



European Commission

**Water
Resources
Management
in water stressed
environments
and Islands:
the challenge of
Ecoadaptation**

**A Water Sustainability Index
for the Canary Islands**

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**LA PALMA
BIOSPHERE
RESERVE**



the eastern islands

*Up to 1965 an absolute water stress situation (<500 m³/cap*year)*



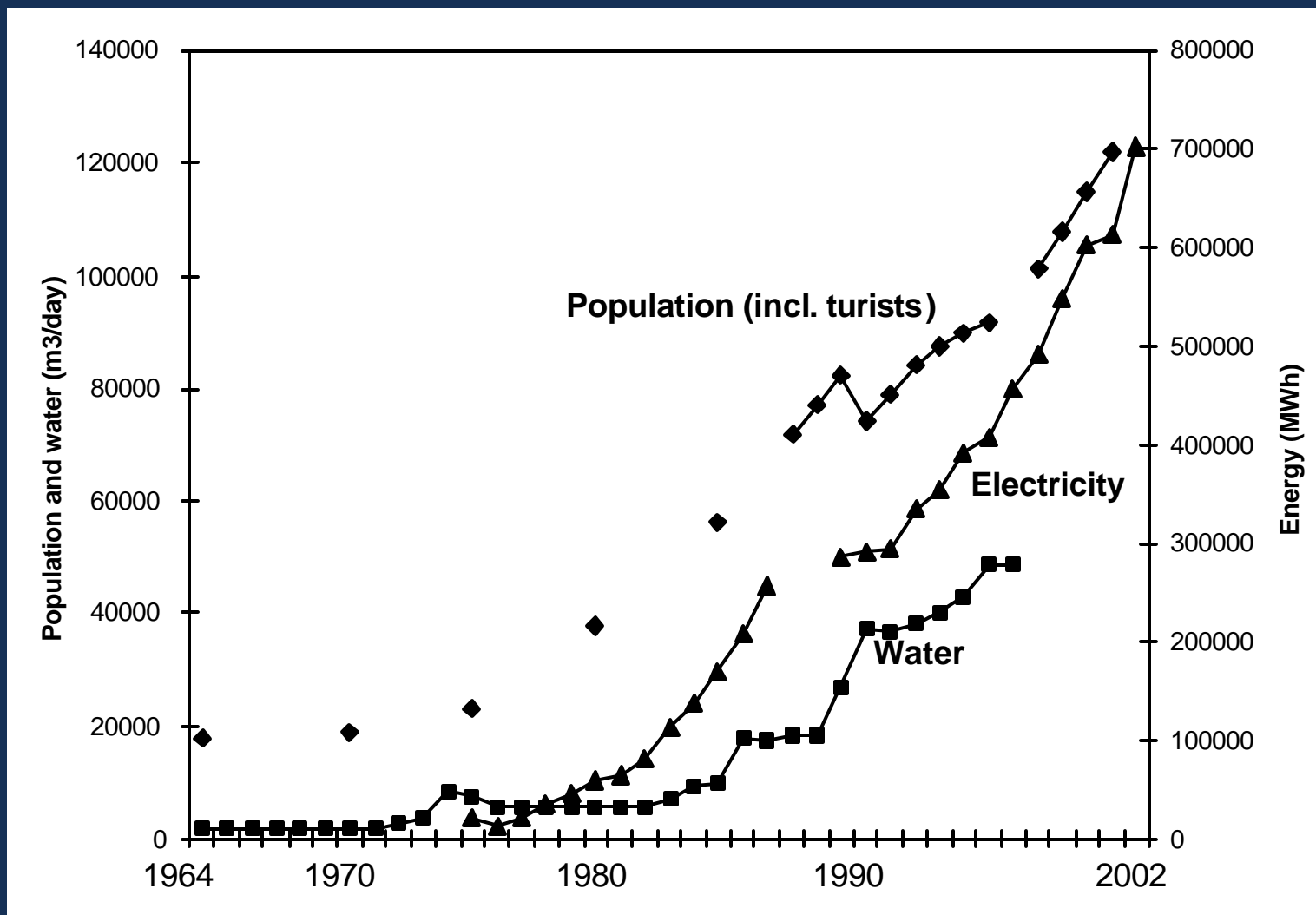
Lanzarote dry farming (Díaz, F. 2001)



Lanzarote 1960's
(Barreto, J.M. 1995)

