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XEROCHORE
An exercise to assess research needs and policy choices in areas of drought

European perspectives on drought preparedness and management: the Italian experience and proposed planning tools

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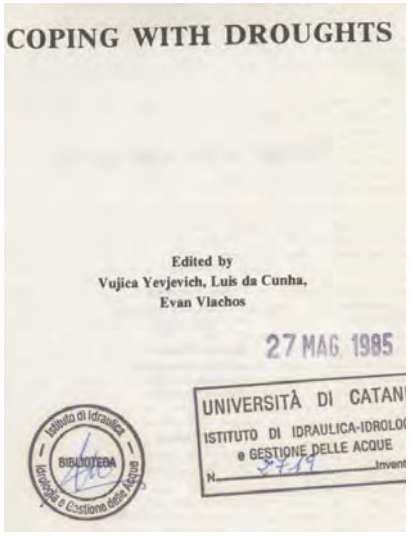
Outline of the presentation

- Remarks on Proactive vs. Reactive approach
- Limits of the WFD
- Proposal of WS&DEN
- Italian experiences in coping with droughts
- Proposal for a drought planning framework
- Conclusions

Introduction

- The severity of drought impacts depends on the vulnerability of water supply systems and of the economical and social sectors, as well as on the effectiveness of the adopted mitigation measures
- A **reactive** approach, based on emergency measures selected after drought consequences are perceived, is inadequate and should be replaced by a **proactive** approach



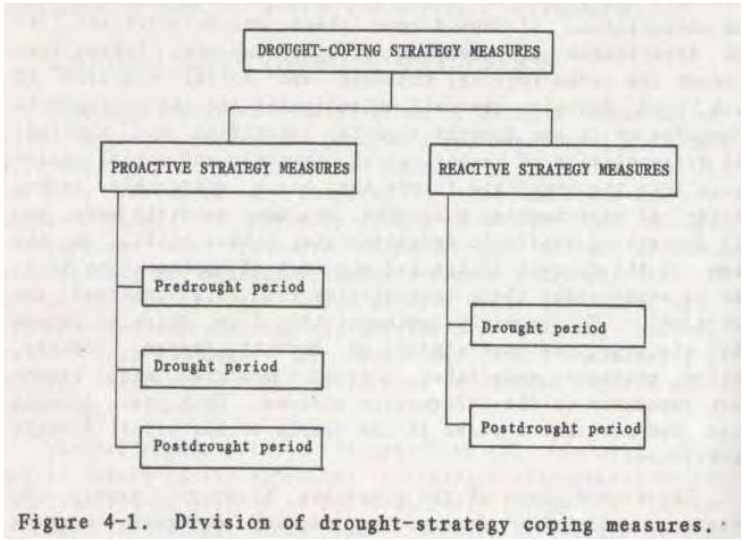


Figure 4-1. Division of drought-strategy coping measures.

WFD and droughts

- WFD lists among its objectives mitigation of floods and droughts (art. 1) and lists ***demand management measures*** among the supplementary measures that can be adopted within the programme of measures of the RBMPs (Annex VI, Part B)

- However, droughts are adressed only marginally
  - “prolonged droughts” are considered as “force majeure” events that enable temporary derogations to environmental prescriptions in terms of delay or less stringent quality objectives (article 4.6)

- Risk of droughts is not addressed, water shortage definition is lacking and prevention measures for droughts and water scarcity are missing

Drought and water scarcity issues at European level

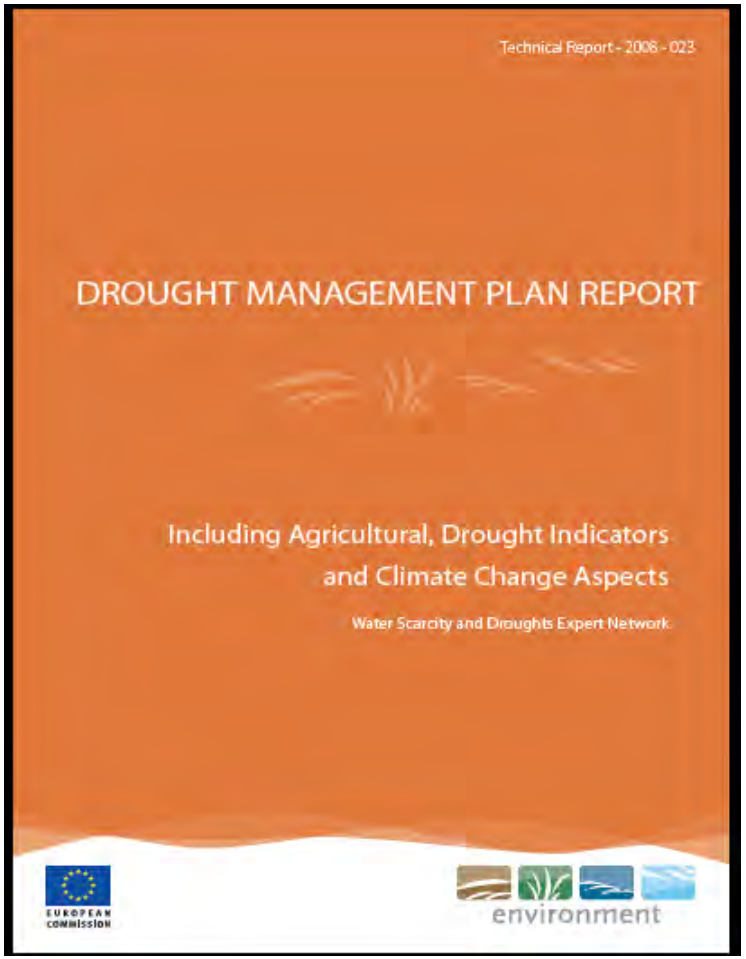
- Technical tools are missing with respect to:
  - Adequate water stress monitoring indices
  - Identification of areas at risk of drought and water scarcity
  - Assessment of the effect of measures (e.g. water saving, water reuse, desalination)
  - Organization of initiative to foster public awareness

