

An aerial photograph of a mountain range, likely the Alps, covered in snow. The image is overlaid with a semi-transparent blue filter. The mountains are rugged and snow-covered, with some rocky outcrops visible. The sky is a pale, hazy blue.

Water demand management in the Mediterranean, progress and policies

ZARAGOZA, 19-21/03/2007

Mediterranean strategy for sustainable development - Monitoring progress and promotion of water demand management policies

National report of Italy



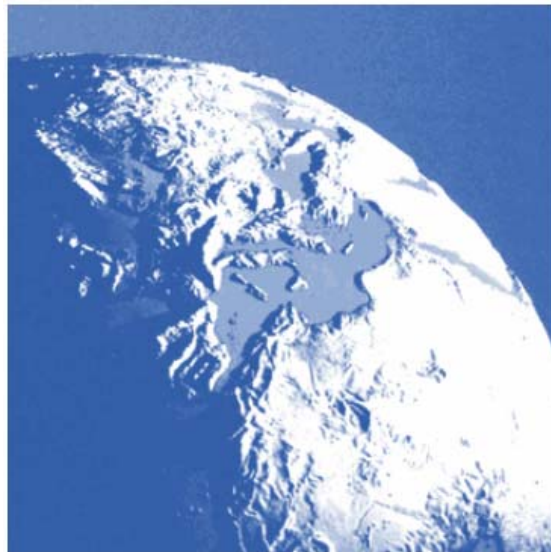
APAT

**Agenzia per la protezione dell'ambiente e per i
servizi tecnici**

MATTM

**Ministero dell'Ambiente e della Tutela del Territorio
e del Mare**

**Mediterranean Strategy
for Sustainable Development
Monitoring progress and promotion of
Water Demand Management Policies**



Italian National Report

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1. Introduction

Italy is a country of the Northern Mediterranean basin and shares with all the other Mediterranean countries the historical, cultural, economic, social and environmental heritage of this area.

The peculiar shape of Italy, a long and narrow peninsula, divided from the rest of Europe by the Alpine chain and cut on its length by the Apennine chain, surrounded for its three-quarter perimeter by the Mediterranean waters gives reason of the variety of its hydrographical structure, hydrographical flow and rainfall distribution. Water availability in Italy is particularly conditioned by the peculiar climatic characteristics of the different zones of the country, being extremely variable from point to point.

According to the demographic statistics of December 2005, Italian population amounts to about 58.751.711 units, 28.526.888 men and 30.224.823 women. Most of the Italians, 26.100.554 units, live in the North, with a percentage of 45%, while 11.321.337 people live in the Centre and 20.760.051 people in the South, respectively with a percentage of 19 % and 36 %. Most people in Italy live in county towns and close to the industrial areas.

Among the States members of the European Union, Italy is the country with the highest average of aged people, with a yearly increase of the old age index. Despite the fact that the birth rate is negative since several years, the negative effects of the natural dynamic are mitigated through the positive migratory fluxes.

Many problems concern water use in Italy but two of them have been particularly noticeable in the last decades: the resource scarcity and its pollution.

Improving integrated water resource and demand management policies represent one of the challenge of the Italian policy, as shown by the significant commitments undertaken by Italy within the Johannesburg Plan of Action, later reinforced on the occasion of the last World Water Forums of Kyoto and Mexico, the G8 held in Evian, by the adoption of the Mediterranean Strategy for Sustainable Development and by the signature of the Il Cairo Declaration at the last Euro-Mediterranean Ministerial Conference on the Environment.

These international commitments on improving integrated water resource and demand management policies are strongly outlined and strengthened by the priority water management objectives of the Italian Environmental Action Strategy for Sustainable Development and by taking into force as Italian legislation the European Directives, especially the Water Framework Directive.

According to the above commitments, this report outlines both the main achieved goals and obstacles encountered in implementing water demand management policies.

2. Major changes in the water situation in Italy

In recent years major changes in the approach to water management have occurred in Europe. Over the last 15 years Council Directive 91/271/EEC concerning urban waste-water treatment and Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources, have set a modern and flexible rule linking discharge requirements with the need to ensure the highest level of protection for certain receiving water bodies, such as those areas sensitive to the problems of eutrophication. In 1999 these Directives were completely transposed into the Italian legislation (Decree D.Lgs 152/99) with a delay which on the other hand has helped the adoption in the Italian legislation of the new and very important regulations concerning the Water Framework Directive implementation. Because of this overlap a great deal of the innovative aspects of the WFD were transposed into the Italian legislation.

The new water framework sets **higher standards for the protection and improvement in water quality**: specific criteria and objectives are fixed to be reached within specific time limits. More than 50% of the Italian Regions have already drafted the Regional Plan for Water Protection, which already covers a large part of the actions required under the WFD. Those plans anticipate in a very satisfactory manner the River Basin Management Plan required by the Directive 2000/60 by 2009.