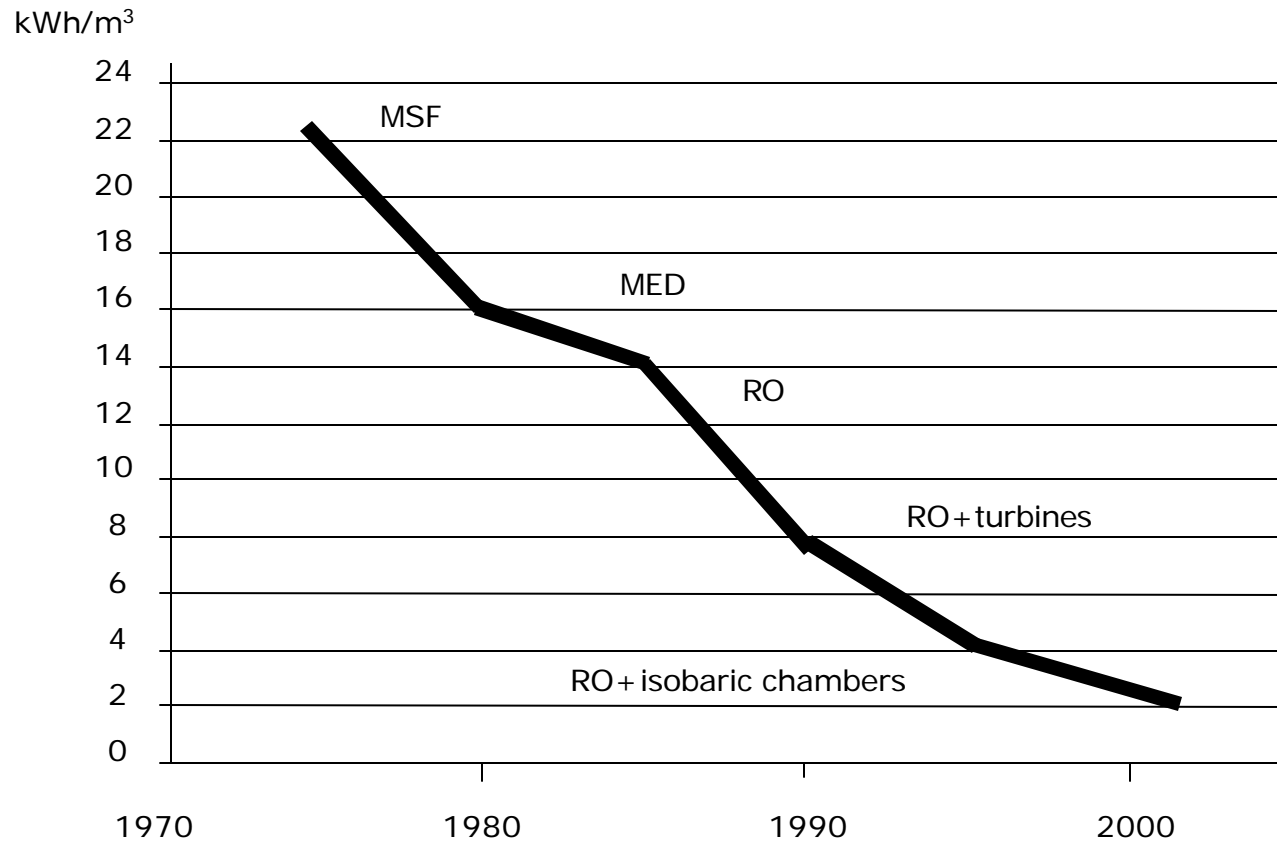


Evolution of population, electricity and water consumption in Lanzarote



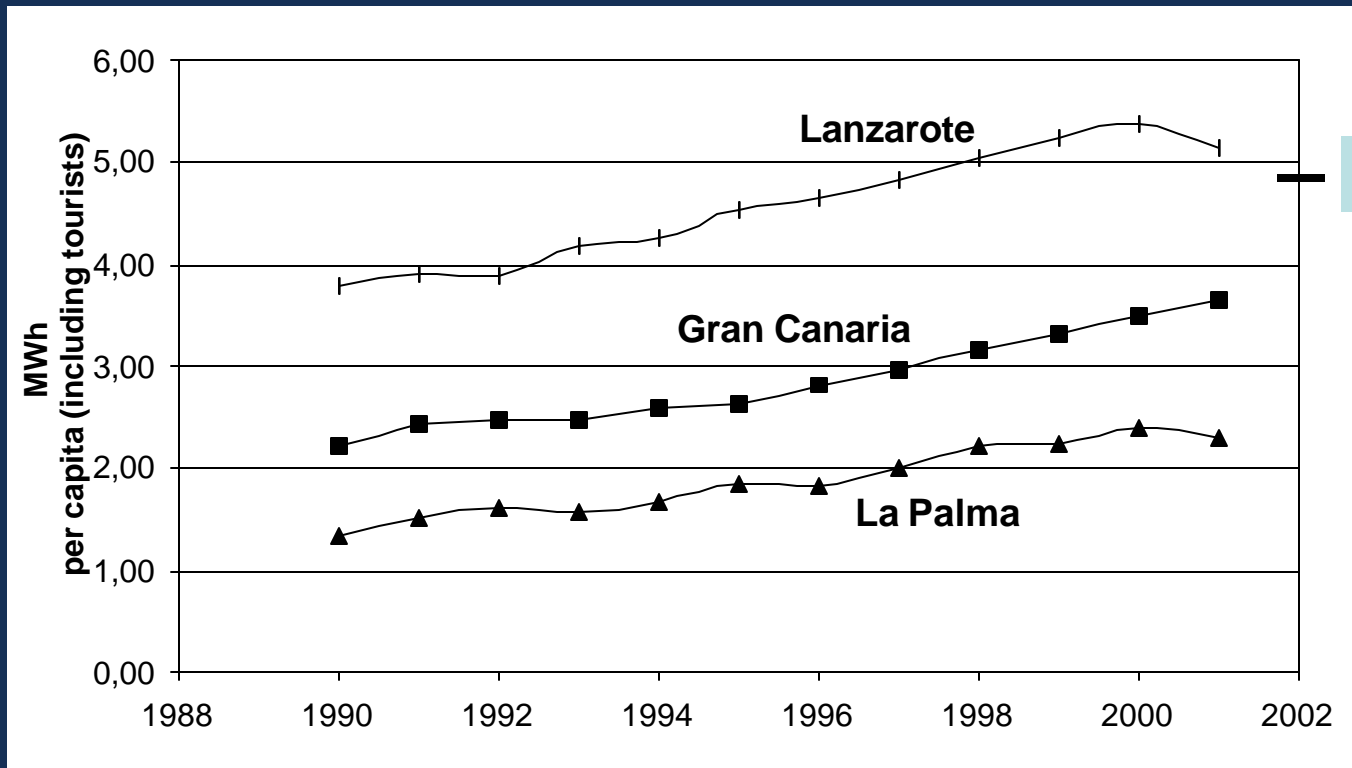
*) Data from Inalsa, ISTAC and Endesa-Unelco.