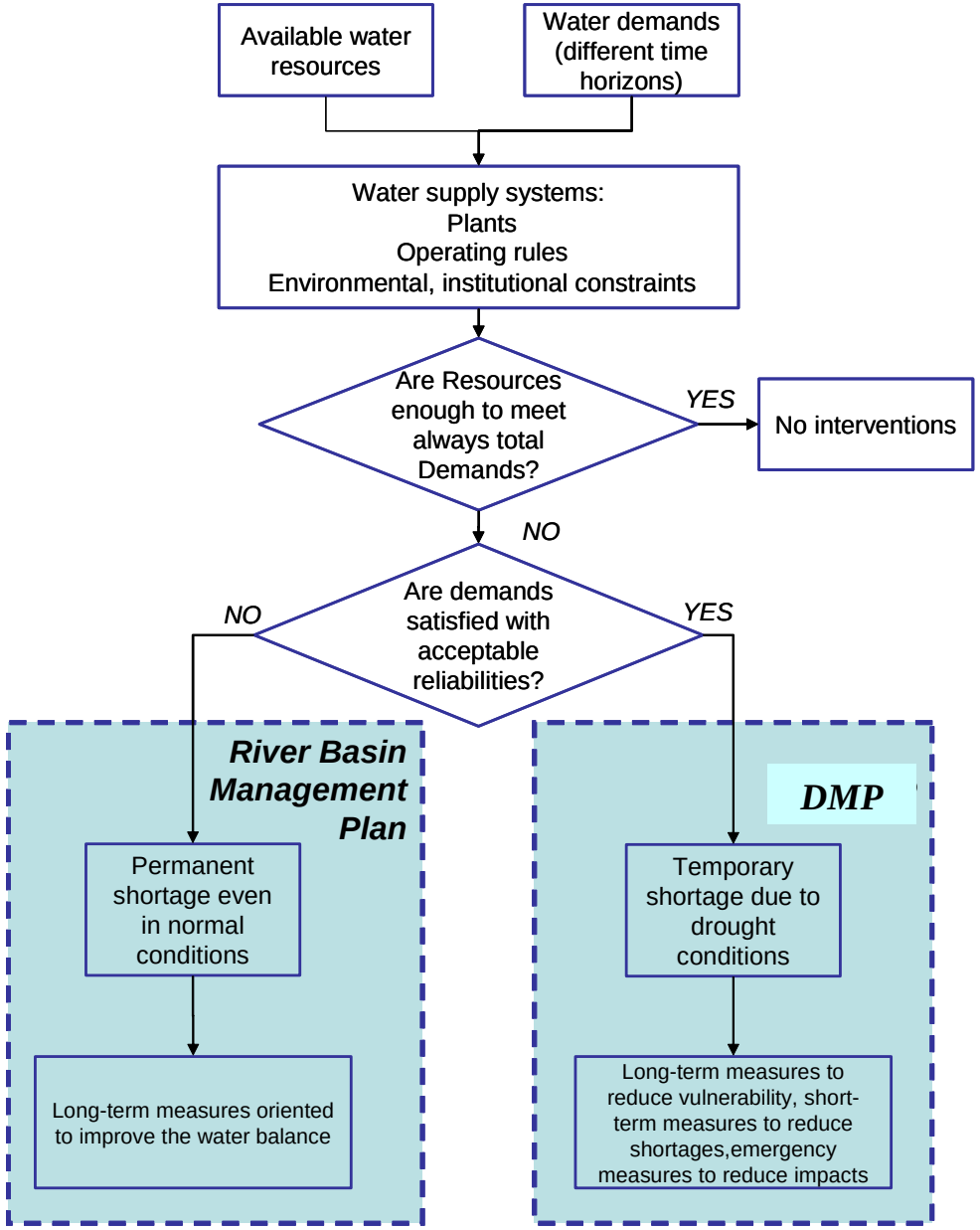
- Financial tools are not adequate since:
  - Financial aids encourage water demanding crops in areas suffering water stress
  - Funds allocation is not at basin or district scale
  - Civil protection funds give more emphasis to flood damages

- At legislative level, tools are missing with reference to:
  - Standards for non conventional water use (e.g. treated wastewater)
  - Specific regulations for water resources management
  - Water saving for all water uses (municipal, irrigation, industrial)

Water Scarcity and Droughts Expert Network

- The **Water Scarcity and Droughts Expert Network** has drafted a **Drought Management Plan Report** **which recommends to include in the implementation process of WFD the preparation of a drought management plan (DMP) as an annex to the River Basin Management Plan (RBMP)**
- The essential elements of such DMP should be:
  - Implementation of drought warning system
  - Drought characterization within the basin
  - Program of measures for preventing and mitigating droughts linked to indicators and thresholds
- DMPs should be developed according to a multi-level approach:
  - National level: strategic measures but also emergency measures that can be activated through a set of global indices and indicators, (e.g. to activate declaration of calamity)
  - River-basin level: tactical measures to delay and/or mitigate drought effects
  - Local level: tactical and response measures to guarantee essential public water supply as well as measures to increase awareness.
- A specific section should be dedicated to “prolonged droughts” (WFD, article 4.6), including indicators to be considered for the identification of PDs.





