



ITALIAN APPROACH TO WATER QUANTITY ASPECTS; NATIONAL KEY STUDIES

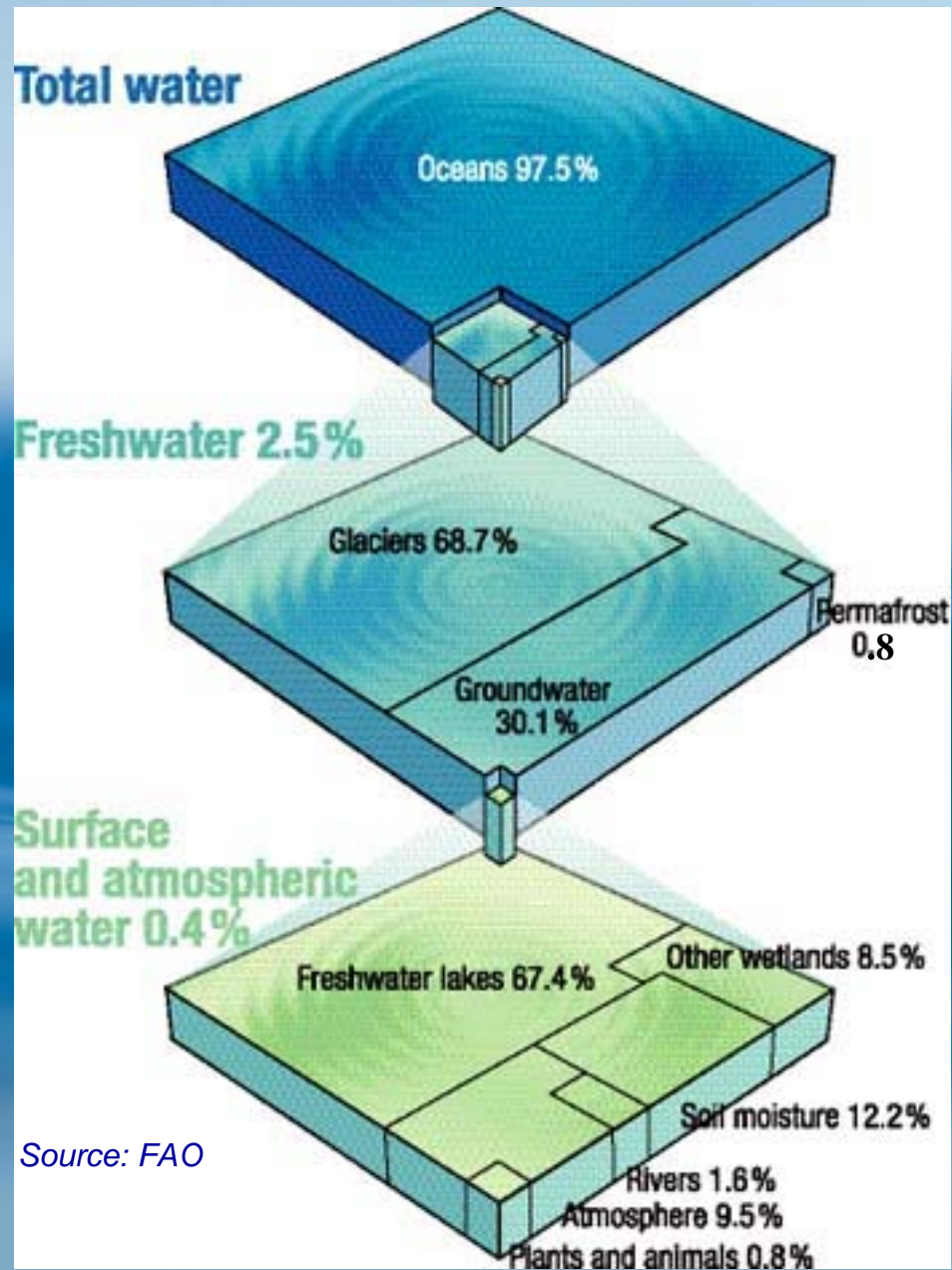
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**Water Framework Directive – Common Implementation Strategy Conference on
“Coping with Drought and Water Deficiencies: From Research to Policy Making”**

