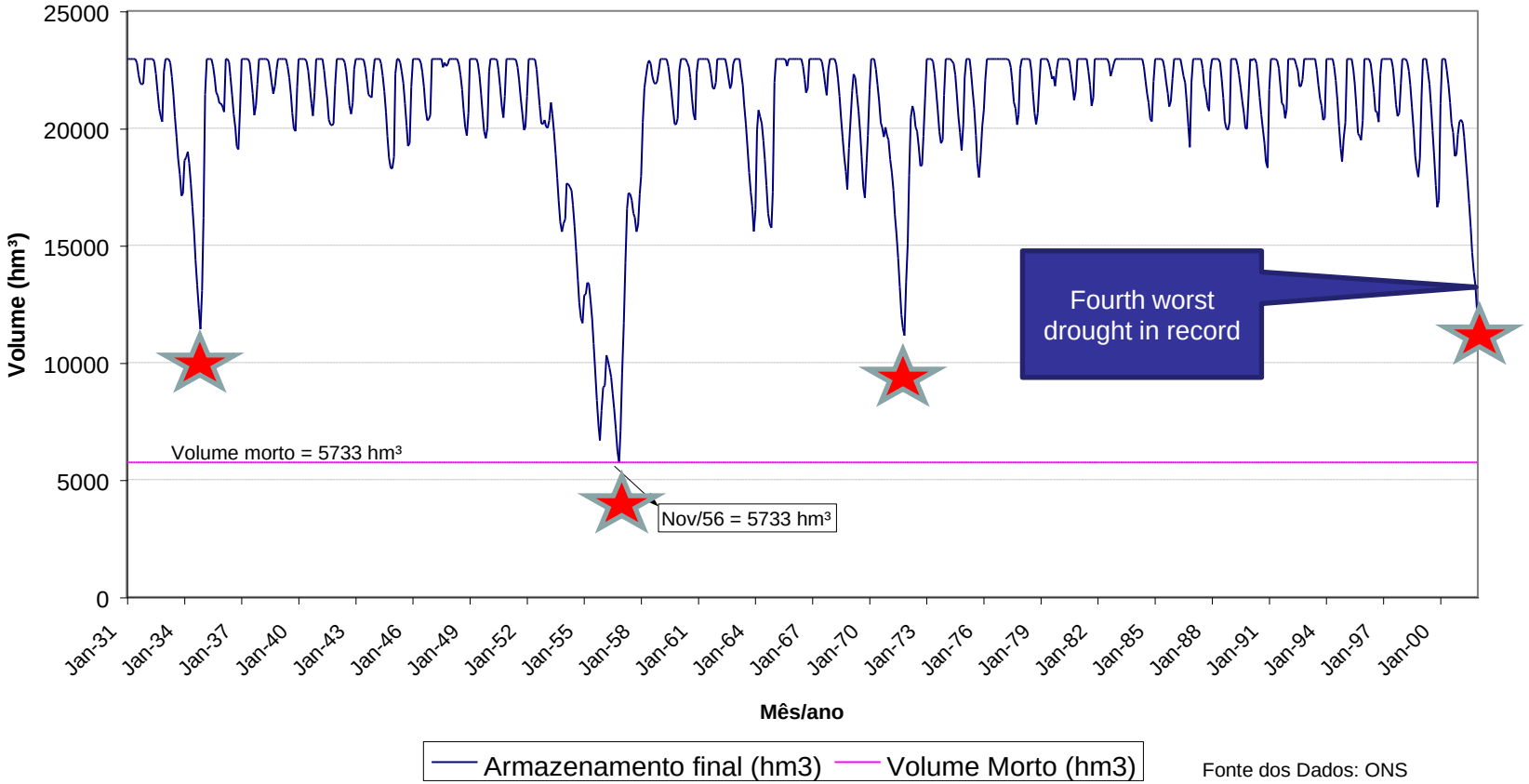
Hydrological uncertainty



Storage in the equivalent reservoir



Water Storage in the Sobradinho Reservoir



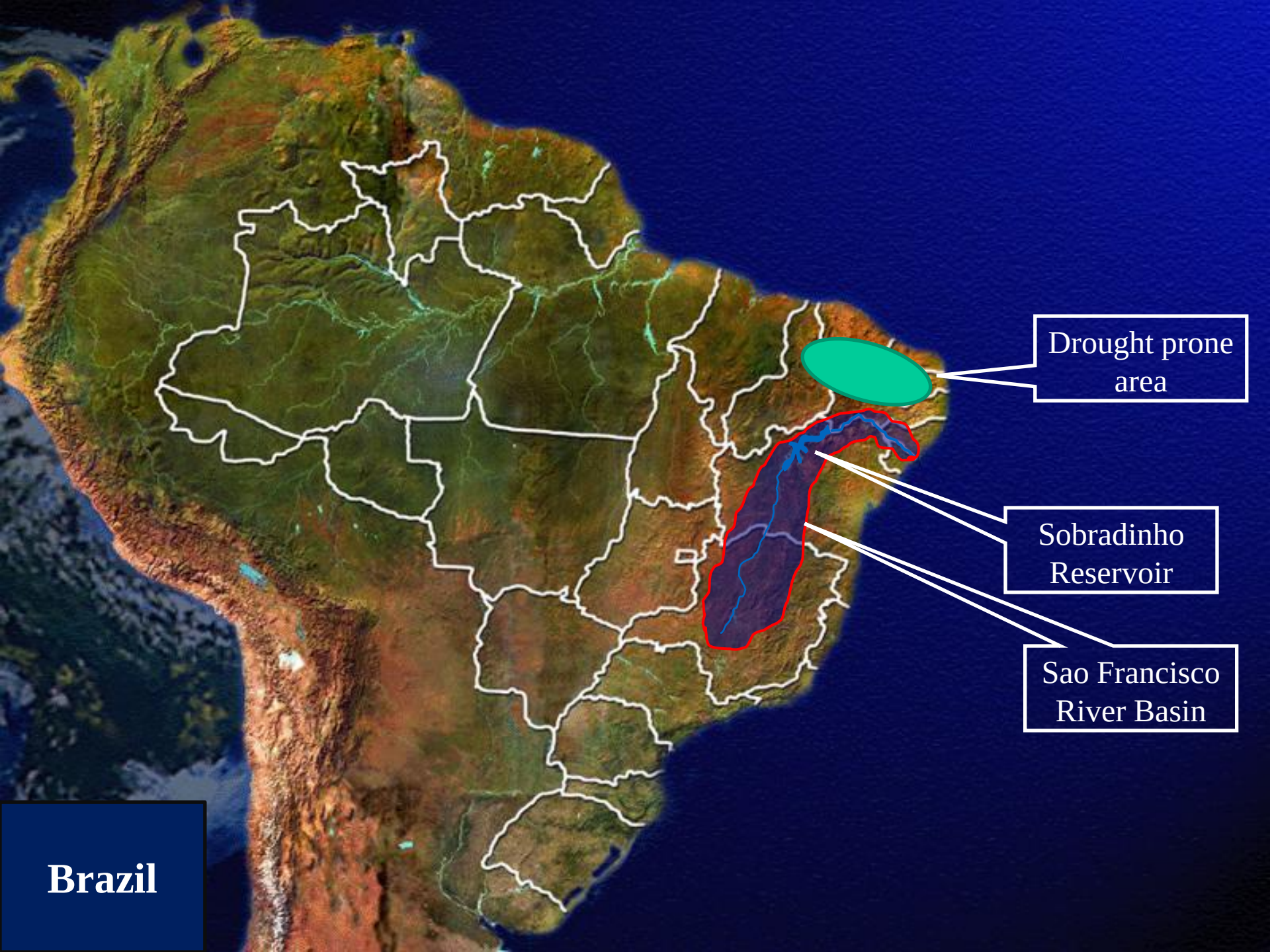
Fonte dos Dados: ONS

Lessons from case 1

- Decisions under uncertainty are politically evaluated by their consequences, not by their wisdom

- The layman expects that the water (or electric energy) supply system is able to endure the worst drought in record