Analysis of permanent and temporary water shortages in the region to identify drought vulnerable areas

Rossi et al. (2008)

Italian experiences

- Although a specific legislative framework to cope with droughts is missing, drought and water shortages problems are adressed in several laws and decrees which, however, lack of homogeneity in terms of:
  - Territorial unit for implementation
  - Agency or authority in charge of implementation
- As a consequence, a reactive approach to drought is still prevailing, although recently a common awareness about the need to shift to a proactive approach is increasing as shown by some positive experiences




Italian legislative indications for preventing and mitigating drought impacts

Legislative Act	Technical Tool	Measures	Territorial Unit	Status of implementation	L. Decree 152/06
L. 183/89	River basin plan (RBP)	Long-term measures to improve drought preparedness	River basin	Drought risk is not taken into account explicitly	RBP should indicate interventions against drought risk and measures against desertification (art. 65)
L. 225/92	Drought contingency plan (DCP)	Short-term measures to reduce drought impacts	Region or Province	Drought risk is not included	-
L. 36/94 and DPCM 4/3/96	OTU plan Identification of areas at risk of water crisis	Long-term and short-term measures	Optimal territorial unit (OTU) for integrated urban water service	Identification of areas at risk of water crisis is not included	-
L. Decree 152/99 and CIPE resolution 21.12.99	Water Quality Protection Plan (WQPP) Identification of areas vulnerable to drought and desertification	Long-term measures to combat drought and desertification	Region	Identification of areas vulnerable to drought and desertification is included in few Water Protection Plans	Drought mitigation (art. 73) and identification of drought and desertification prone areas within WQPP (art. 93)

Rossi et al. (2007)

Recent droughts in Italy

- Severe droughts in the past (e.g. 1988-90 Sicily, 2001-2002 Apulia and Basilicata, 2002-2003 Sicily, 2005 Po River Basin)
- Prevalent approach → ***reactive***
  - Sicily 1988-1990: ***contingency measures implemented by Civil Protection to ensure municipal supply*** (mainly structural measures)
  - Apulia and Basilicata 2005: ***Appointment of Commissioners for Water Emergency*** to draft a programme of actions to face water shortage situations, to foster the realization of hydraulic works for improving withdrawal, conveyance and distribution networks

Table 8. Civil Protection Acts during 1987-90 period of water emergency in Sicily, Italy (from Barbagallo *et al.*, 1994)

Type of intervention	Area of intervention	Amount (millions Euro)	% of amount
Surface reservoirs	Scanzano (Pa)	5.84	
	Poma (Pa)	16.85	
	Blufi (PA)	92.96	18.4
Links between surface reservoirs	Garcia-Poma (Pa)	11.88	
	Piana Albanesi-Risalaimi (Pa)	7.02	3.0
Desalination plants	Trapani	88.31	
	Gela (5° modulo)	36.15	19.8
Purification plants	Voltano (Ag)	1.55	
	Leone, Voltano and Castello (Ag)	3.31	0.8
Conveyance aqueducts	Municipalities of Palermo province	19.37	
	Municipalities of Trapani province	25.53	
	Municipalities of Caltanissetta province	96.58	
	Municipalities of Agrigento province	39.56	
	Municipalities of Catania province	73.50	
	Municipalities of Enna, Caltanissetta, Catania	54.02	49.1
Distribution networks	Municipalities of Palermo province	7.57	
	Municipalities of Trapani province	2.47	
	Municipalities of Agrigento province	38.73	
	Municipalities of Caltanissetta province	5.76	
	Municipalities of Catania province	1.55	8.9
Total		628.54	100

Promising Italian experiences

- ***Emilia Romagna region***
  - areas vulnerable to drought and desertification have been identified within the regional Water Quality Protection Plan, also based on the spatial distribution of a drought index, namely the Standardized Precipitation Index
  - Four categories of actions have been defined: a) Soil protection; b) Sustainable water resources management; c) Impact reduction of productive activities d) Improved territorial planning
  - The regional government is finalizing a “Drought Management Program”, covering aspects related to monitoring, risk evaluation and mitigation actions for areas threatened by drought

- ***Po River Basin***
  - on June 2005 a formal preliminary agreement was signed with all the institutions involved in water resources issues, in order to:
    - define common indicators of water resources status
    - to assess the water balance