Since 1989 (Law 183/89) Italy has assumed the **river basin** as the principal physical and ecological unit for water management, including flood protection and a new approach for the integrated water quantity and water quality protection. This is one of the main pillars of the WFD, and it was accomplished by Italy many years in advance in respect to the European requirements. River Basin Authorities are active in the planning exercise, defining the water balance between water supply and water demand, the minimum flow supporting dependent ecosystems (DMV), drafting risk and hazard maps and preparing the Hydro - Geological Configuration Plan (PAI).

Regarding **water services in civil sector**, in 1994 a very important reform (the “Galli” Act) was introduced in Italy. This law provides for the “Integrated Water Service” (integrated management from the abstraction to the discharge), organized in selected “optimal management areas” (ATO) covering the totality of the national territory, where water is managed with an industrial approach aiming at improving the technical and economic efficiency of the service itself. In each ATO is operational an “industrial” manager which realizes and implements the water infrastructure and conducts the service management according to the provisions established in a specific Plan (“Piano d’Ambito”) drafted by the ATO Authority, which is a public body.

In the recent past Italy has licensed a new legal text for the reorganisation of the whole environmental matter and through this new piece of legislation Italy is now accomplishing the integration of all the WFD requirements not yet fully covered by the previous existing legislation. This process is still ongoing and represents a new challenge in the difficult task of implementing the WFD in a full and correct way. Following data will give a picture of the past and present water situation in Italy concerning quantitative and quality aspects.

2.1. Resources, their mobilization and unconventional water production

According to its peculiar hydrological characteristics, Italy has always shown a great variability of situations: the basins of the North, fed by the Alps, catch a big amount of water, while over the Apennine chain the basins are smaller and with a more irregular structure.

In fact there are important differences throughout the country: Northern Italy, thanks to the Alps and to the natural storage capacity provided by glaciers and lakes, enjoys regular and abundant per-capita endowment. In central and Southern Italy and in the islands available resources are much less, seasonal variability of runoffs is at the highest.

Natural resources:

In 1989 the National Conference of Water evaluated that in Italy the average renewable natural surface resource was, in theory, around 155 km³/year, equal to the meteoric contribution net to the evaporation and loss, with a renewable natural resources per capita of about 2700 m³/hab/year. However, due to the natural loss, to the irregular nature of the flows and to the practical difficulties for utilizing some of the “in theory” available resources, the amount drastically lowers to 110 km³/year, with a renewable natural resources per capita of about 2000 m³/hab/year.

Considering the real available resource which can be used with the existing water infrastructures, the amount of water further lowers to about 42 km³/year and to 928 m³/hab/year.

However we can add to the surface water resources also the available ground waters which amount to about 12-13 km³/year and to 200 m³/hab/year, so that the total amount of average renewable natural resource is of about 55 km³.

The above-mentioned data can be precisely stated at regional scale, matching all information related to the climatic, hydrologic and of the human settlements, which determine great variability of situation (table 1).

However, considering historical average, during the last decade 1994-2004 precipitation has suffered a decrease of about 10% over the all national territory. Moreover the natural superficial flow has suffered, during the above decade, a decrease of about 20% for most of the principal basins.

Of course data refer to an average assessment which could be quite different from a basin to an other according to their own peculiar characteristics into the different hydrologic areas. Nevertheless it has to be noticed that probably climate changes play a role in the referred decreases.

Table 1: Italian available waters for hydrologic district in 1989 (hm³/year)

Hydrologic district	Rainfall	Utilized resources		Existing reservoirs	Ground waters	Total resources
		Without regulation	With regulation			
Po basin	71800	11374	16118	2194	4468	20586
Triveneto	42800	4425	10939	1069	1721	12660
Liguria	6400	235	372	29	307	679
Romagna-Marche	20700	299	995	212	620	1615
Toscana	20900	199	543	141	440	983
Lazio-Umbria	24100	321	1399	452	1126	2525
Abruzzo-Molise	11900	621	2454	603	248	2702
Puglia	13200	13	523	397	325	848
Campania	23200	152	1237	77	929	2166
Calabria-Lucania	24000	650	2514	1131	595	3109

Sicilia	18800	29	738	718	1151	1889
Sardegna	18300	29	1841	1403	217	2058
Italy	296000	18347	39673	8426	12146	51820

Source: IRSA-CNR (1999)

Table 2: Intensity of available water resource respect to the local availability

Hydrologic districts	Availability in the surface (10⁶ m³)	Utilization respect to the availability in the surface (%)
North	33.925	78
Centre	7.825	52
South-Islands	10.058	96
Italy	51.820	78

Source: APAT evaluation on IRSA-CNR data (1999)

Mobilisation of natural resources: Regulation index of water (storing capacity of dams and volume referred in km³/year for the artificial refilling of water tables)

In Italy there are 542 “big dams” which means reservoirs high more than 15 m and with a storage volume exceeding 10⁶ m³ (Law 584/94). Those reservoirs play an important role in public water supply, irrigation and industrial uses. Dams are not directly constructed to artificially recharge water tables, even a considerable amount of the stored water naturally flow into the aquifer. Large dams are usually dedicated to several purposes (hydroelectric, irrigation, water supply, recreational uses). In many case the “design volume” (the maximum storage capacity) is much higher than the “authorized volume”, which is linked to the condition and to the management of the single infrastructure. This gap causes a net loss in the potential storing capacity of the Italian reservoir network.