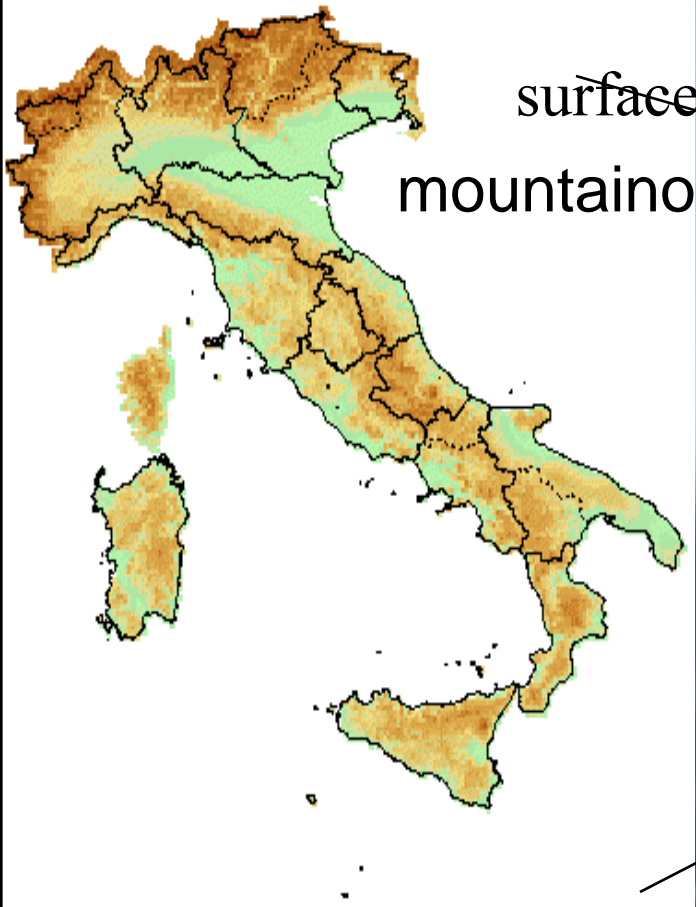
Cyprus May 12 and 13, 2005

GLOBAL WATER AVAILABILITY



surface area: 301,341 km²

mountainous and hilly regions: 75% of the whole territ



country shows an hydrographical grid essentially made of a high number of torrential streams with very short branches

Surface flow:
 $167 \times 10^9 \text{ m}^3$ per year
(of which $12 \times 10^9 \text{ m}^3$ per year of
groundwater)

Total exploitable
water resources :
 $40 \div 44 \times 10^9 \text{ m}^3$ per
year

Water received
by the land:
approximately
 $296 \times 10^9 \text{ m}^3$ per
year



Total amount of
groundwater available:
 $12 \times 10^9 \text{ m}^3$ per year

Global national needs for
water : 740 m^3 /person per
year, agriculture (48%),
municipal water supply
(19%), energetic field (14%)

Annual amount of water used by the municipal
water supply systems: $7.86 \times 10^9 \text{ m}^3$ (about 373
litres/person per day), groundwater (50%),
springs (40%) and surface water (10%)