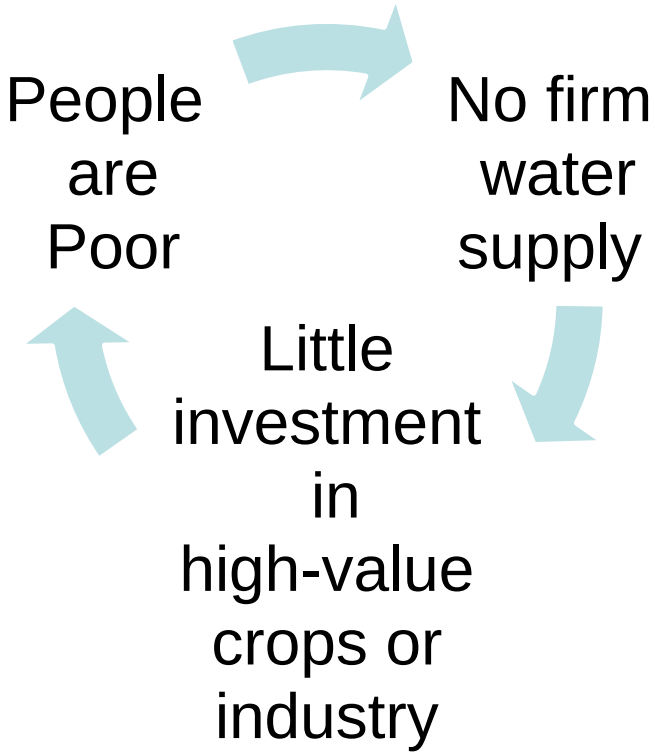
- It is sometimes preferable to make easy to understand but less than optimal decisions


Drought prone area
Sobradinho Reservoir
Sao Francisco River Basin
Brazil

During the 1887-89 drought, about one million people emigrated from the drought prone area

