Water and Land

1. Land Use Planning, Forest Cover and Afforestation

Techniques for increasing aquifer recharge in semiarid regions

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Water in semiarid regions

Problems

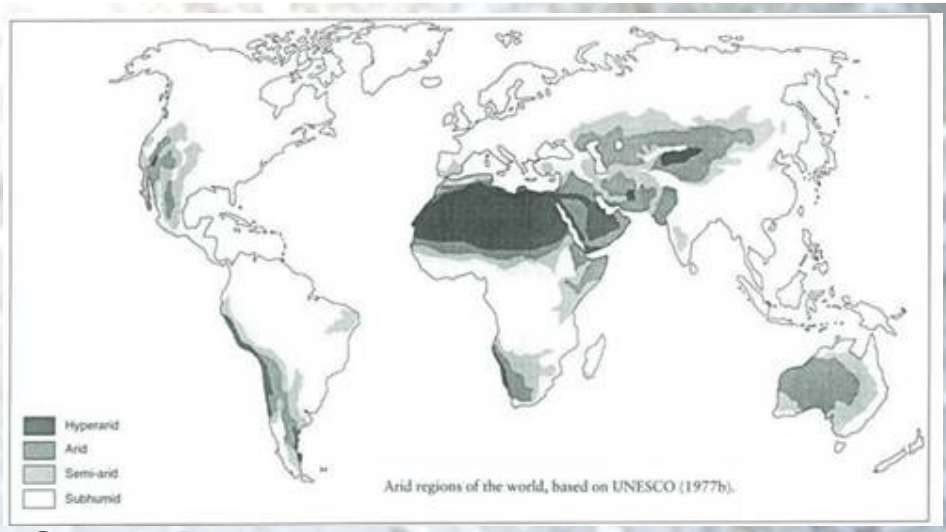
Solutions

A case study

- 1/3 of the earth
- Semiarids regions→ 5%; 7×10^6 km^2
- Sparsely populated areas

Zaragoza, June 16, 2008

- **Quantity**
- **Quality**



Quantity

Spatial and temporal rainfall variations
Runoff and infiltration

Rainfall intensities
Terrain infiltration capacity

High variation of water availability
Contonous increasing of demand of water

Some water harvesting and recharge systems

Rainfall and fog harvesting

Artificial rainfall
Fog harversting

Rain and run-off harvestings

Rural environment

"Water boxes"
Storm water
Collector tanks
Infiltration wells

→

Infiltration in stream bed
Check dams, pools and ditches
Careos
Sand dams
Conventional dams

Urban environment

Roof systems
Porous asphalts, porous concrete
Open-celled pavers with vegetation

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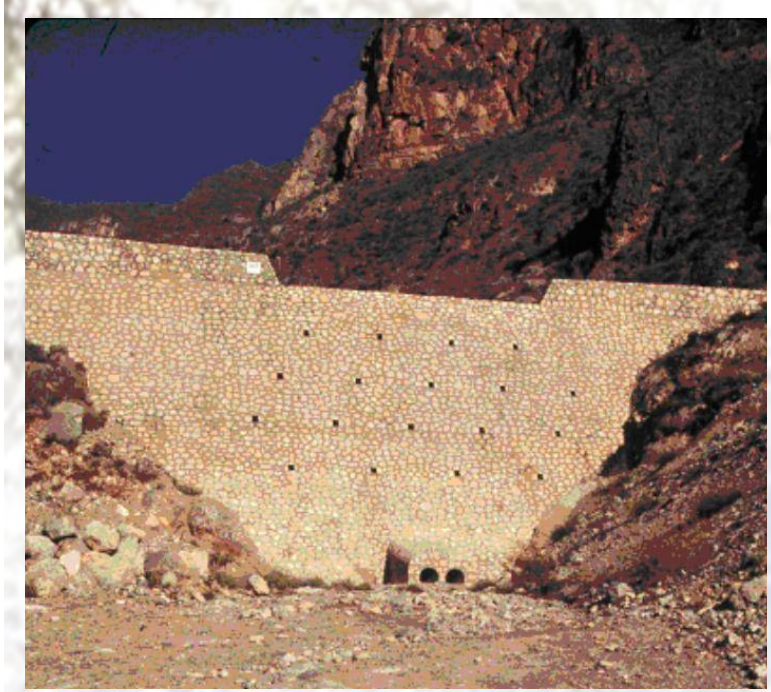