AUTORITÀ DI BACINO DEL FIUME PO
PARMA

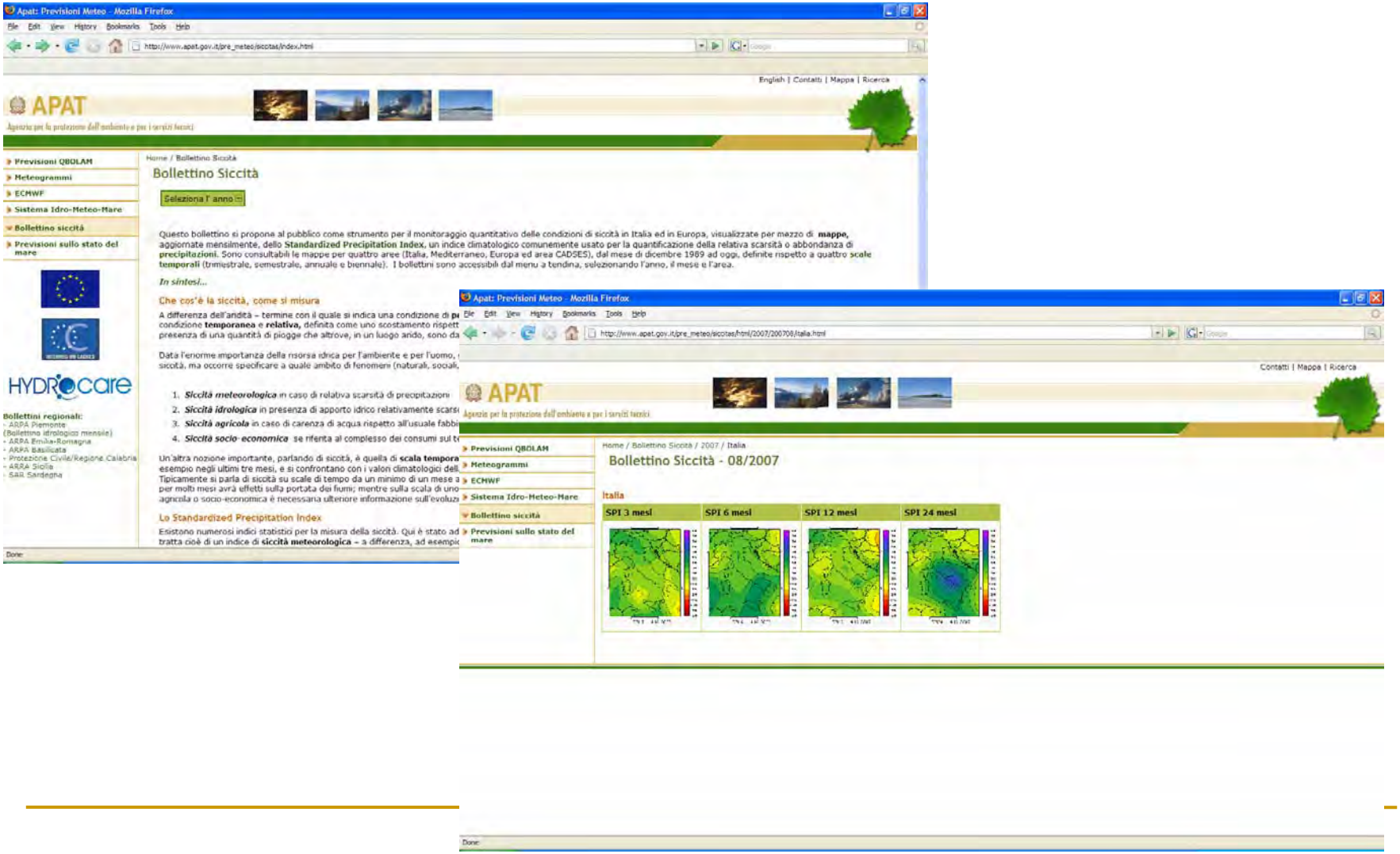
PROTOCOLLO D’INTESA

ATTIVITA’ UNITARIA CONOSCITIVA E DI CONTROLLO DEL BILANCIO IDRICO VOLTA ALLA PREVENZIONE DEGLI EVENTI DI MAGRA ECCEZIONALE NEL BACINO IDROGRAFICO DEL FIUME PO

STIPULATO TRA

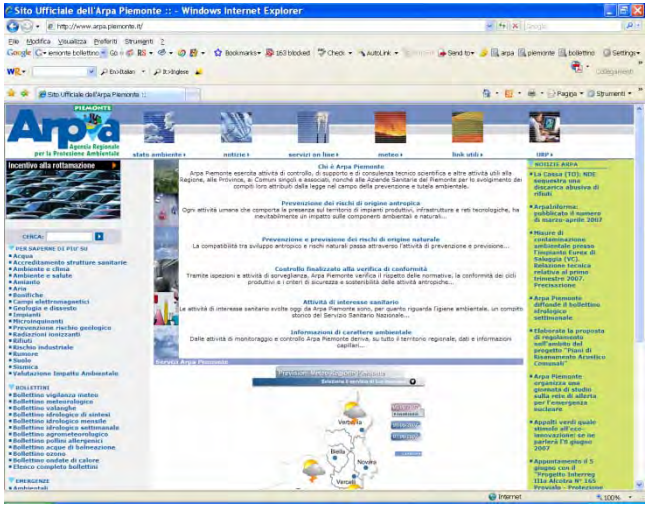
- AUTORITA’ DI BACINO DEL FIUME PO
- REGISTRO ITALIANO DIGHE
- REGIONE EMILIA ROMAGNA
- REGIONE LIGURIA
- REGIONE LOMBARDIA
- REGIONE PIEMONTE
- REGIONE VALLE D’AOSTA
- REGIONE VENETO
- PROVINCIA AUTONOMA DI TRENTO
- GESTORE DELLA RETE DI TRASMISSIONE NAZIONALE (GRTN)
- ENTI REGOLATORI DEI LAGHI: CONSORZI E AGENZIA INTERREGIONALE PER IL PO
- ASSOCIAZIONE NAZIONALE BONIFICHE E IRRIGAZIONI (ANBI)
- AZIENDE-DI PRODUZIONE DI ENERGIA IDROELETTRICA

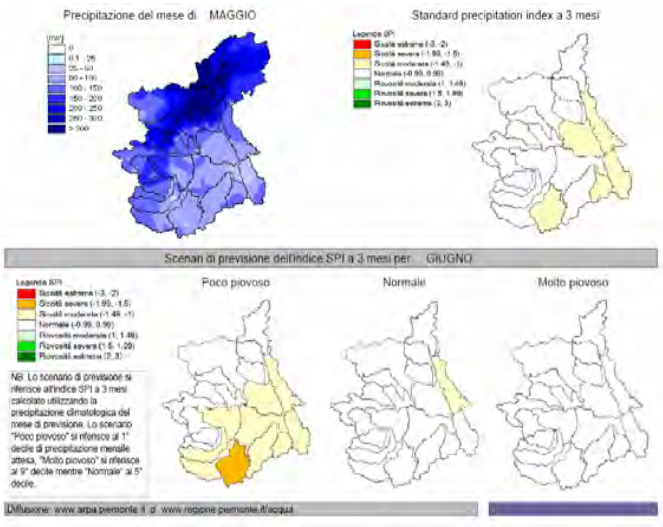
Example of drought bullettin: ISPRA (formerly APAT)