Evolution of energy requirement for seawater desalination

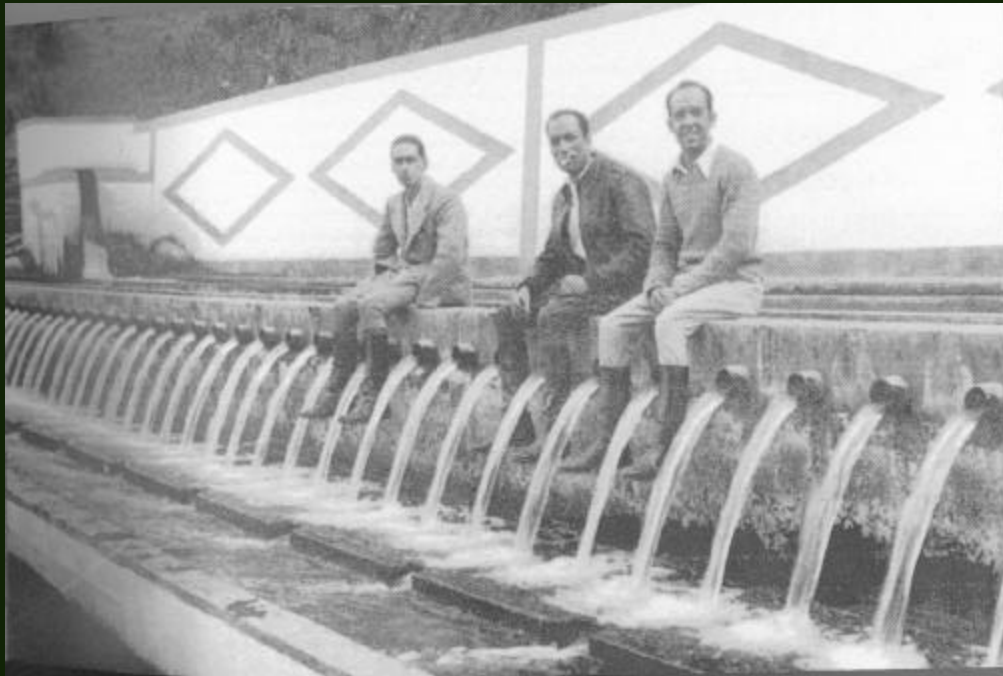


Hernández, M. 2001

Comparison of electricity consumption per capita

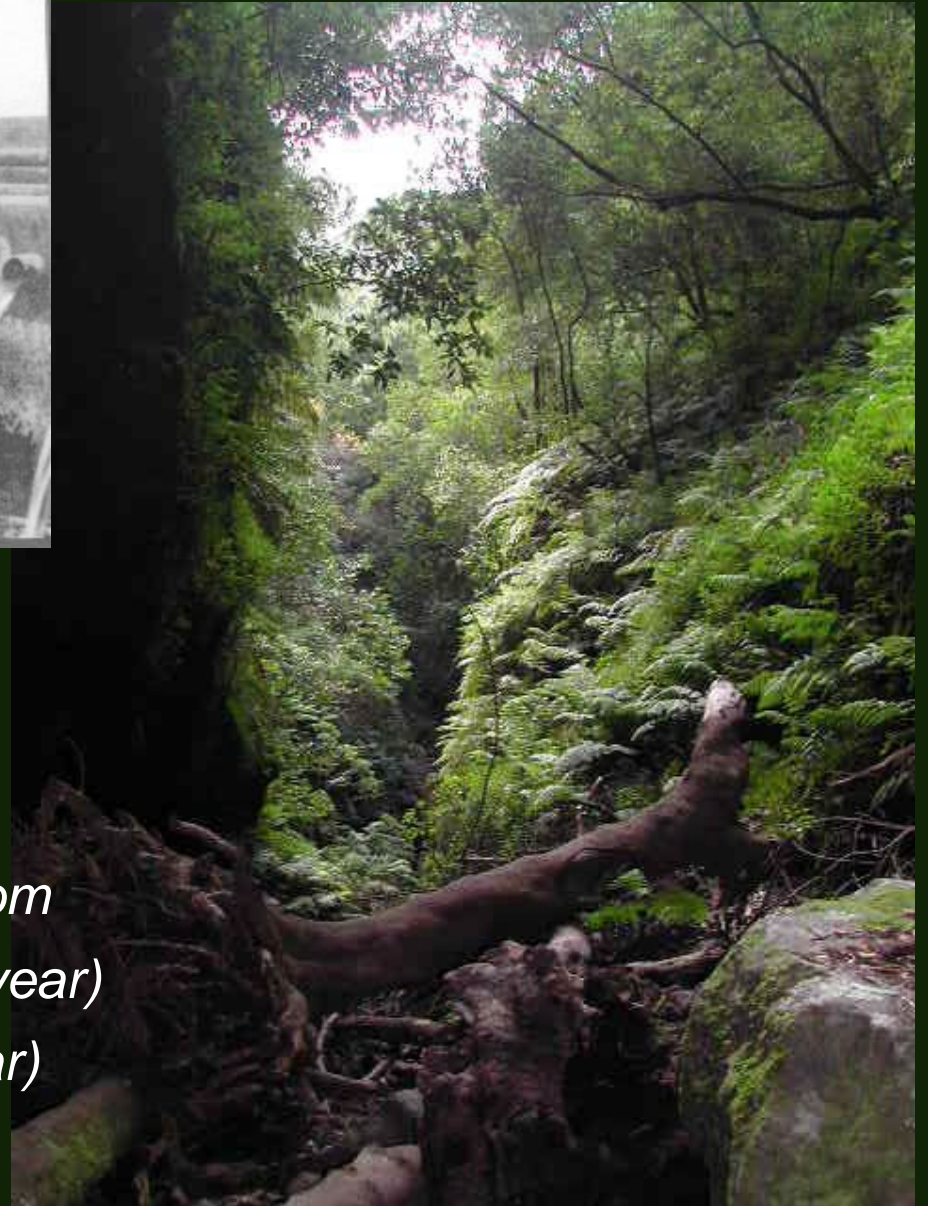


*) Based on data from ISTAC and Endesa-Unelco.