Countless died

HYDROLOGICAL VICIOUS CYCLE

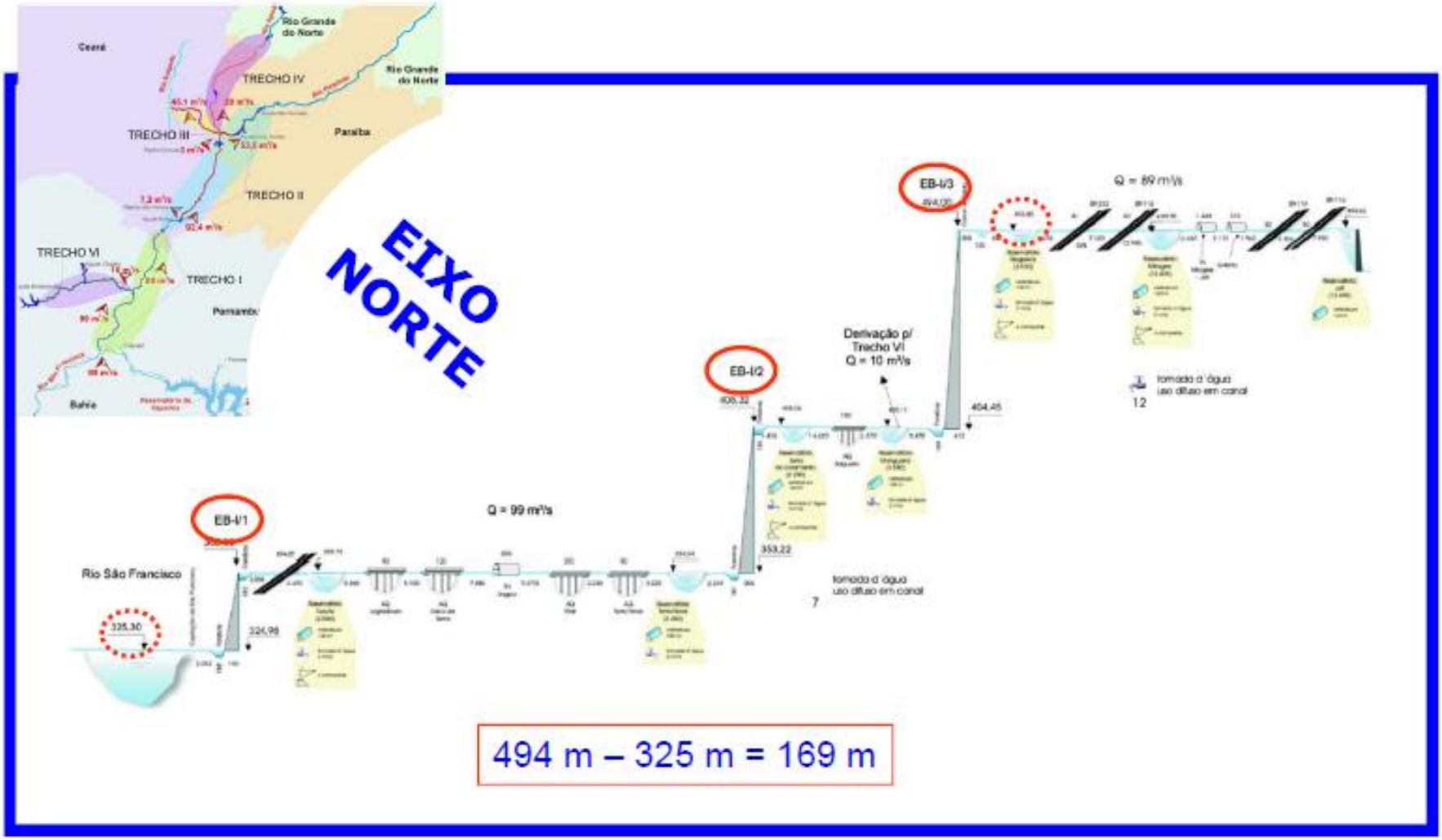


It is necessary an initial stock of investments on water infrastructure before reaching the "inflexion point… and then real progress starts