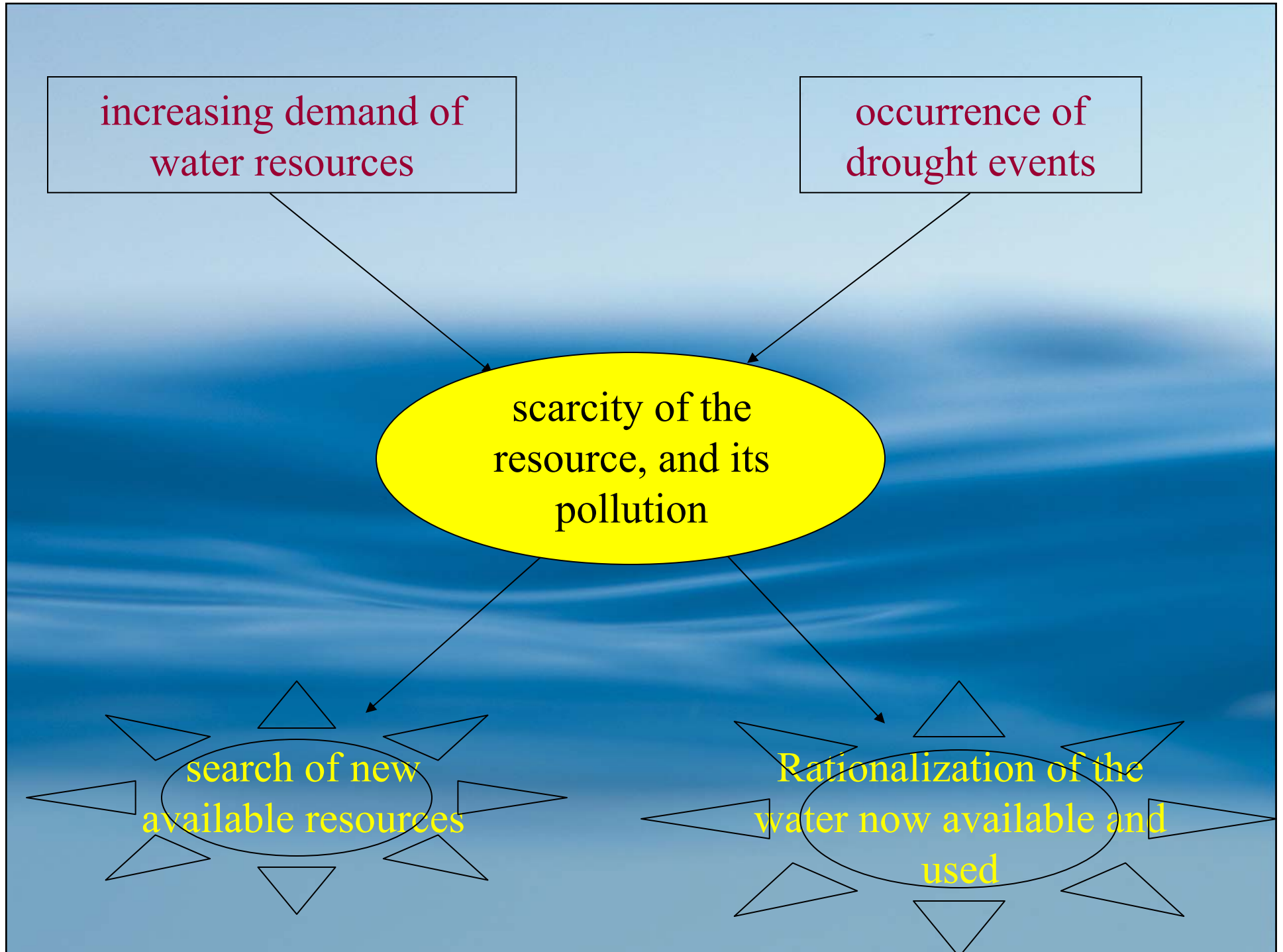
increasing demand of
water resources

occurrence of
drought events

scarcity of the
resource, and its
pollution

search of new
available resources

Rationalization of the
water now available and
used



DLgs 112, 31 marzo 1998

Dpcm 24 luglio 2002

**decentralisation toward the regions also of
water monitoring and protection activities**



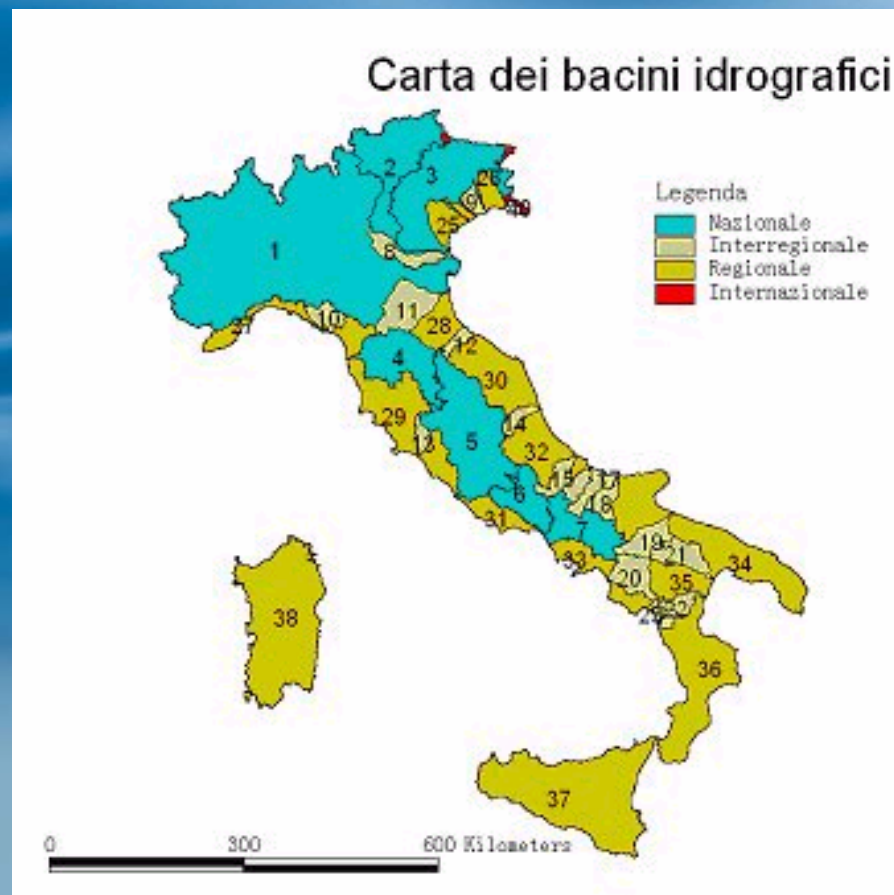
Law 225, 24 February 1992
civil defence as a National "Service"
composed by State administrations, central
and peripheral, by the regions, by the
provinces, by the local councils.