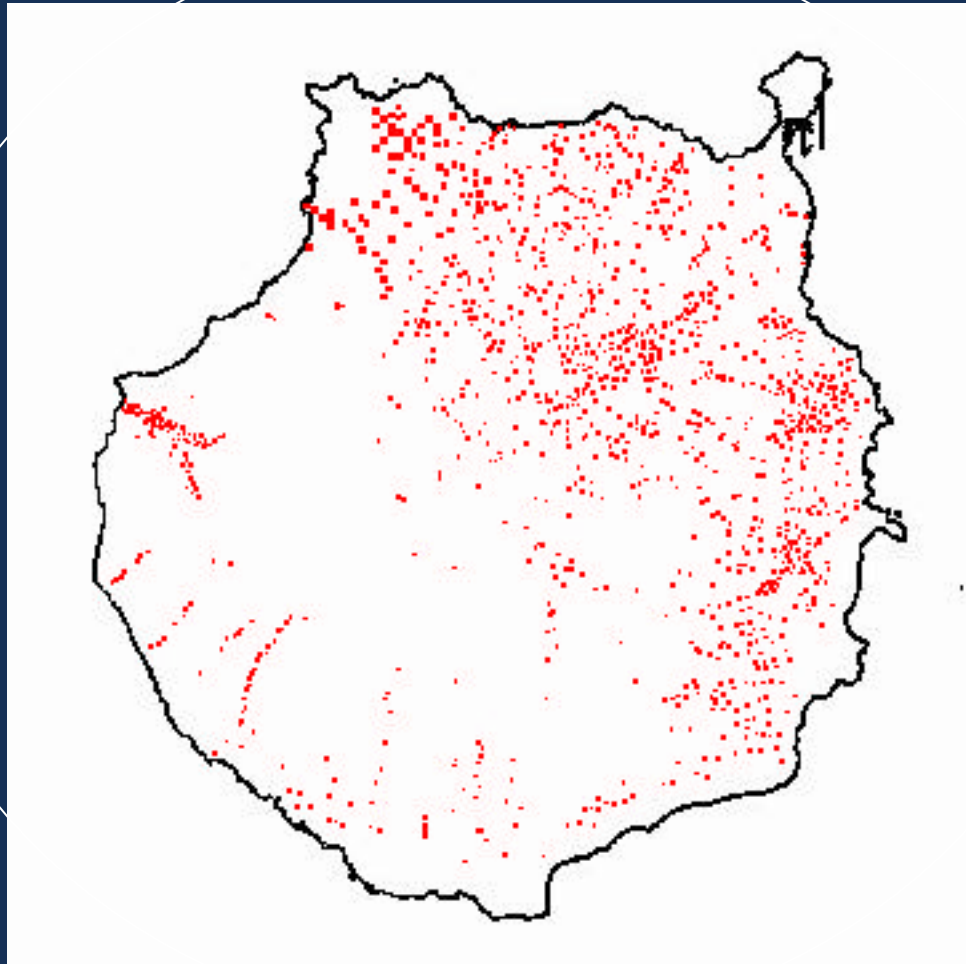


Tenerife 1950's (Méndez, T. 2002)

La Palma rainforest (Hernández, M. 2003)



*On western islands, conditions varied from chronic water stress (500-1000 m³/cap*year) to regular stress (1000-1700 m³/cap*year)*

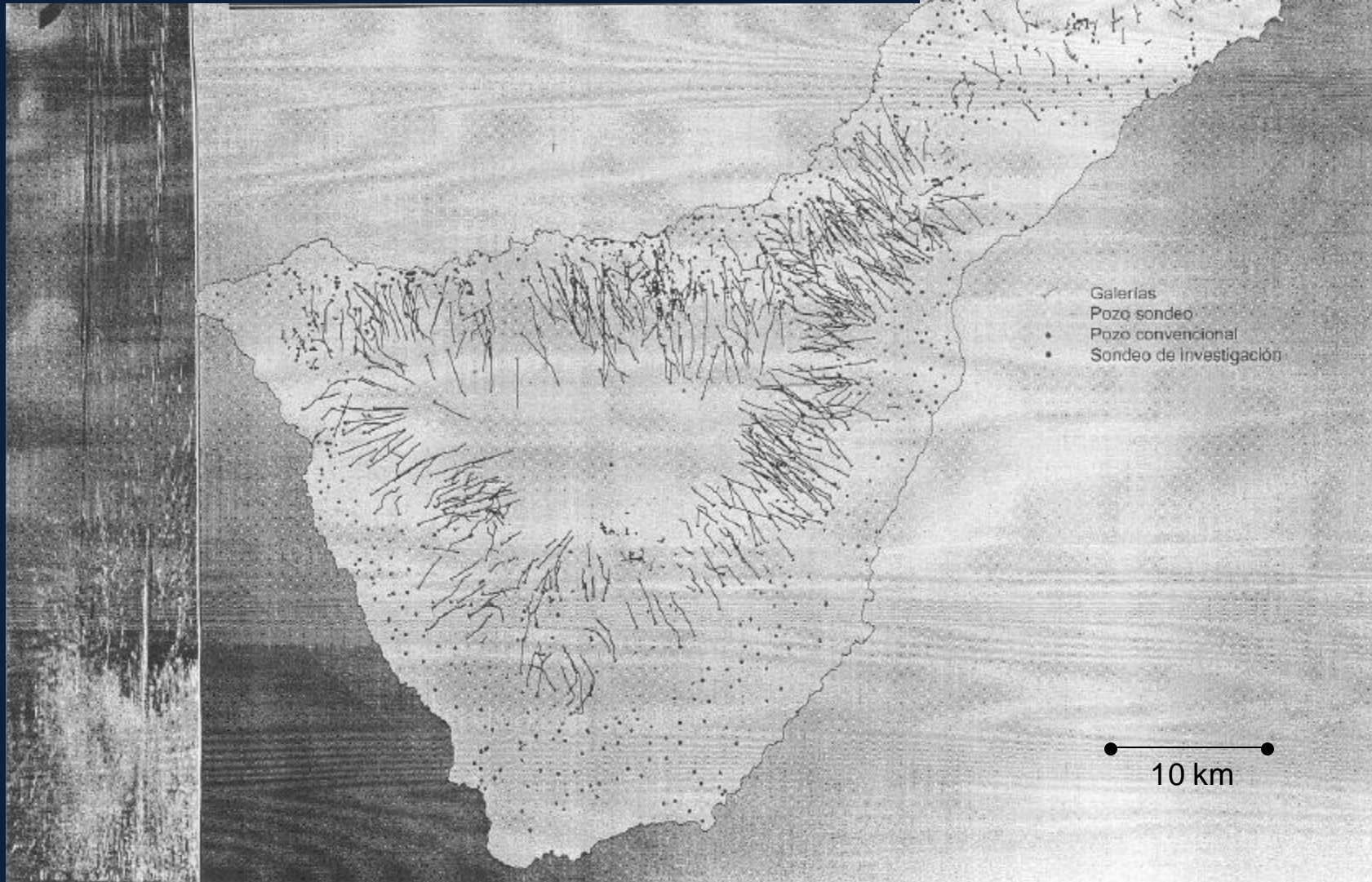


CIAGC, 1995

20 km

Wells in Gran Canaria (1980)

Groundwater extraction works in Tenerife (2000)