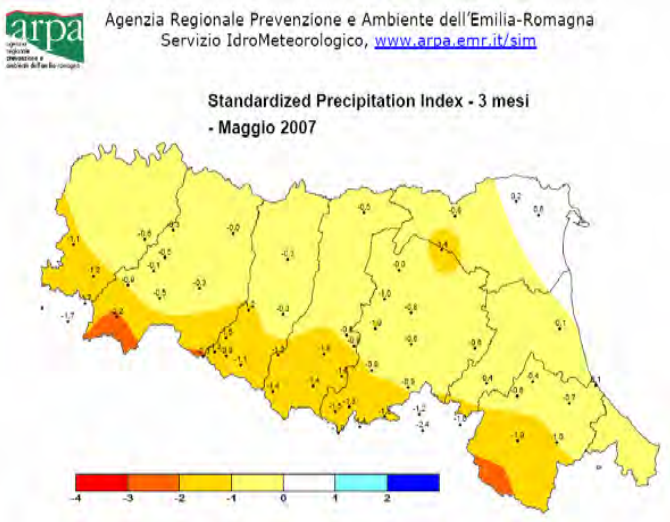
Examples of Regional Drought Bullettins

ARPA Piemonte (www.arpa.piemonte.it)



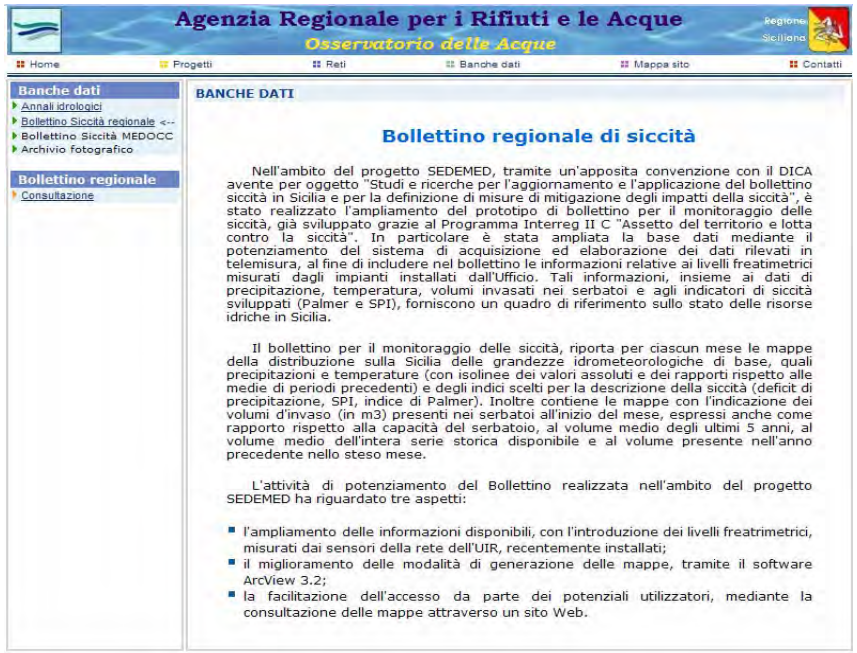


ARPA Emilia Romagna (www.arpa.emr.it/ia_siccita)

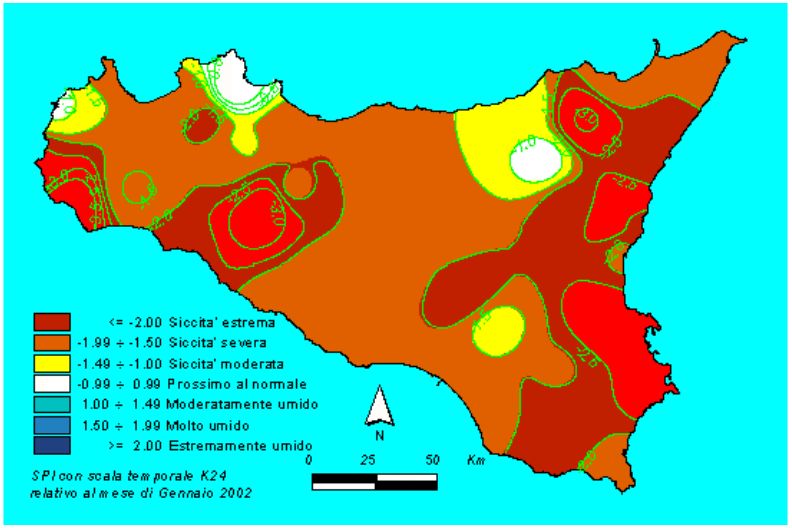


Examples of Regional Drought Bullettins

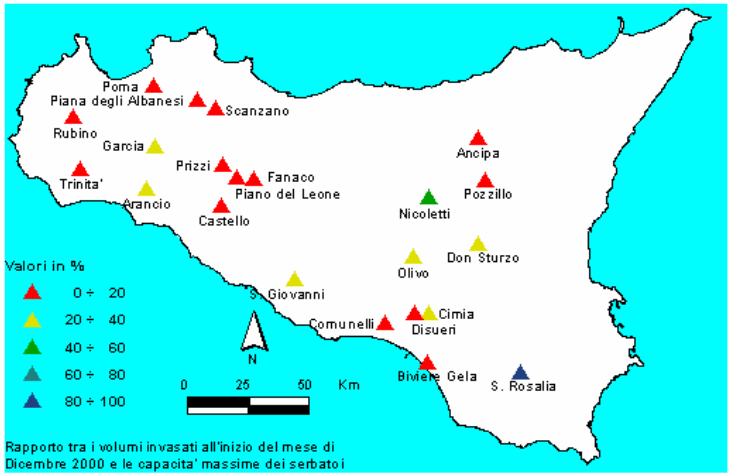
Water Observatory, Sicilian Agency for Waste and Water