Law 183/89

National Water Basin Authorities

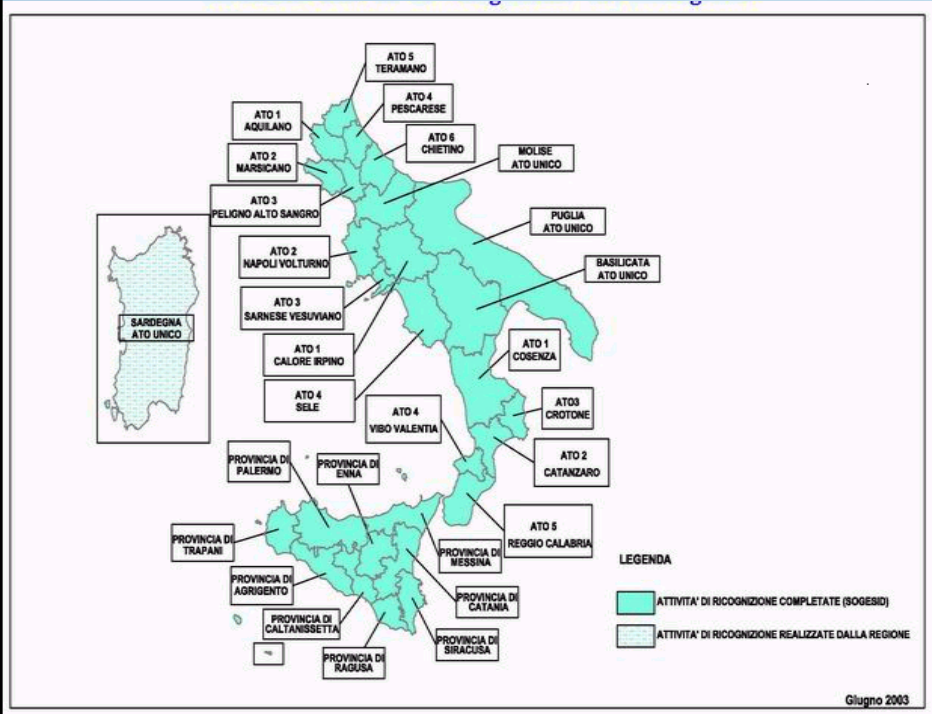
Po, Adige, Alto Adriatico, Arno,
Tevere e Liri-Garigliano-Volturno

**Regional and interregional Water
Basin Authorities**



Law 36/94

Optimal Territorial Areas (ATOs)



integrated water services

D.L.152/99

DEFINES AN INTEGRATED ACTION PICTURE FOR THE AQUATIC ECOSYSTEMS PROTECTION

- ➔ unifies all the norms for preventing waters from pollution and for the implementation of the Council directive 91/271 on urban wastewater treatment and the Council directive 91/676 on the water protection against pollution caused by nitrates from agricultural sources
- ➔ foresees a water body monitoring network including some biological parameters. The regulation includes a protection plan whose objective is to achieve good waterbody quality status by 2016, similarly to the WFD concept.

Water Balance

Balance between water resources (readily available or available) in the period of time considered and with reference to determined river basin (surface and groundwater) to the net resource necessary for the conservation of the aquatic ecosystem and the needs of different uses.

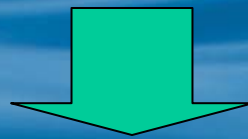
What does it serve?

Quantitative
protection

- Sustainable water consumption
- optimum planning
- Optimal water management plan
- Readjustment of authorisations

Qualitative
protection

- Achievement of the environmental quality objectives



Development of water resource plan compatible with qualitative-quantitative protection

PROTECTION PLAN (qualitative quantitative model)
OPTIMAL MANAGEMENT AREA PLANS
(available resources, treatment plants)

Who ?

River Basin Authority (Art. 3, L. 36/94)

Periodic definition and updating in order to assure an equilibrium between the availability of resources in the area concerned and the needs of the different uses, taking care not to deplete or degrade the water bodies

Continuity equation of the incoming flow, leaving and collected in the surface water basin, in the hydrogeological basin, or in both of these two together

$$R(\text{sup+sott}) - F(\text{civ,agr,ind,en,vari}) + R_{\text{riu}} + V_{\text{rest}} \geq 0$$

Reference area \longrightarrow River basin or sub-basin
Temporal scale \longrightarrow At least annually

From a legislators point of view, the water balance is being aimed at sustainable use and assumes a central role with respect to the achievement of anthropogenic needs and to the achievement of the quality objectives

Minimum Vital Flow

Minimum flow necessary for every homogeneous section of the water course to guarantee the protection of the water body characteristics and of the water and maintain the biocenosis typical of natural conditions

Law 183/89

Art. 3

Objectives of the programme activities, planning and implementation

“the rational use of surface water and deep groundwater guarantees....that the abstraction does not compromise the minimal constant vital flow of the downstream catchments

Law 36/94

Art. 3

RB Authority defines and updates the water balance

The abstractions are regulated in a way to guarantee a flow level necessary to the life of the downstream catchments in order not to compromise water resources, environmental livability, agriculture, aquatic flora and fauna, geomorphological processes and the hydrological equilibrium

Dec. 152/99

Art. 22

Under the Protection Plans the Regions adopt the measures

“...aiming to assure an equilibrium in the water balance while taking into account(...) of the minimum vital flow” ... “all abstractions are regulated by the authority through forecasting of dam releases in order to guarantee the minimum vital flow