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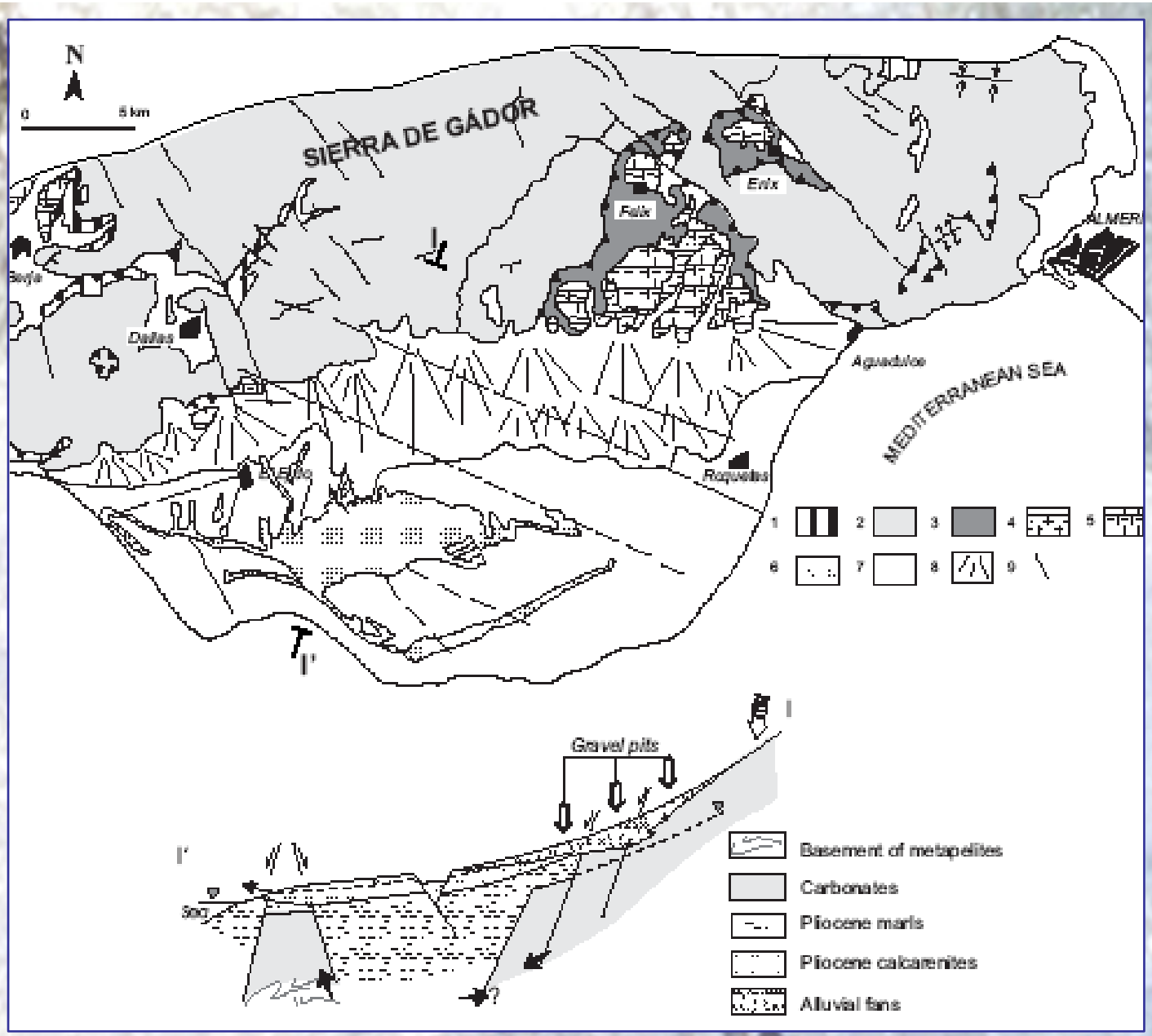