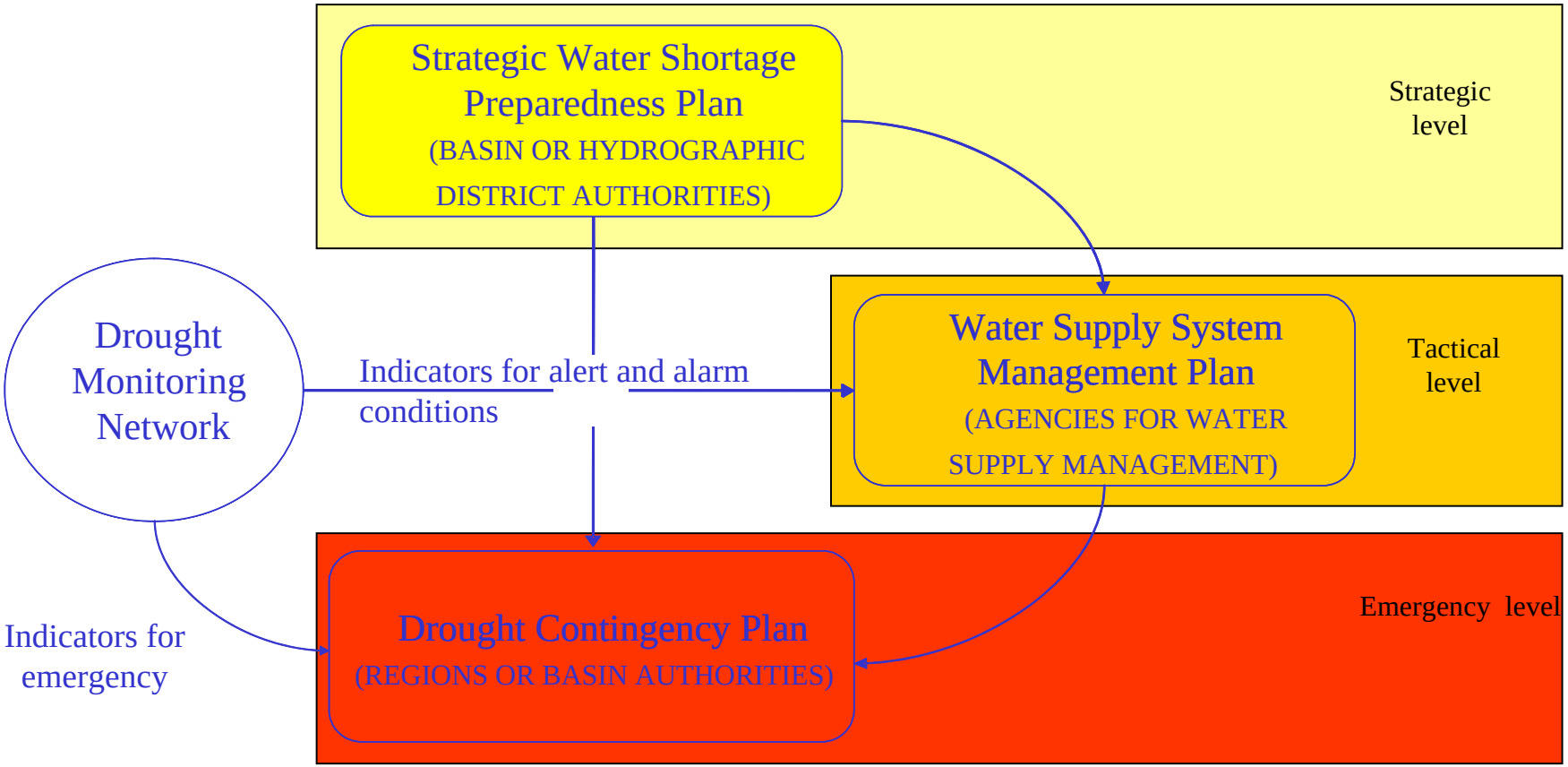
SPI at k=24 months (August 2005)



Stored volumes in reservoirs (December 2000)