(David Grey and Claudia Sadoff, "Sink or Swim? Water security for growth and development")

INTERBASIN WATER TRANSFER

sair



494 m – 325 m = 169 m

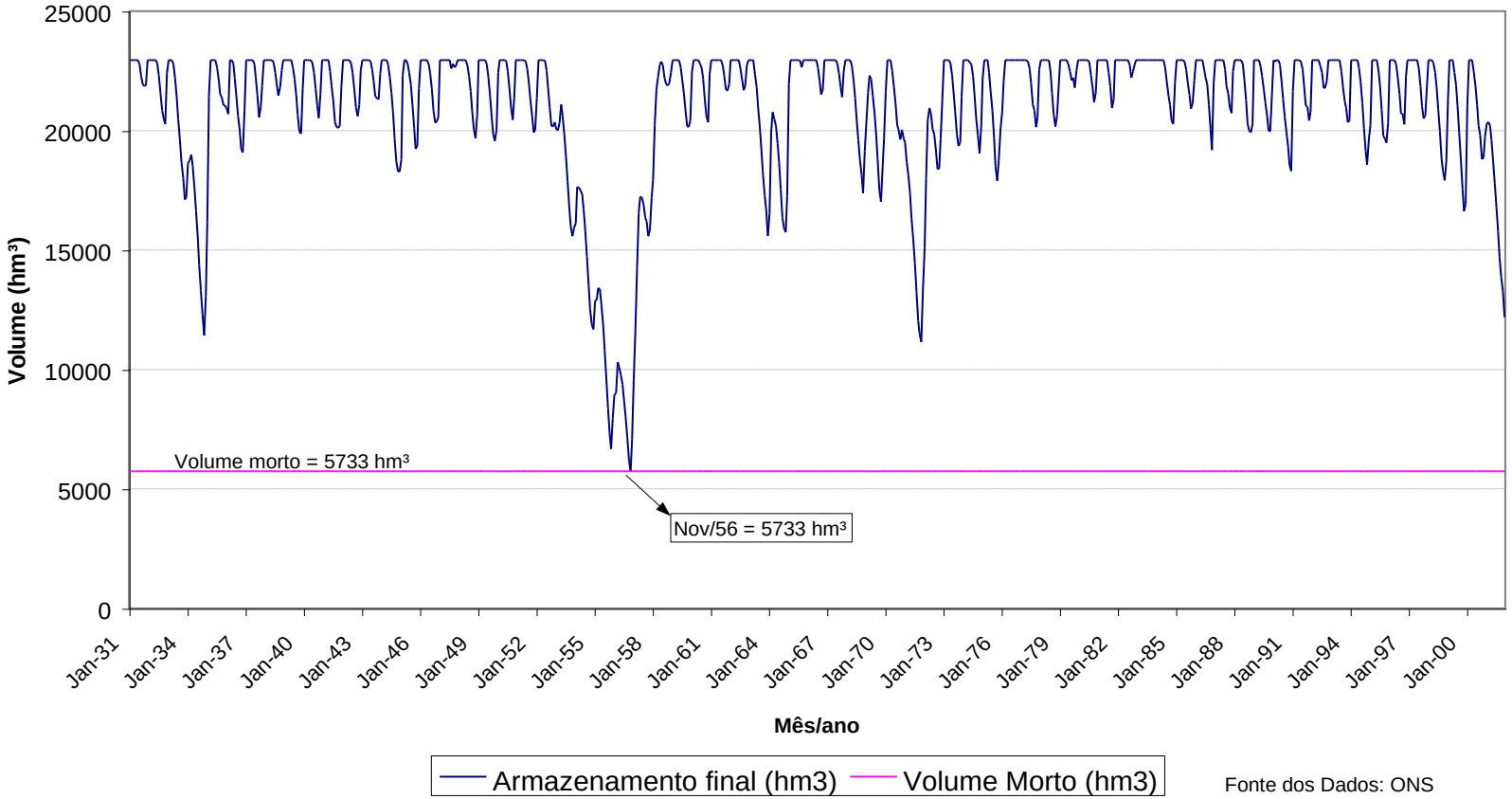
Q_{mean} São Francisco River = 2600 m^3 /s