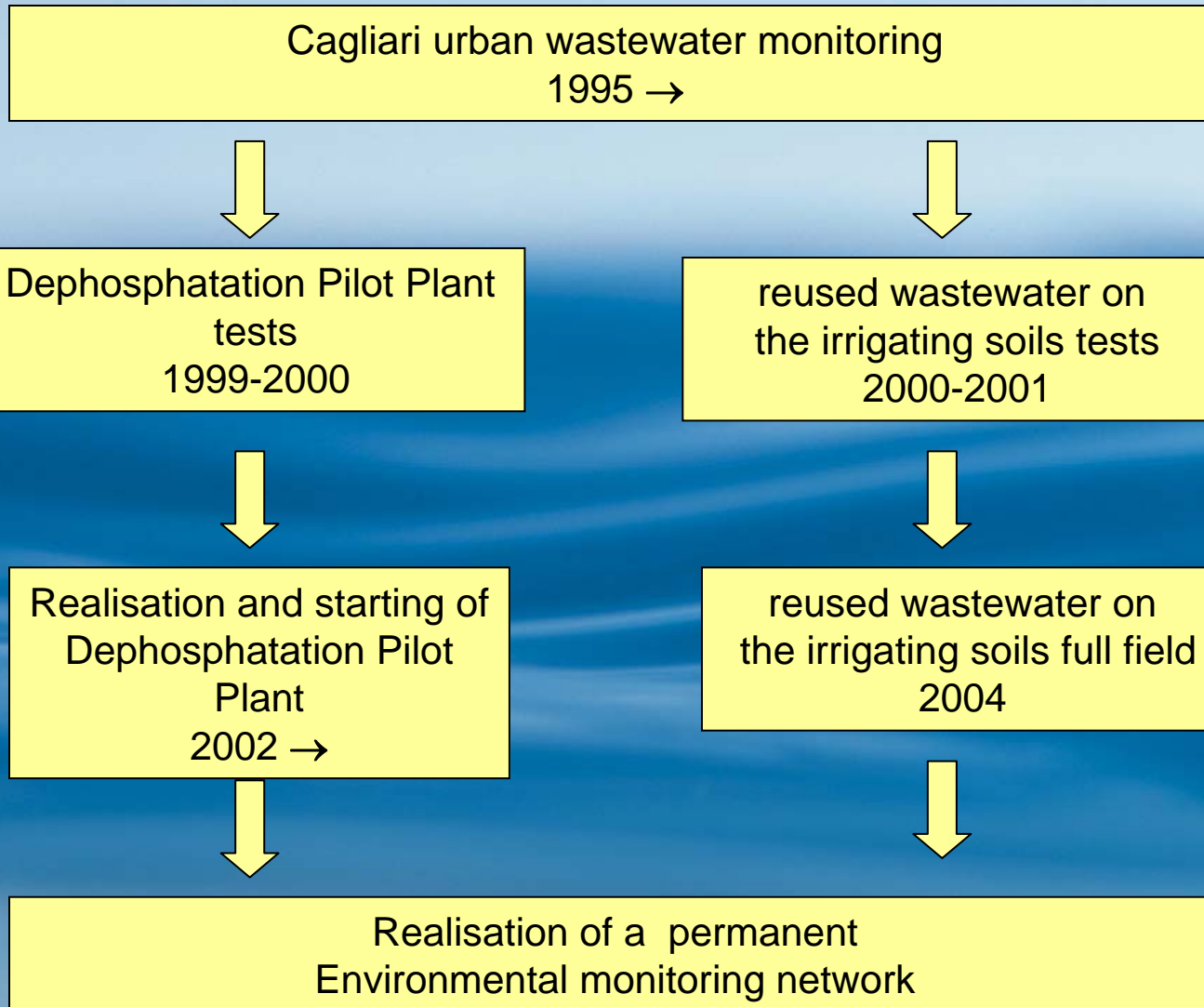


Decree 28th July 2004

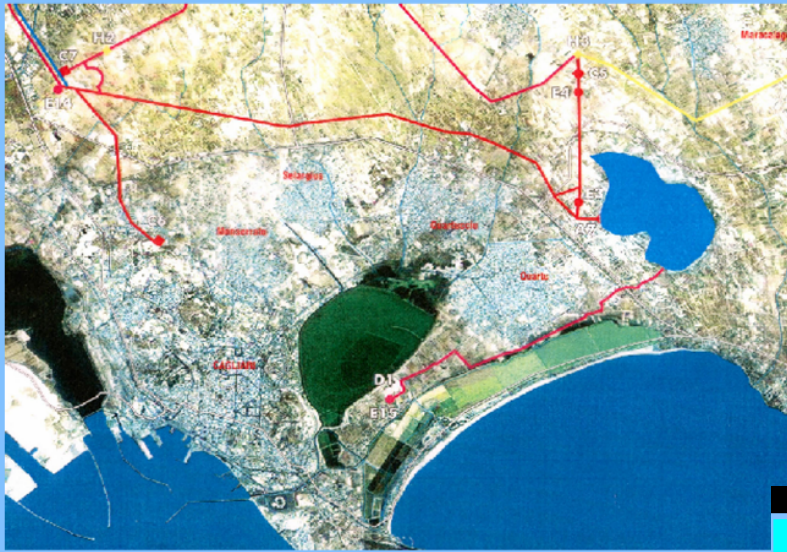
bringing the Guideline for the arrangement of the water balance of the basin, including criteria for the user census and for the definition of the minimum vital flow, of which Article 22, point 4, of the legislative decree 11 May 1999, no. 152