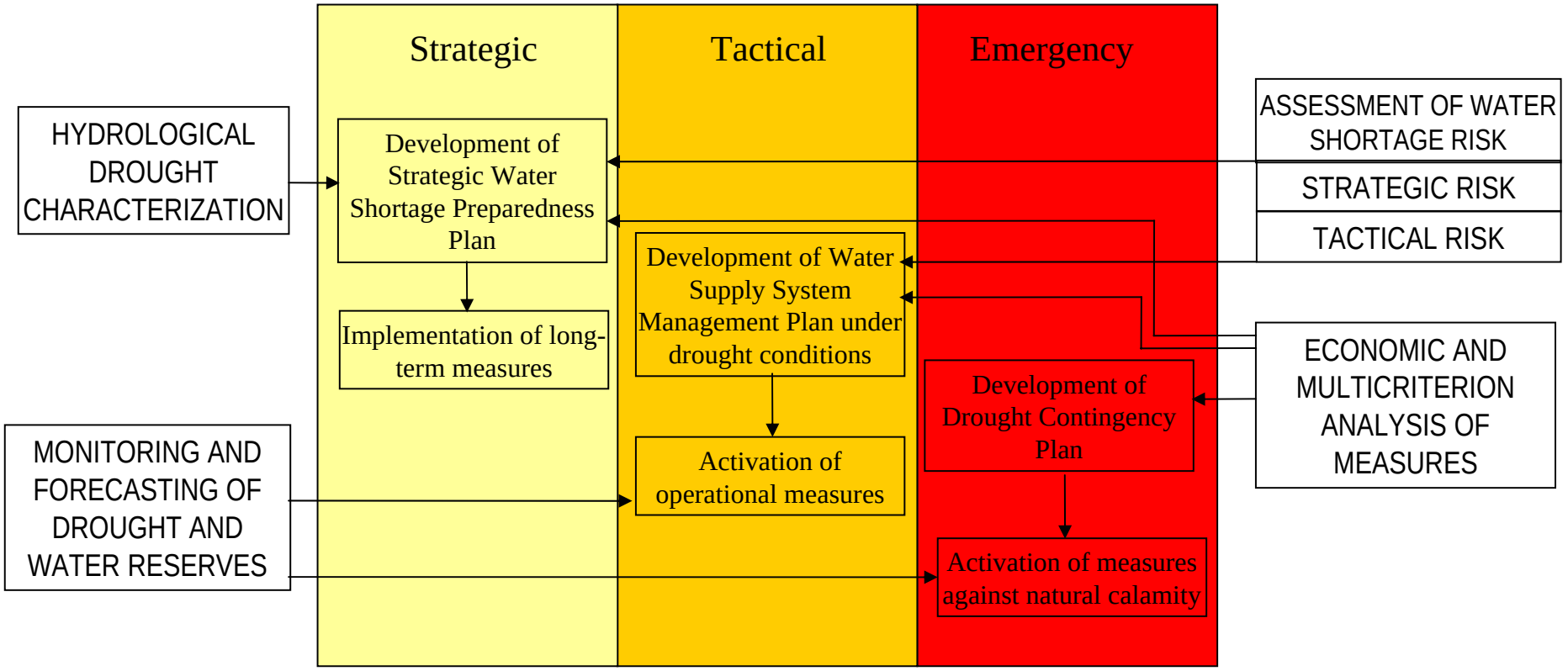


PROJECT ARCHIMED-PRODIM: Proposed planning framework for drought management



Rossi et al. (2008)

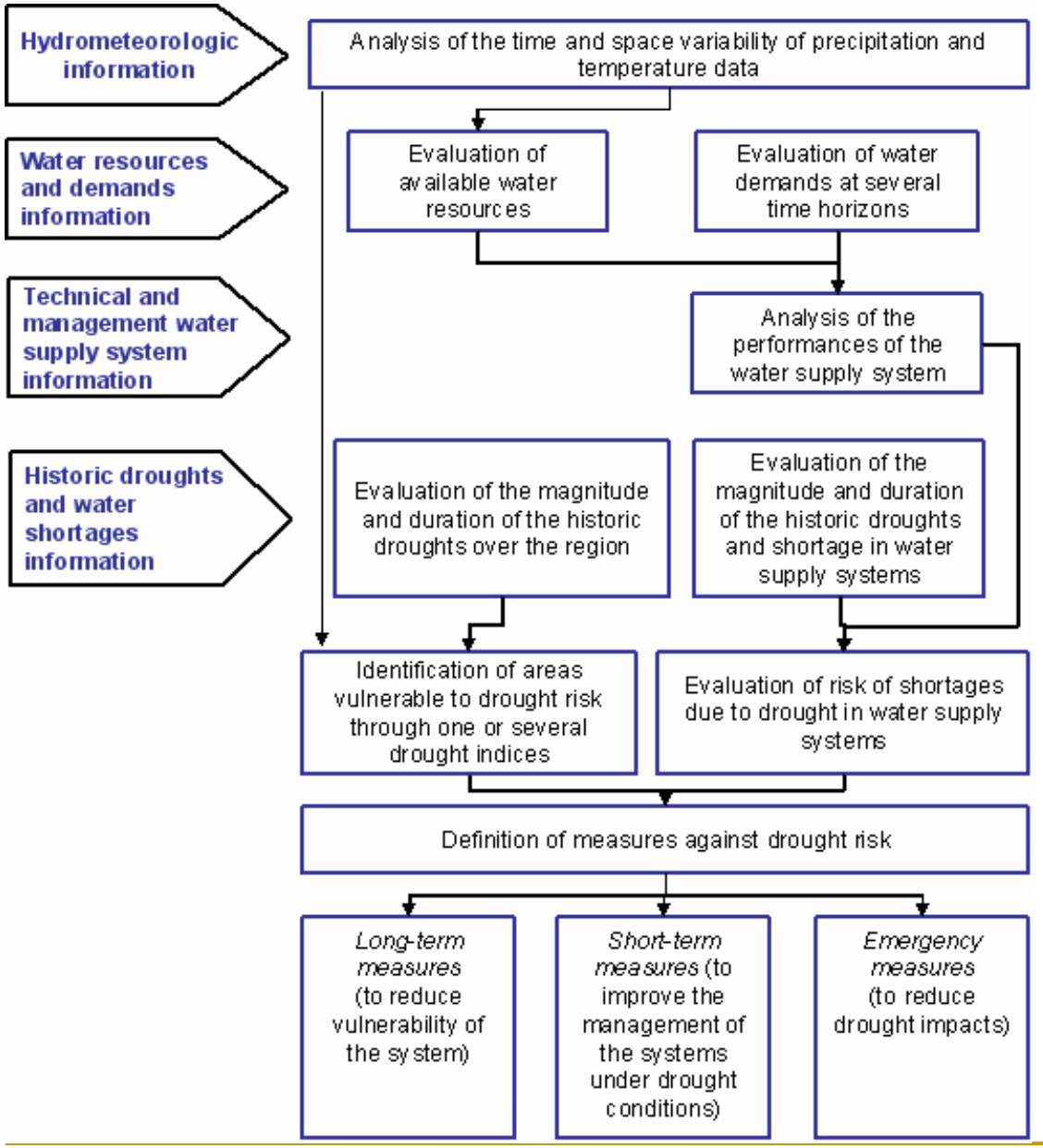
Planning framework of drought risk management