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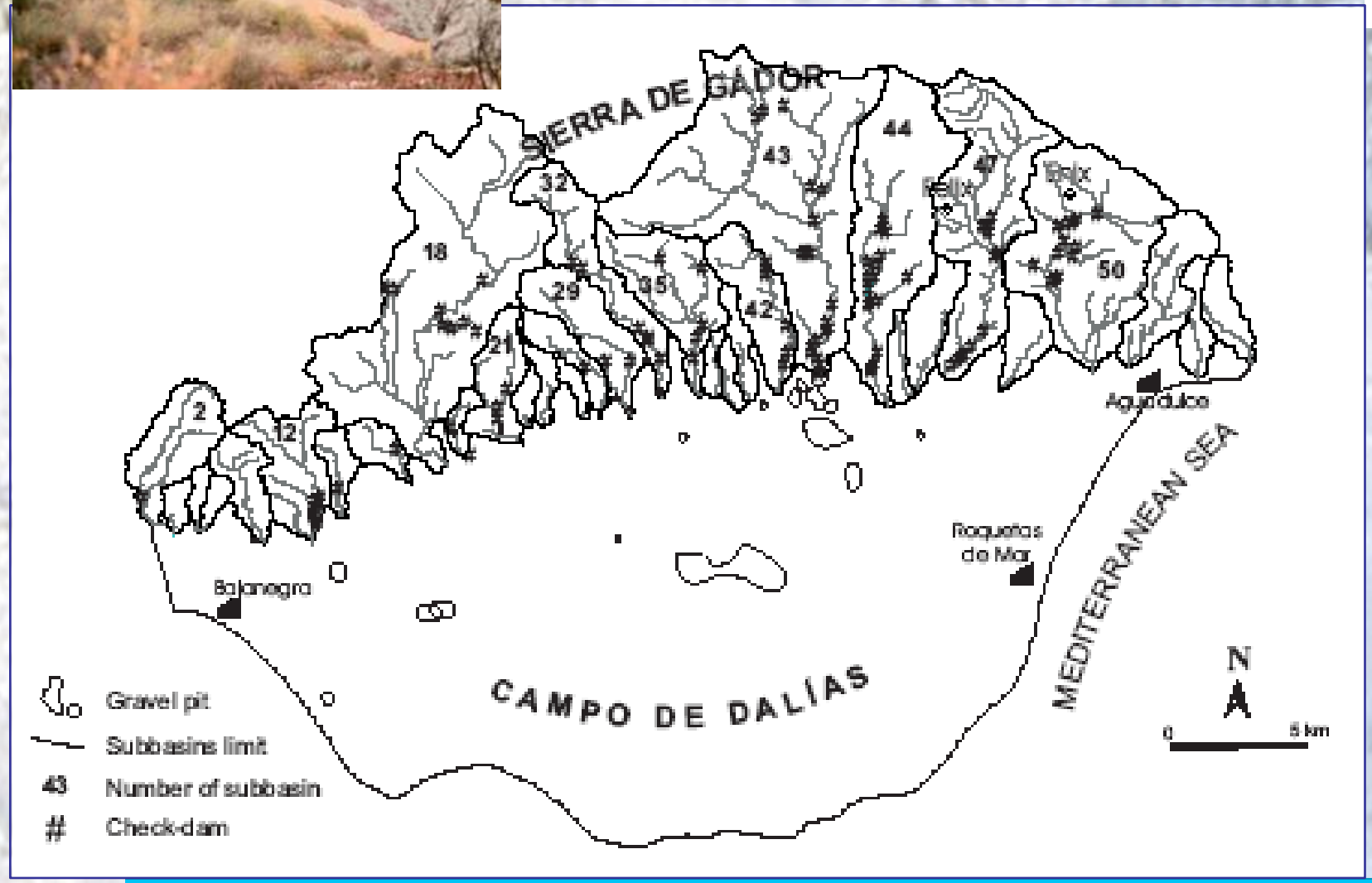