REUSE OF WASTEWATER

Sardinia experience



SCHEMA RIUTILIZZO REFLUI DI IS ARENAS



REUSE OF WASTEWATER

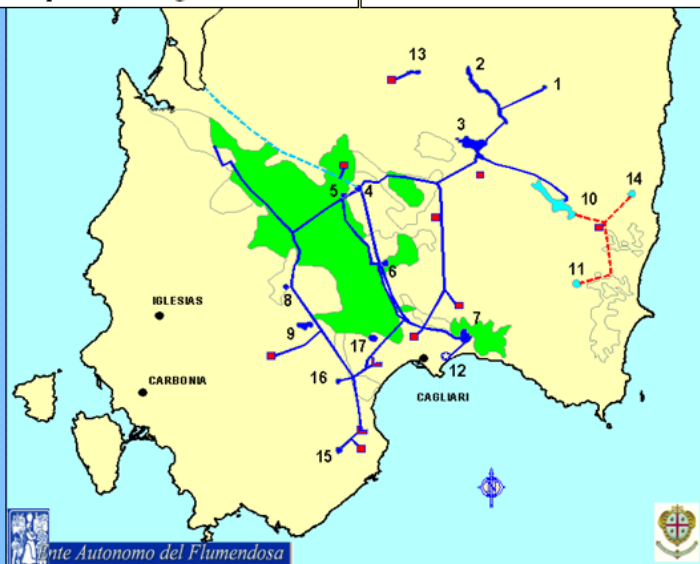


Cap
Pop

Comprendorio irriguo: 60.000 ha

20 NOVEMBRE 2003 204 Mln³

IMPIANTO DI DEFOSFATAZIONE, CENTRALE DI SOLLEVAMENTO E CONDOTTA PER IL COLLETTAMENTO DEI REFLUI TRATTATI DELLA CITTA' DI CAGLIARI AL SERBATOIO DI SIMBIRIZZI



Monte Autonomo del Flumendosa

CAGLIARI



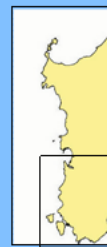
DEPURATORE IS ARENAS



TERZIARIO IS ARENAS



LAGO SIMBIRIZZI



The Cecina River Basin

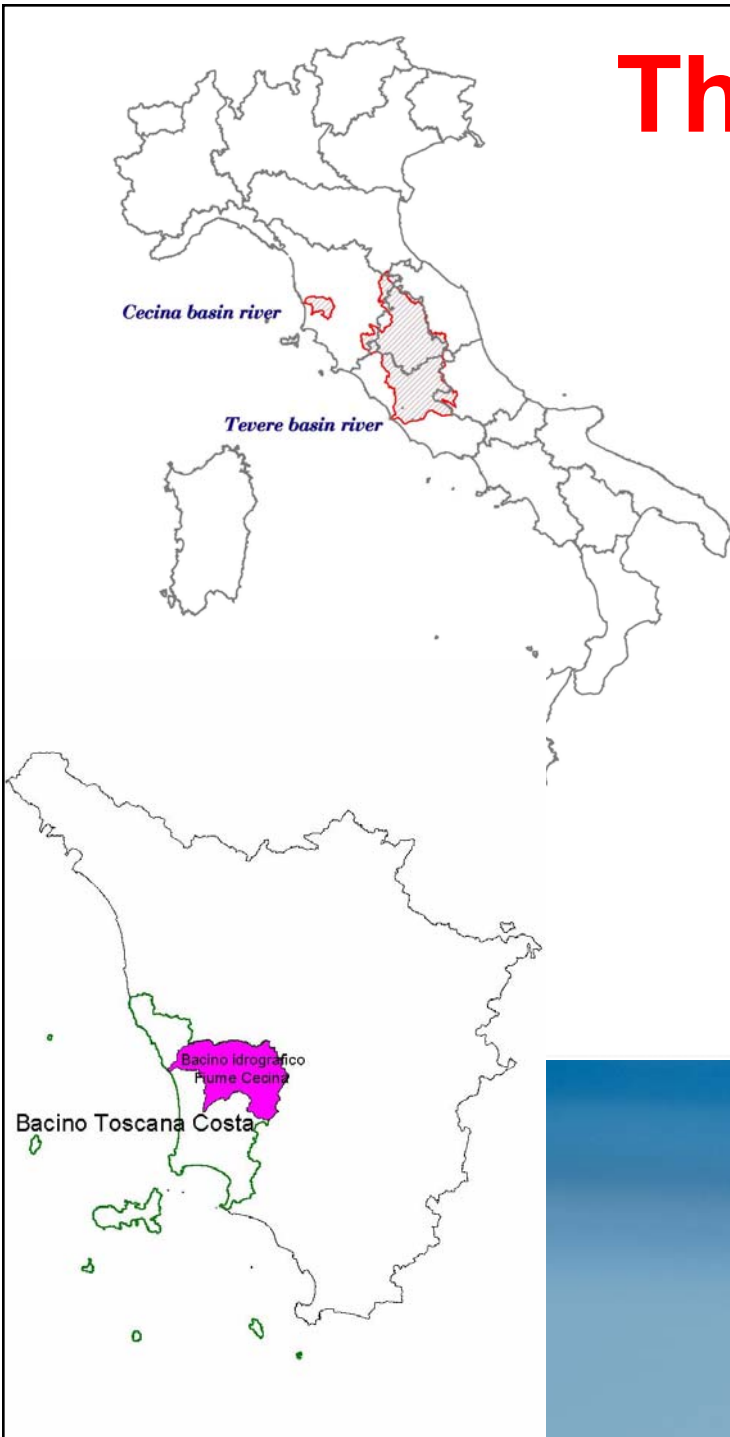
Surface Area: 900 km²

Length of River: 80 km

Flow regime (Q = 1030 : 0,01 mc/s)