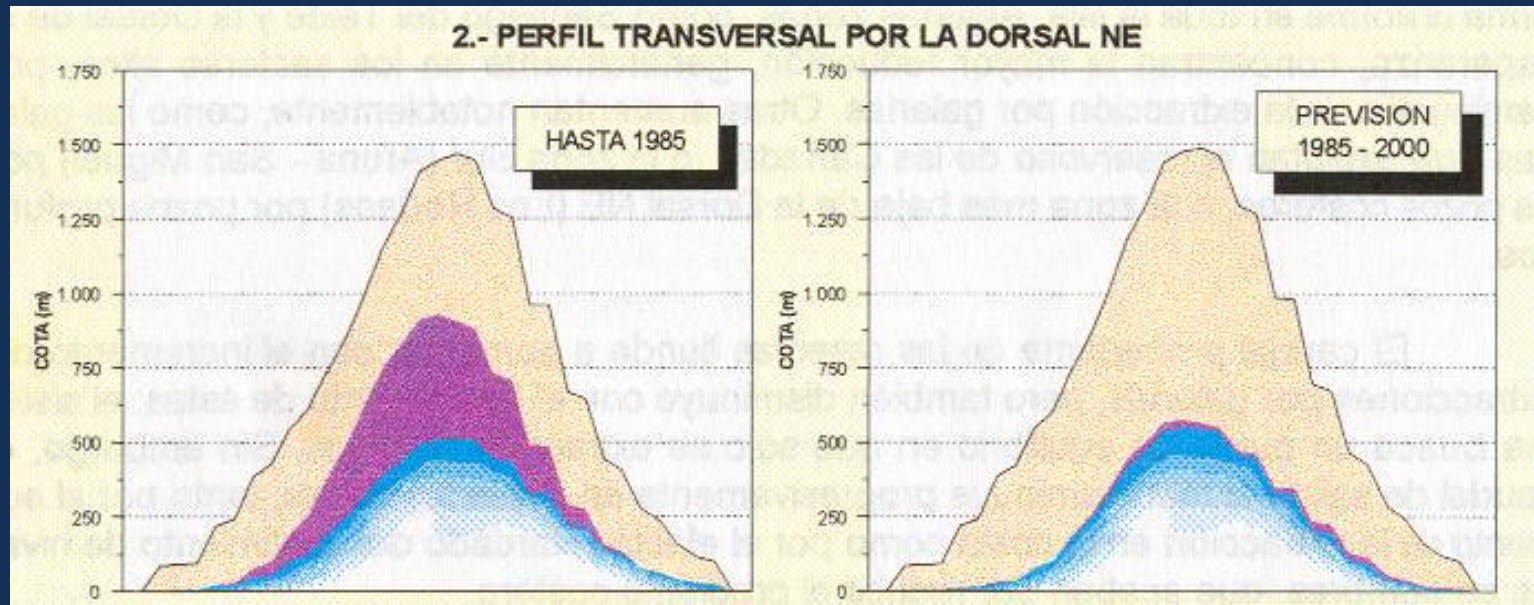
CIATF, 2003

Private water distribution in Tenerife



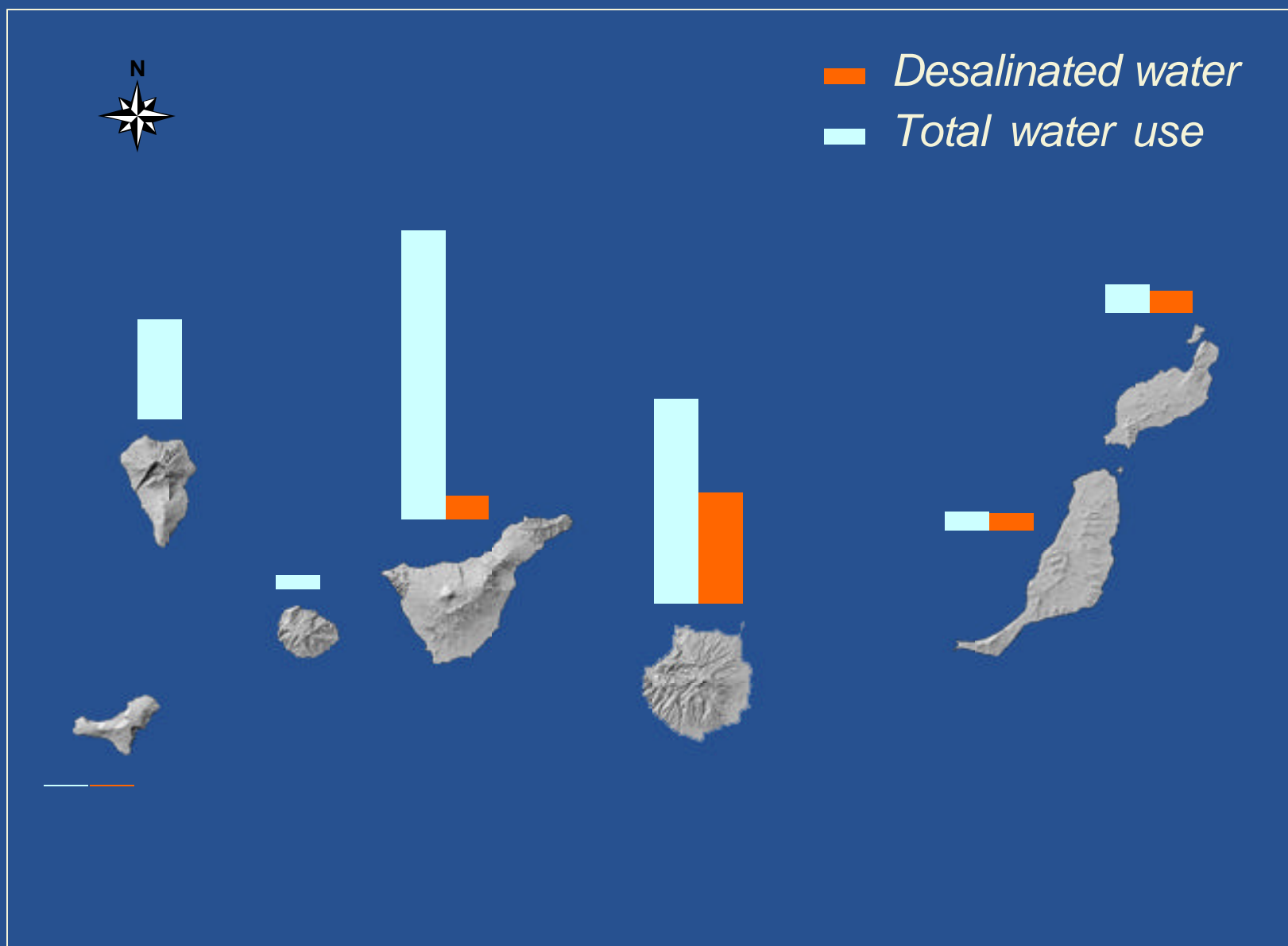
Hernández, M. 2004

Groundwater depletion in Tenerife



CIATF, 1995