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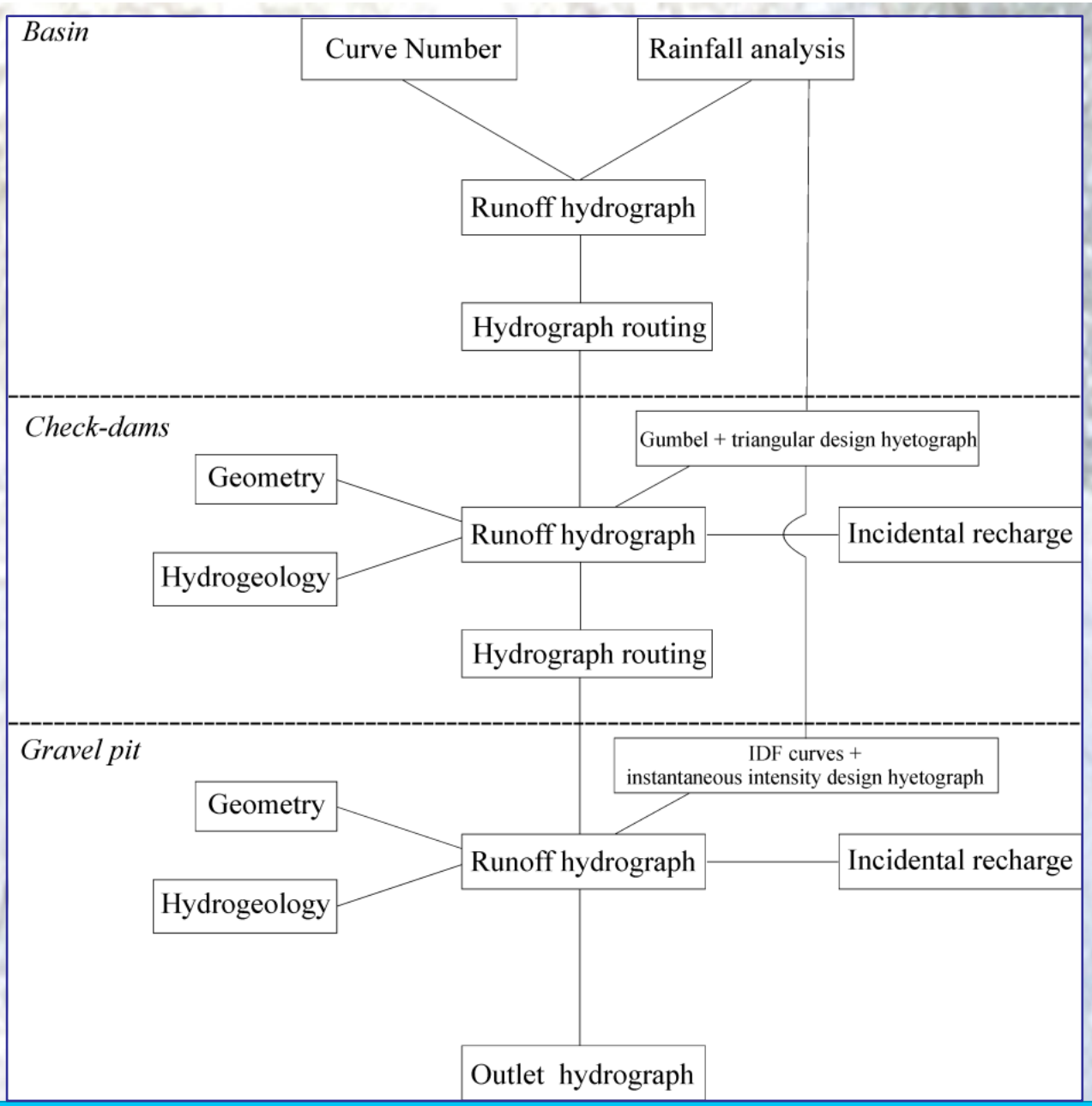
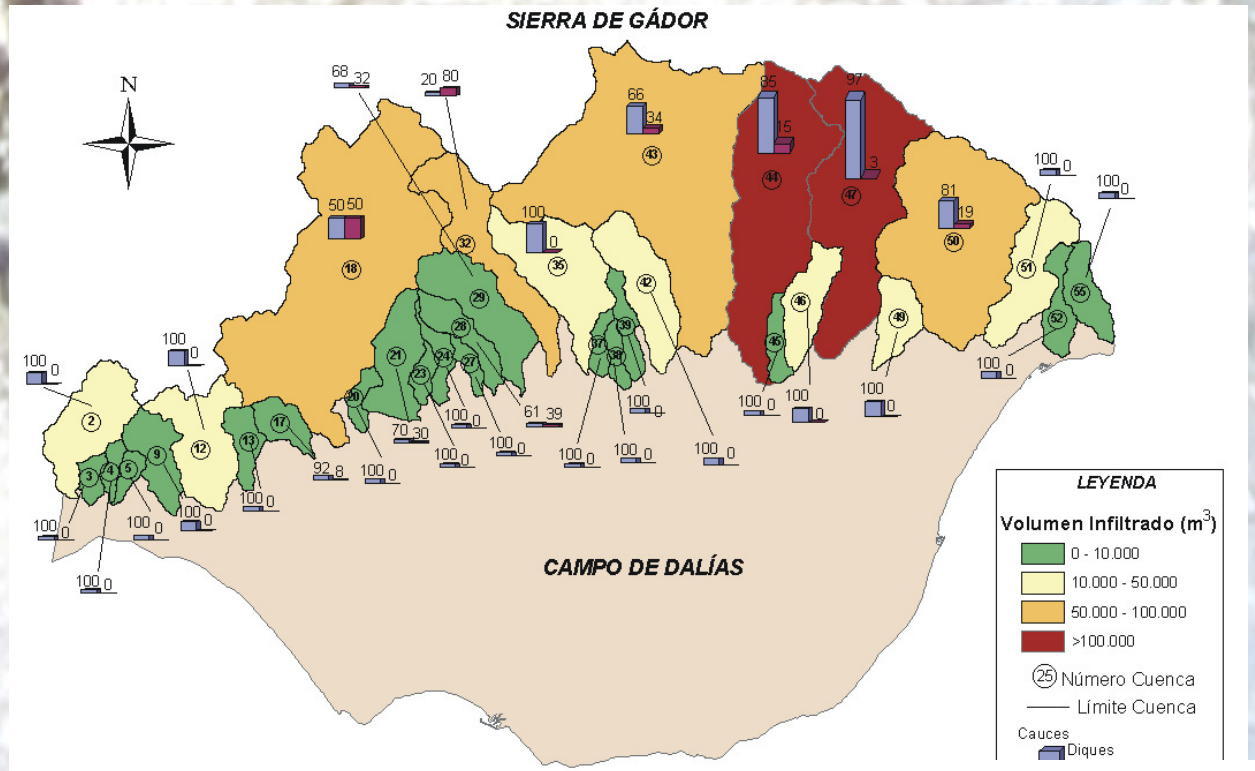
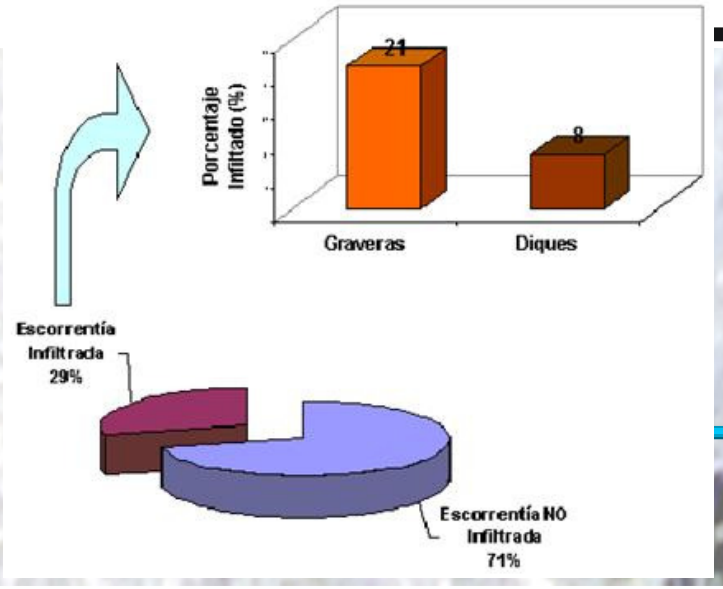
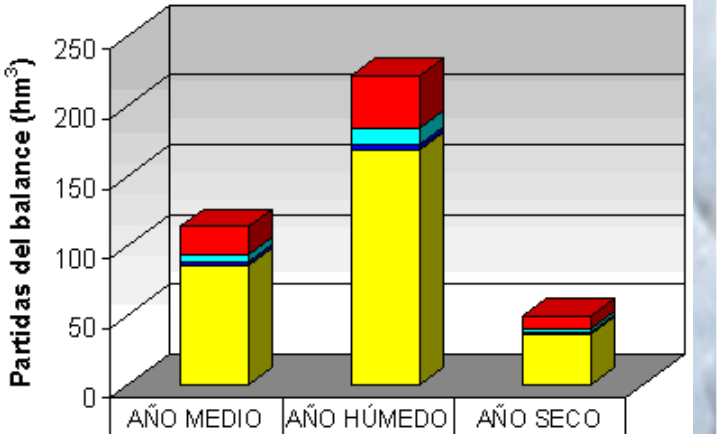

Basin
Curve Number
Rainfall analysis
Runoff hydrograph
Hydrograph routing
Check-dams
Gumbel + triangular design hyetograph
Geometry
Hydrogeology
Runoff hydrograph
Incidental recharge
Hydrograph routing
Gravel pit
IDF curves +
instantaneous intensity design hyetograph
Geometry
Hydrogeology
Runoff hydrograph
Incidental recharge
Outlet hydrograph







	AÑO MEDIO	AÑO HÚMEDO	AÑO SECO
ES restante	20	38	9
ES infiltrada en GRAVERAS	6	11	3
ES infiltrada en DIQUES	2	4	1
ETR + I	86	168	37