Regional River Basin

- *4 Provinces (Livorno, Pisa, Siena, Grosseto)*
- *Inhabitants 83609*
- *Isolated households – 12329*
- *Population density – 93 inhab/km²*
- *19 Municipalities*
n.2 municipalities > 10,000 inhab
n.9 municipalities < 2,000 inhab
- *2 “ATO” (Territory with unified water management)*

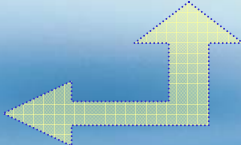


Organisational Structure

Protocol Agreement signers
Ministry of Env, Region, local authorities, River Basin Authority, APAT, ARPAT, ATO, Mountain Municipalities Association

FORUM
(Stakeholders
NGO's,
Citizens.....)

Co-ordination Committee



Presidency: Water Director

Secretary: Mayor of Cecina

CIS Guidance Documents

Protection of water quality

Remediation

Protection of Water quantity

GIS experimental activities

Water Infrastructures



Authorities legally responsible for the implementation of the activities

The Cecina PRB project

Work Plan

- **Survey of water related environmental issues: pressures & impacts analysis**
- **Identification of specific Objectives**
- **Implementation of urgent actions**
- **Selection of appropriate measures for:**
 - 1. water quality protection*
 - 2. water quantity protection*
 - 3. soil remediation*
 - 4. administrative support*

Critical water related issues

- Water scarcity (water deficit)
- Pressures on water quality
- insufficient sewer & WWTP network
- soil contamination
- Alteration of the morphological conditions of rivers and of ecosystems



Water deficit effects

- Droughts during summertime
- Reduction of available water supply
- Deterioration in water resource quality (concentration effect)
- Economic damages for industry and agriculture
- Social conflicts



Actions

- Extention of monitoring network (water, sediment & biota)
- Water abstraction measurements
- Survey of Wastewater discharges (database)
- Identification of Sensitive Areas and nitrate vulnerable zones
- Water balance computation, Minimum vital flow

Actions for Water Quantity Protection

- water network interconnection
- reduction of water losses (drinking water)
- wastewater reuse for industrial purposes: ARETUSA project
- Protection measures

Hydrological mass balance and Minimum Vital Flow

- **hydrological mass balance:** $R=F+E+X$,

R= rain,

E = evapotranspiration

X= groundwater losses to other basins and water abstractions not returned

Yearly flow (F) = 130 million (average 1970-2002)

Hydrological Deficit (X) = 20 million

- **Minimum vital flow:**

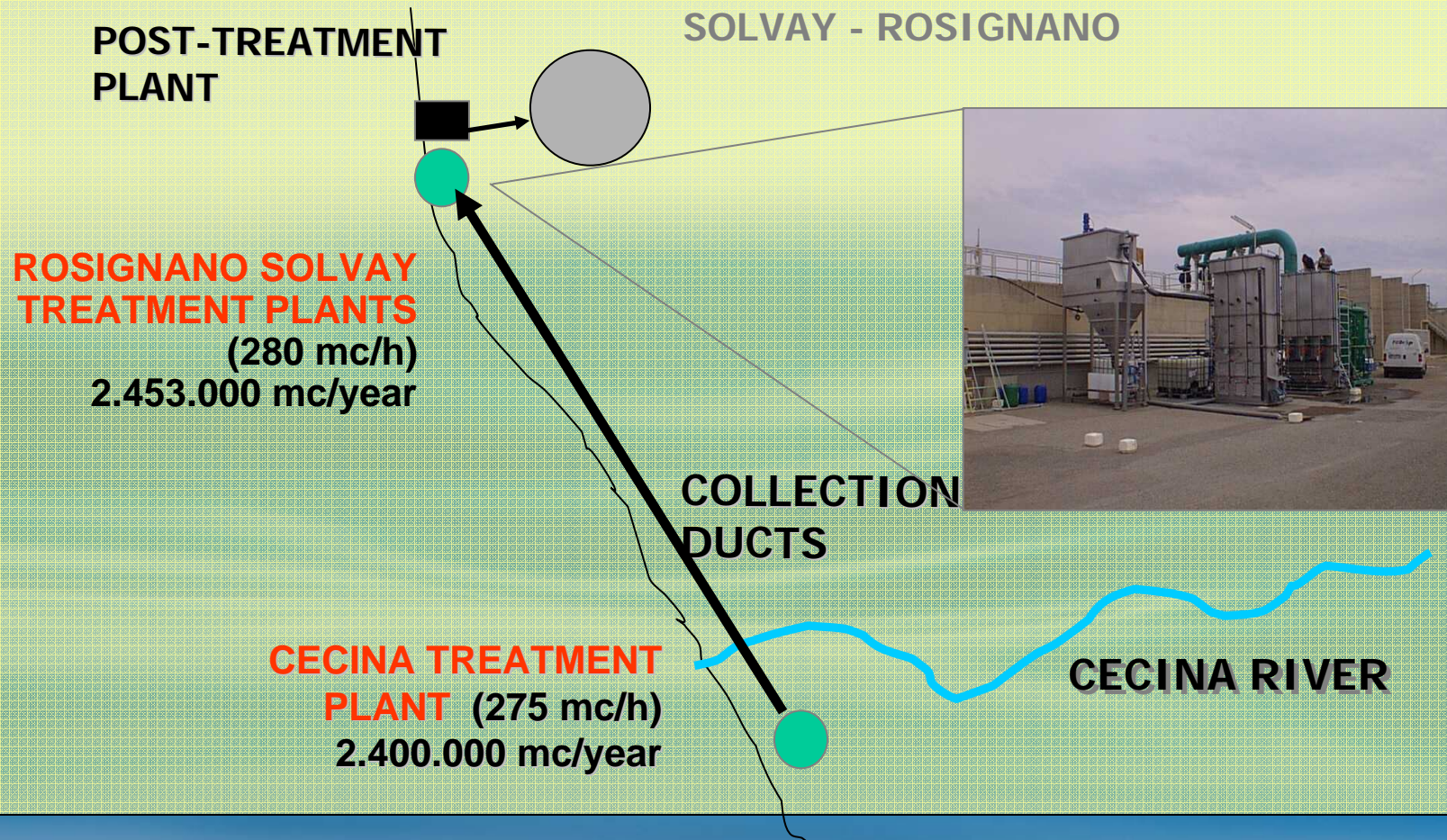
MVF is the minimum vital flow rate supporting:

- water ecosystems and water life
- groundwater recharge

MF = 7.8 l/s – summer dry period

MF without abstractions = 93.5 l/s

ARETUSA Project



Solvay WILL NOT abstract from wells a quantity of water equal to that produced by treatment plants: from a minimum of 3,8 to a max of 4,16 million of mc/year;

a minimum of 2 million mc/year is destined for potable use

ARETUSA Project

IMPLEMENTATION COSTS	PUBLIC CONTRIBUTION	KIND OF INVESTMENT
8.500.000 €	60% European Structural Funds	Infrastructures for water cycle Structural Funds objective 2- 2000/2006 Provincia di livorno – progetti infrastrutturali
BENEFICIARY	COMPANY TITLE	PARTECIPAZIONE
Soc. CONSORZIO ARETUSA	ASA SPA	45%
	TERMOMECCANICA ECOLOGIA SPA	45%
	SOLVAY CHIMICA ITALIA SPA	10%

REDUCTION OF WATER ABSTRACTION IN BASSA VAL DI CECINA	REDUCTION OF POLLUTED LOADS FROM WASTE WATER TREATMENT PLANTS	REDUCTION OF DRINKING WATER DEFICIT																																			
<p>INDUSTRIAL ABSTRACTION Data 2001-2002</p> <p style="text-align: right;"><i>m3/Y</i></p> <p>- Cecina wells: 1.800.000</p> <p>- Riparbella wells:..... 1.200.000</p> <p>-Montescudaio surf. waters and wells: 3.700.000</p> <p>TOTAL 6.700.000</p> <p>REDUCTION of WATER ABSTRACTION TOTAL:.....4.000.000 [m3/y] % of the total:.....60% %of groundwaters.....next to 100%</p>	<p>CURRENT EFFLUENT LOADS</p> <table border="1"> <thead> <tr> <th></th> <th colspan="2">CECINA</th> <th colspan="2">ROSIGNANO</th> </tr> <tr> <th>PORTATE</th> <th>m3/anno</th> <th>2,400,000</th> <th>m3/anno</th> <th>2,453,000</th> </tr> <tr> <th></th> <th>mg/l</th> <th>t/anno</th> <th>mg/l</th> <th>t/anno</th> </tr> </thead> <tbody> <tr> <td>COD</td> <td>100</td> <td>240</td> <td>100</td> <td>245</td> </tr> <tr> <td>BOD5</td> <td>30</td> <td>72</td> <td>30</td> <td>74</td> </tr> <tr> <td>N</td> <td>35</td> <td>84</td> <td>60</td> <td>147</td> </tr> <tr> <td>P</td> <td>10</td> <td>24</td> <td>10</td> <td>25</td> </tr> </tbody> </table>		CECINA		ROSIGNANO		PORTATE	m3/anno	2,400,000	m3/anno	2,453,000		mg/l	t/anno	mg/l	t/anno	COD	100	240	100	245	BOD5	30	72	30	74	N	35	84	60	147	P	10	24	10	25	<p>Current deficit of Cecina and Rosignano municipalities:</p> <p style="text-align: center;">1.500.000 m3/y</p> <p style="text-align: right;">(ASA estimate)</p> <p>ARETUSA CONTRIBUTION :</p> <p style="text-align: center;">2.000.000 [m3/y]</p> <p>they will be assigned for drinking uses</p>
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