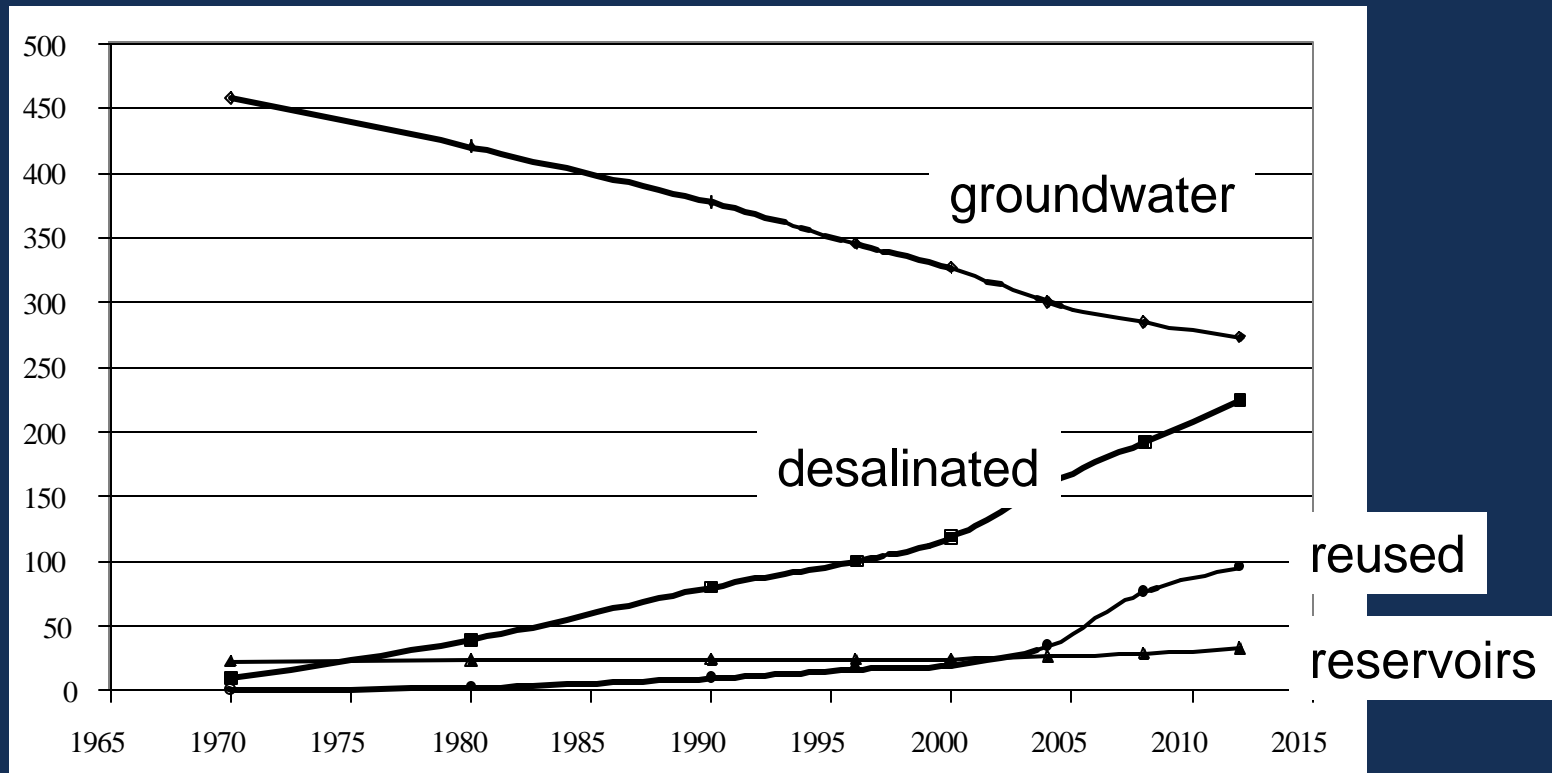
Desalination in 2000



*) Working document of the Water Resources Plan of the Canary Islands (2001).

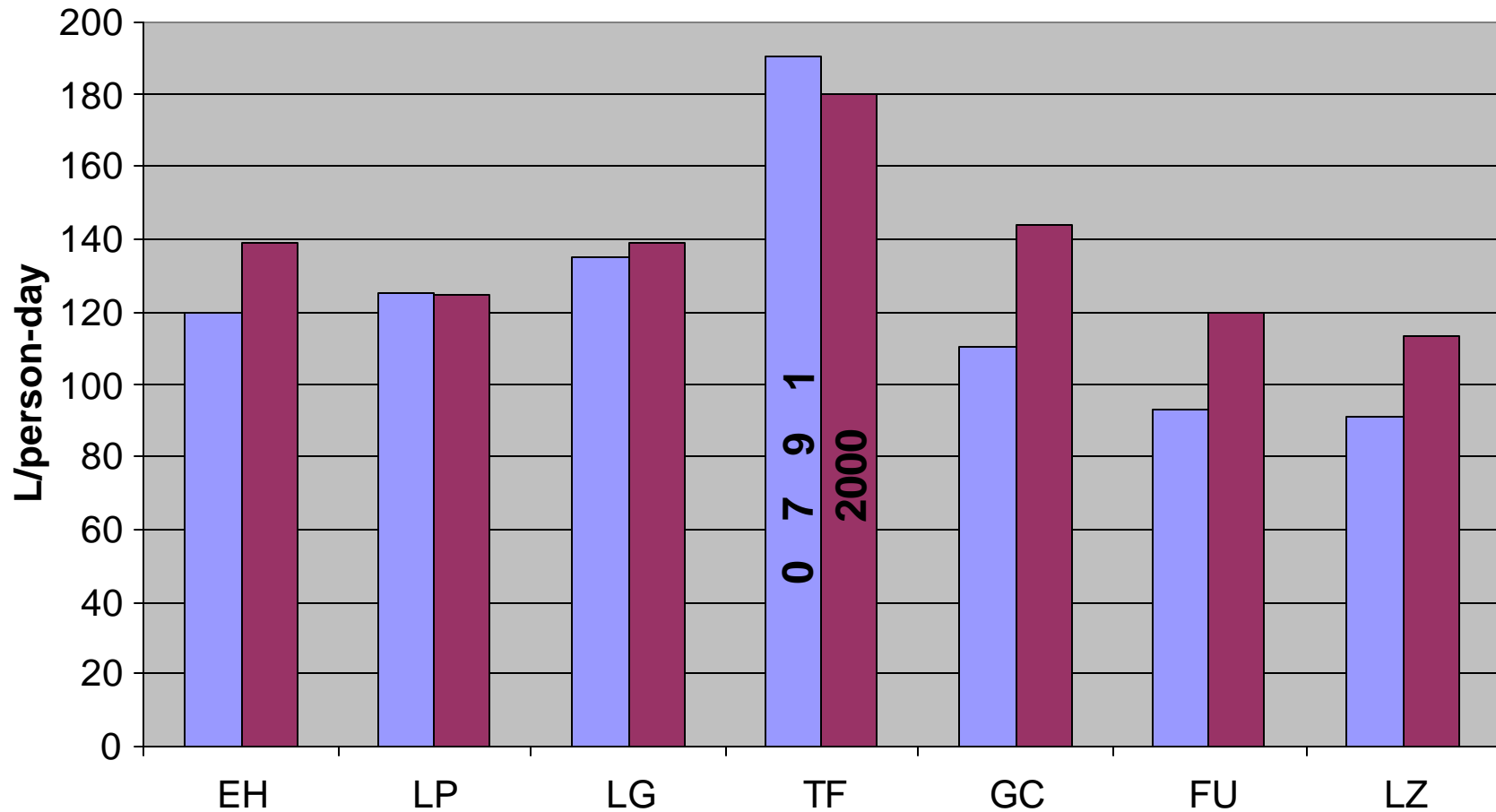
Evolution of water resources development in the archipelago

