Catchment Water Deficits in the 21st Century

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A CATCHMENT WATER SURPLUS

• A catchment water surplus is a situation in which, throughout the course of a specified year, total precipitation in the basin is sufficient to simultaneously satisfy four conditions:

  • The river’s instream flows do not fall below defined minima.

  • Abstraction from the aquifer is maintained at a sustainable rate.

  • Outstream water fully meets the economic demand for water from households, agriculture, mining, manufacturing, construction and the services sectors.

  • The basin population’s economic demand for food is fully met from the domestic rainfed and irrigation sectors and/or from food imports financed by the basin’s commodity and service exports.
Redemptive options (I):

Measures that, however attractive, do not reduce the deficit.

- to reduce environmental standards
- to promote the reuse of abstracted water
- to introduce and expand rainwater harvesting
- to import water from another catchment
- to desalinate sea water and other saline waters
- to import food
Redemptive options (II):

• To reduce the rate of growth of population
• To reduce the rate of growth of output per person
• To increase water productivity
• To price water
• To reduce evaporation from reservoirs and from leakage
• To strengthen water resource institutions
DENSITY ANALYSIS

- **DRIVERS TO DEFICIT:**
  - Persons per square kilometre (persons/km²)
  - Value of irrigation output per square kilometre ($/km²)
  - Value of other output per square kilometre ($/km²)

- **DRIVERS TO SURPLUS:**
  - Effective precipitation (mm.)
  - Water productivity ($/m³)
THAMES RIVER BASIN DATA

- Density 1: 960 persons/km²
- Density 2: £20,000,000/km²
- Density 3: negligible
- Density 4: 280mm
- Density 5: £1730/m³
THE RIVER THAMES BASIN IN DEFICIT

- Overabstraction
- Net imports
- Desalination proposed for Newham

- $\Delta$ Population
- $\Delta$ Output
- Climate change: warmer, hotter summers