26 m^3 /s ≤ $Q_{diversion}$ ≤ 127 m^3 /s

1% of Q_{mean} ≤ $Q_{diversion}$ ≤ 5% of Q_{mean}

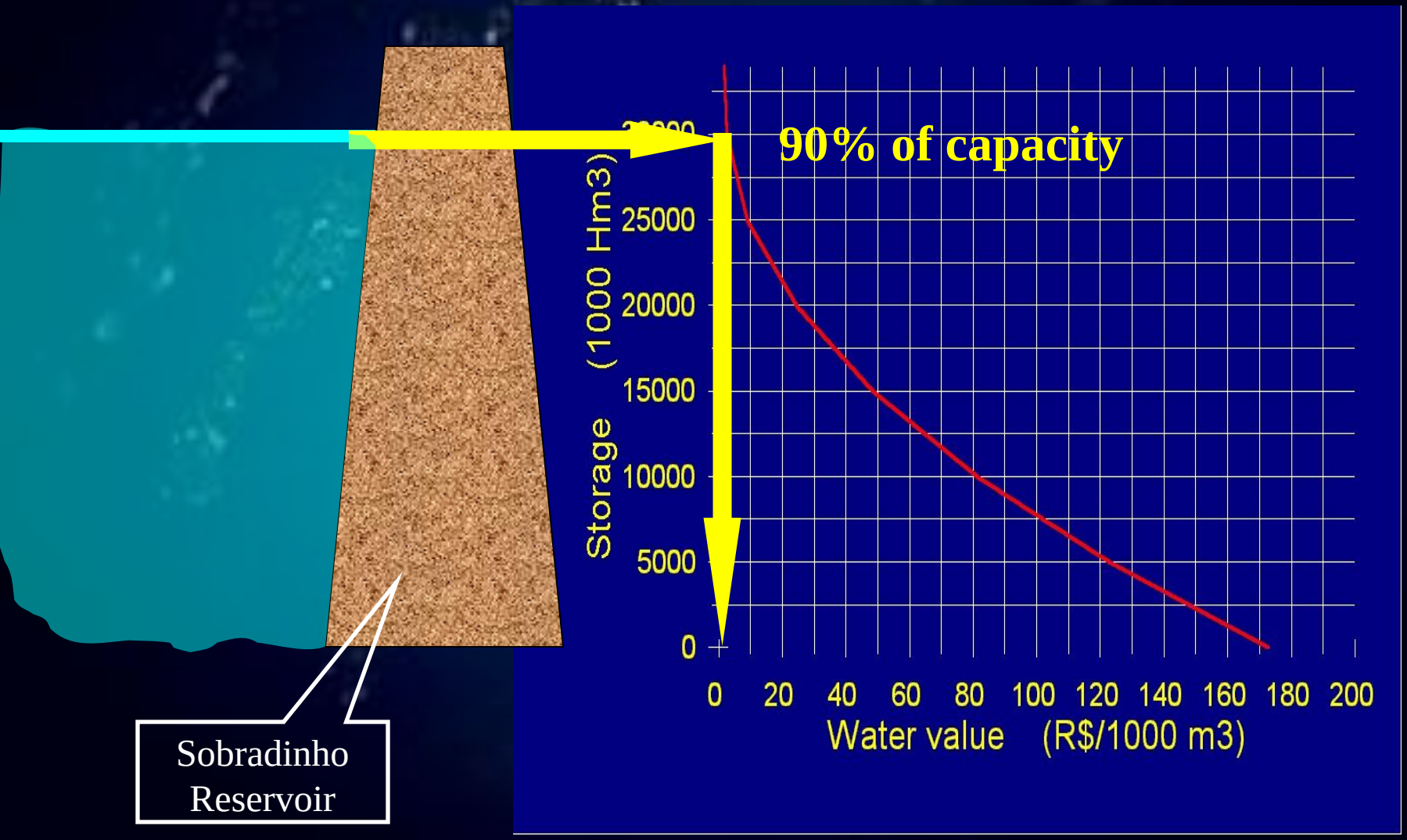
600 Km of channels

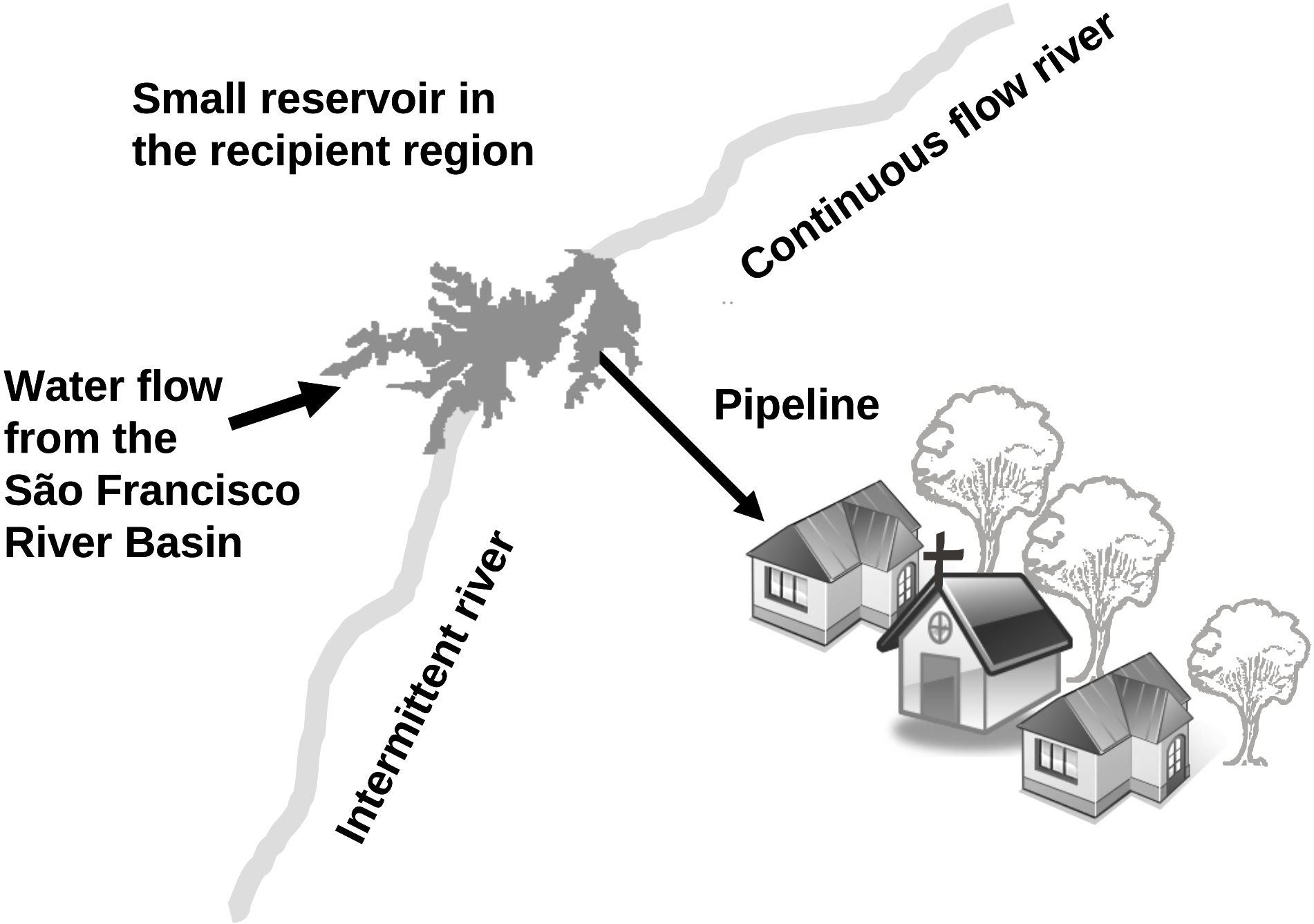
Water Storage in the Sobradinho Reservoir