hm³



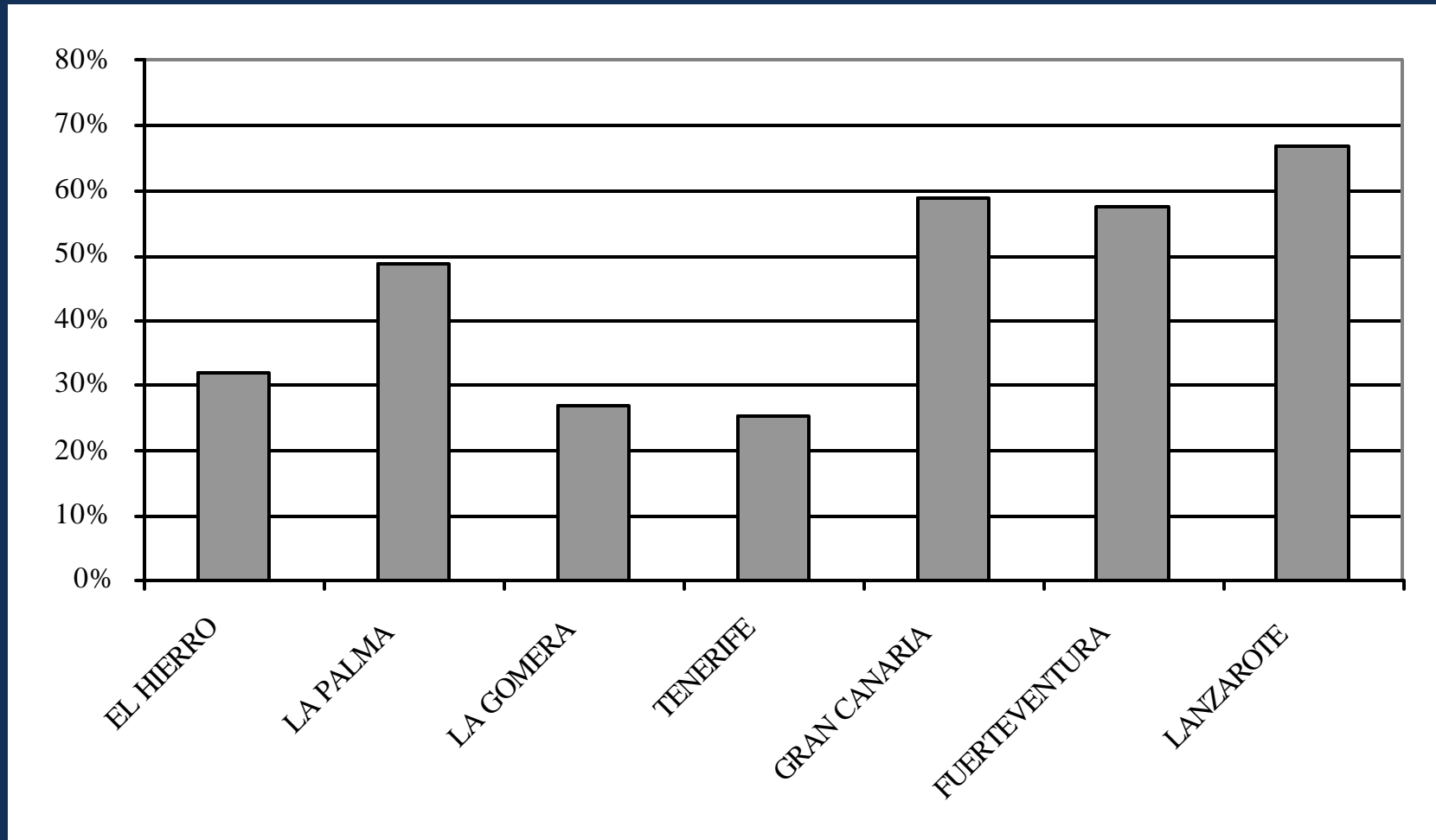
*) Working document of the Water Resources Plan of the Canary Islands (2001).