Responsible authorities and main contents of proposed drought management plans

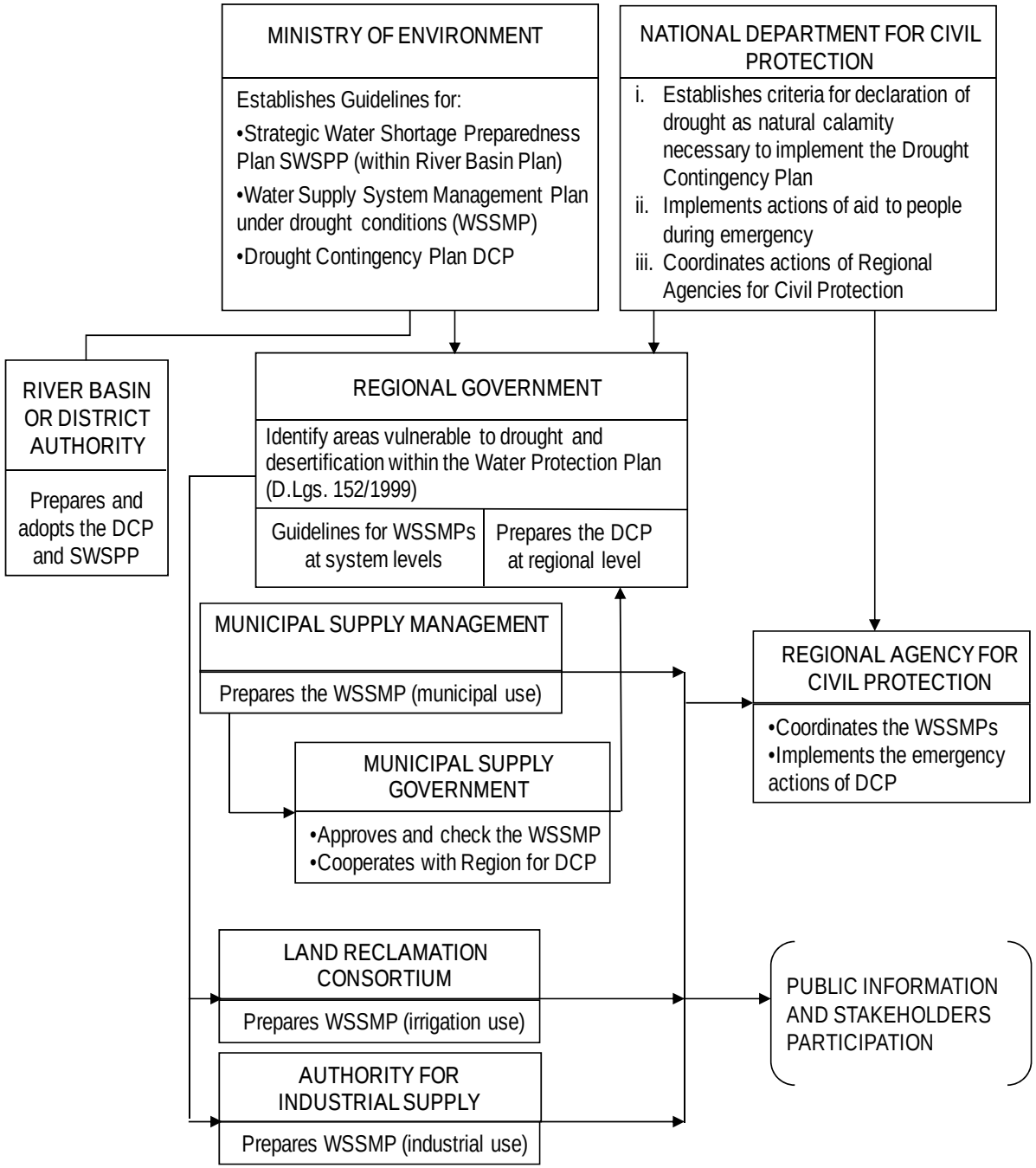
Plan	Responsible Authority	Contents
Strategic Water shortage Preparedness Plan (SWSPP) to be annexed to the River Basin Management Plan	Basin Hydrographic District Authority	• Identification of drought vulnerable areas, through the analysis of past drought events and their impacts • Estimation of water shortage risk in water supply systems taking into account: - definition of the priority in water allocation under shortage conditions among different uses - definition of guarantee levels for different uses (expressed as time reliability and volumetric reliability) • Definition of appropriate long term actions to reduce water shortage risk; • Comparison and selection of alternative drought mitigation measures; • Procedures to ensure the transparency of information on drought situation and planning process and to allow public participation to the decisions • General indications for the drafting of Water Supply System Management Plan (WSSMP) • General indications for the drafting of Drought Contingency Plan (DCP)
Water Supply System Management Plan	Agencies for Water Supply Management	• Definition of indicators and their values to define Normal, Alert and Alarm conditions with respect to drought for a given water supply system • Definition of the best mix of long term and short term measures to avoid emergency • Estimation of costs and financing sources for the chosen mitigation measures • Tools for fostering the stakeholder participation and exchanges
Drought Contingency Plan	Regions or Basin Authorities (with the contribution of Civil Protection)	• Definition of indicators and their values for declaration of a drought as natural calamity • Tools for an institutional participation through a devoted task force on drought • Definition of short term mitigation measures and their costs • Indications for the coordination of state, regional and local interventions during emergency • Tools to ensure the transparency of information on drought situation • Possible recovery from drought damages

Information needed to draft SWSPP against drought



Rossi et al. (2008)

Proposal of competence sharing for drought management
(adapted from Rossi, 2004)



Conclusions

- Reactive approach is still prevailing, while proactive approach is lagging behind
- Positive experiences
  - At EU level: WS&DEN report, but also research efforts (MEDROPLAN, PRODIM, XEROCHORE, etc.)
  - At Italian level: planning tools taking into account drought risk, drought monitoring systems
- WS&DEN proposal may require some adaptations according to the specific national institutional and legislative framework
  - At italian level a three level planning framework could be adopted

References

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