Fonte dos Dados: ONS

Opportunity cost of water in the Sobradinho Reservoir

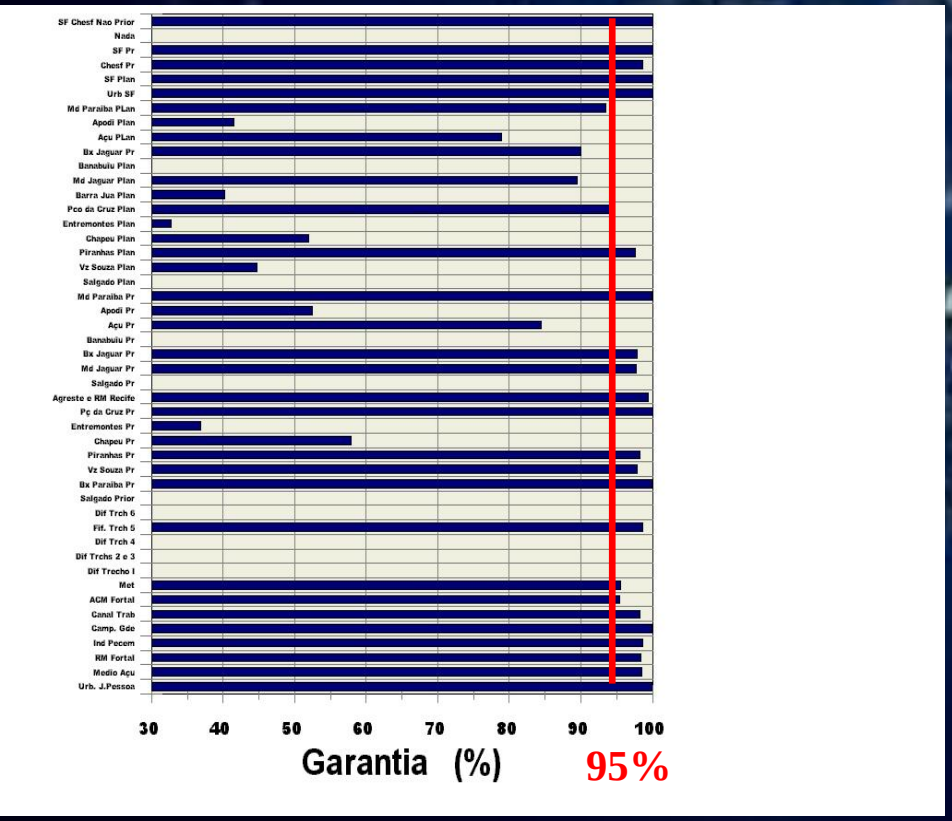



Small reservoir in
the recipient region
Continuous flow river
Water flow
from the
São Francisco
River Basin
Pipeline
Intermittent river

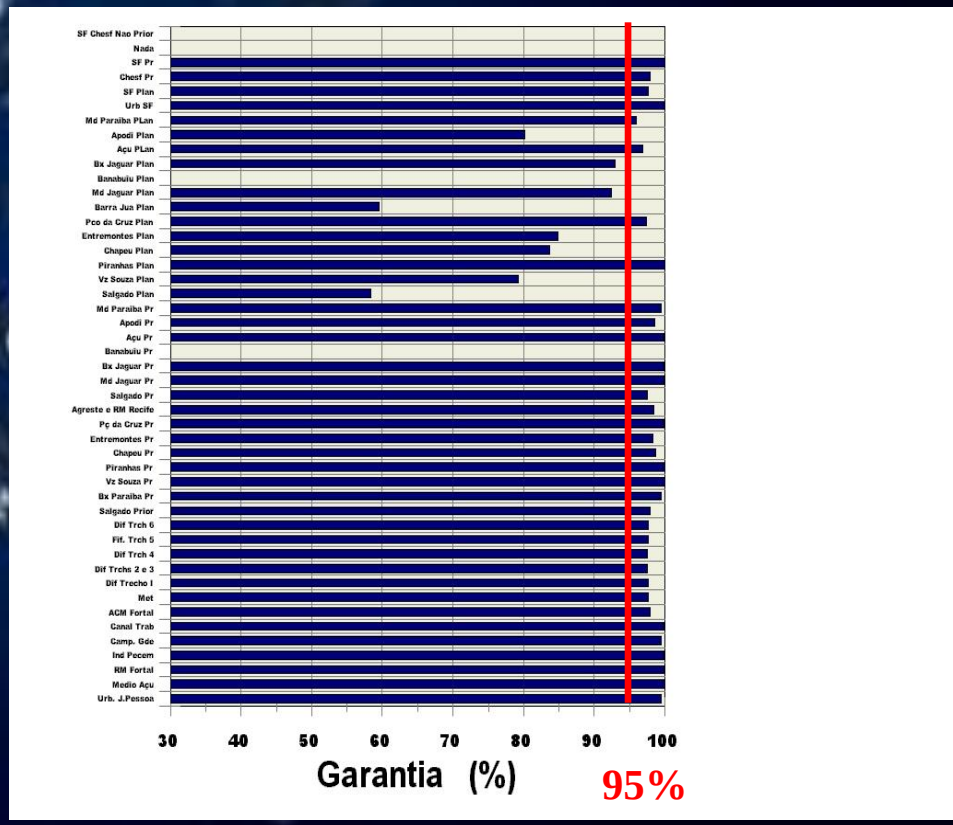
Water reliability in different site of the recipient region