Changes in urban water consumption



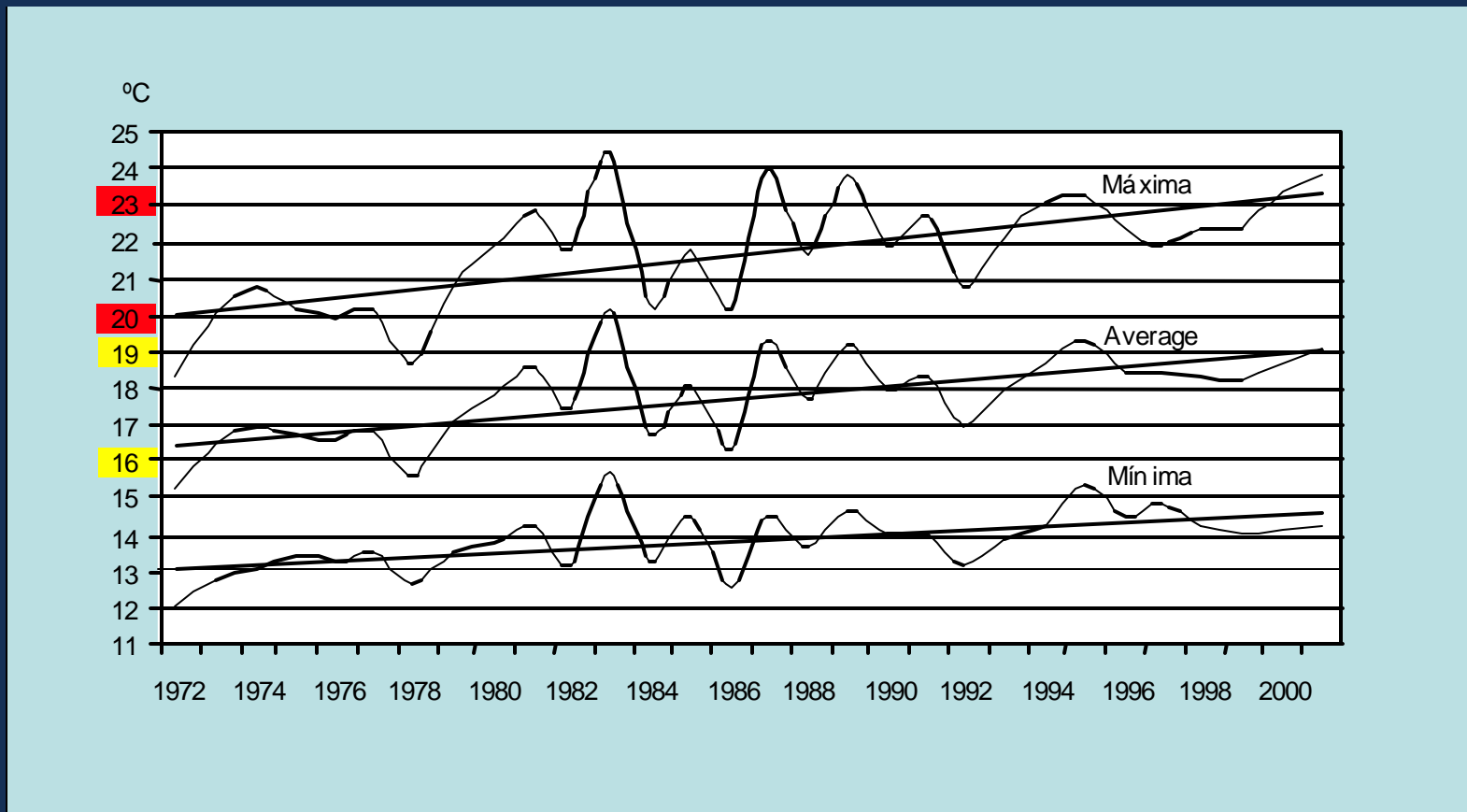
*) Working document of the Water Resources Plan of the Canary Islands (2001).

Percentage of wastewater with secondary treatment in 2000



*) Working document of the Water Resources Plan of the Canary Islands (2001).

Evolution of June's temperature at Los Rodeos airport (Tenerife) from 1972 until 2001



Altitude of Los Rodeos: 617 m.a.s.l.

*) Data from the Spanish Meteorological Institute

Integrating data with a water sustainability index

(a Pressure-State-Response approach)

	Canaries	Mainland
components	8	8
indicators	14	15
variables	65	98

*) variable value was obtained by multiplying a condition/performance score (-3 to +3) by a specific weight (0-4).

Components

Indicators

NATURAL RESOURCES

*hydrological water balance situation,
pollution, water resources conservation*

INFRASTRUCTURE

waterworks for water supply and sanitation

WATER QUALITY

drinking, agriculture, urban, and tourism

WATER QUANTITY

agriculture, urban and tourism

EFFICIENCY

water and energy use efficiency

TECHNOLOGY + RESEARCH

technology used, research undergoing

EDUCATION + SOCIAL

education, social and institutional capacity

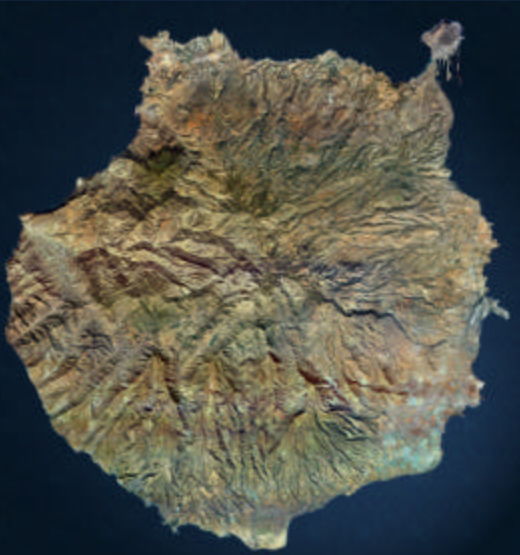
WATER ECONOMICS

pricing, value added, incentives

Lanzarote	1950	2003
natural resources	9	-10
infrastructure	-4	8
water quality	-4	-5
water quantity	-10	1
efficiency	13	-12
technology	-2	5
research+social	-4	-3
economics	1	3
Water Sustainability Index	-1	-13



Gran Canaria	1950	2003
natural resources	-20	-11
infrastructure	-7	8
water quality	0	-6
water quantity	-1	-3
efficiency	-11	-15
technology	-3	0
research+social	-3	1
economics	9	11
Water Sustainability Index	-36	-15



Tenerife	1950	2003
natural resources	-7	-15
infrastructure	-14	6
water quality	14	-9
water quantity	18	-6
efficiency	-4	-3
technology	-3	2
research+social	-2	6
economics	8	13
Water Sustainability Index	10	-6



La Palma	1950	2003
natural resources	4	-11
infrastructure	-11	3
water quality	9	3
water quantity	11	4
efficiency	-2	-5
technology	-7	-4
research+social	-6	-4
economics	13	15
Water Sustainability Index	11	1



BOTTOM LINES

NATURAL RESOURCES

are driven to near exhaustion

INFRASTRUCTURE

improving and desalination gaining ground

WATER QUALITY

maintained or improved thanks to desalination

WATER QUANTITY

still below demand in most islands

EFFICIENCY

although improving still low, need renewable

TECHNOLOGY + RESEARCH

needs strengthening

EDUCATION + SOCIAL

more public sector specialization needed

WATER ECONOMICS

no incentives for water protection and use of renewable energy other than market prices

Some recommendations for improving sustainability in relation to water

Maintain investment in infrastructure above 40 €/person per year to protect natural resources and increase efficiency in water production and distribution.

Facilitate application of waterworks standards in public tenders.

Implement compliance of water quality standards and control techniques.

Orientate applied research and specialized training in water issues.

Use economic tools to stimulate water savings and application of renewable energy in the water sector.



Human nature