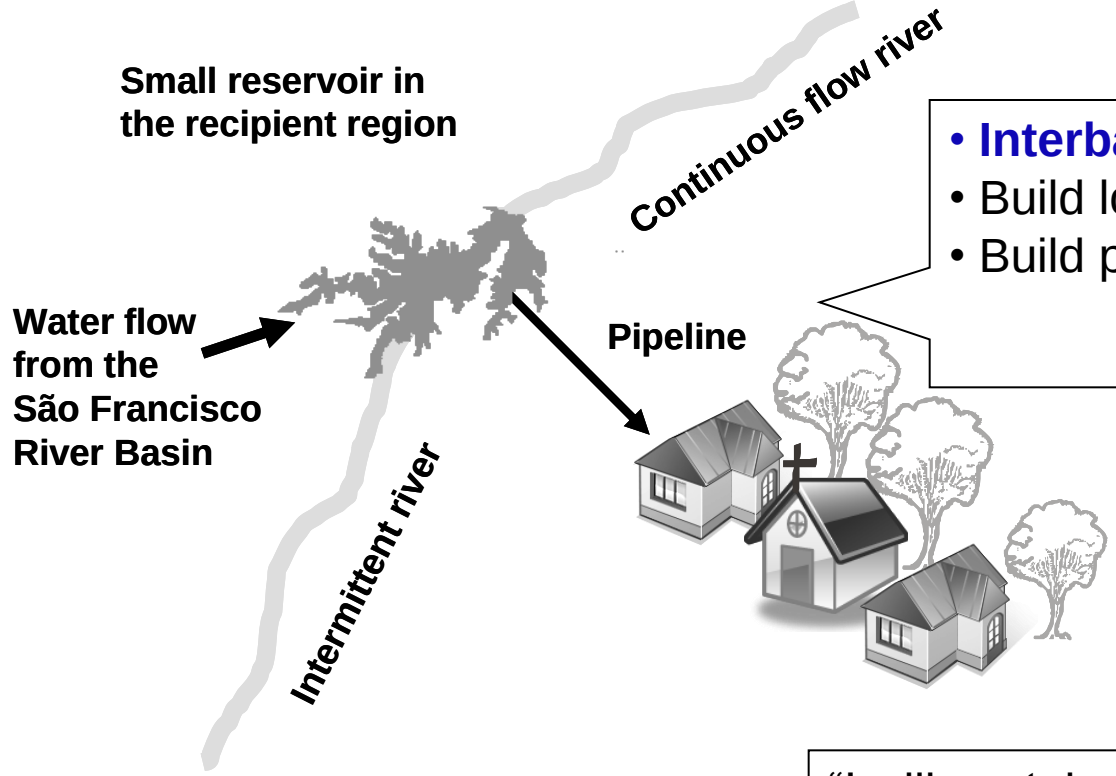
W

without diversion



with diversion





- **Interbasin Diversion Project**
- Build local reservoirs
- Build pipes and channels

Water for production

X

"I will sustain a hunger strike until Government cancels the Project" (Bishop Dom Cappio)

- **No Interbasin Diversion Project**
- Build individual water tanks
- Store rain falling on the roofs

Water for survival

Lessons from case 2

• When the probability P of a catastrophic drought tends to zero and the corresponding cost C tends to infinity…

Expected Cost … $0 \times \infty$ …undefined

Mathematical lack of definition…
… political lack of resolution

• When ideology opposes hydrology, it is very difficult to discuss water security challenges using risk as a unifying framework

Thank you!

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