Data presented in the table 3 and in table 4 show the current distribution and the exercise status of RID’s (Italian Dams Register) big dams. In recent years it’s possible to observe an increase in number of “in normal exercise” dams and an increase in number of “authorized volume capacity” . Furthermore, there is an increase in “temporarily out of order” dams number.

Table 3: Regional distribution of big dams falling under the RID competence

Region	Dams (n.)	Basin Volume (10 ⁶ m ³)	Authorized Basin Volume (10 ⁶ m ³)
Piemonte	62	374,12	370,53
Valle d'Aosta	10	144,78	132,30
Lombardia	75	3.529,95	3.499,78
Trentino Alto Adige	37	647,71	647,71
Veneto	18	237,97	237,96
Friuli Venezia Giulia	12	191,86	167,55
Liguria	13	60,73	60,67
Emilia Romagna	21	138,93	129,11
Toscana	54	325,66	314,98
Umbria	13	442,01	232,30
Marche	17	119,07	112,07
Lazio	20	514,56	513,95
Abruzzo	14	370,38	360,33
Molise	7	202,91	163,16
Campania	17	293,10	160,67
Puglia	9	534,22	441,23
Basilicata	14	910,39	772,04
Calabria	24	684,46	383,84
Sicilia	47	1.129,78	813,97
Sardegna	58	2.505,00	2.012,14
ITALY	542	13.357,59	11.526,29

Source: Italian Dam Register – RID (Registro italiano dighe)

Table 4: National summary of dams status falling under RID competence

Status	Dams (n°)	Storage Volume (10 ⁶ m ³)	Authorized Basin Volume (10 ⁶ m ³)
Dams under construction	23	562	0
Dams put on trial	97	4.252	3.182
Dams in normal exercise	359	7.725	7.725
Dams in limited basin	37	800	619
Dams temporarily out of order	26	18	0
Great Dams Total	542	13.358	11.526
Legend			
a – The Under Construction Dams include those where works are in progress or suspended and those where works are completed but not yet functioning			

Source: APAT (2006)

Production of unconventional water.

Non-conventional sources of water represent complementary supply sources that may be substantial in regions affected by extreme scarcity of renewable water resources. Such sources are calculated separately from natural renewable water resources. They include :

- the production of freshwater by desalinisation of brackish or saltwater (mostly for domestic purposes);
- the reuse of urban or industrial wastewaters (generally following a specific treatment), which increases the overall efficiency of use of water (extracted from primary sources), mostly in agriculture but increasingly also in industrial and domestic sectors. This category also includes agricultural drainage water.

The desalination process in Italy is not a sound water resource, but it can be considered quite important for some specific situations, such as small islands (i.e. Pelagic islands), as, although it is an expensive system, nevertheless it would reduce the water supply costs for the islands which are mostly shipped by means of tanker ships (belonging to private companies or to the national Navy). The total amount of water production is of around 160000 m³/day. Salt and brackish water use is about the 0,3 % of the total water abstracted.

In Italy there is a specific law on water reuse (Law185/2003), for domestic, agricultural and industrial uses. The general approach behind this rule is to set quality standards for urban wastewater treatment plant discharges for chemical, biochemical and microbiological parameters. More stringent quality standards are required for parameters of organic loads (BOD-COD-suspended solids) and faecal pollution (*Escherichia coli*), in particular the value for this parameter is established lower than the WHO criteria, to reduce the risks, for example, of virological contamination of crops (see table 5 in appendix 1).

The implementation of this law is so recent that it is not possible to report detailed information on water reuse for agriculture and industry except for some few examples, quite limited, which cannot represent the national situation . In chapter 3 some examples of good practices are shown and it is possible to add that for about other 285 (see table 6 in appendix 1) Italian regional waste water treatment plants are foreseen their utilise, or by now or after adaptation, for agricultural, recreational or industrial reuse.

2.2. Water demand and pressure on resources

The following data (table 7; table 8) give a picture of the current Italian withdrawals and pressure on water resources. Considering the situation in the future, it is quite difficult to outline a possible forecast because of the lack of reliable data as well as the uncertainty of the future projections, which depend on the choice of socio-economic models and the demographic trend.

Table 7: Withdrawals per year (hm³/year) in 1998

	Civil	Industrial	Agriculture	Energy	Total
North west	2.268	3.520	8.193	3.502	17.483
North east	1.453	1.648	5.277	1.800	10.687
Centre	1.618	1.482	970	581	4.142
South	1.803	879	3.506	36	6.224
Islands	798	457	2.191	0	3.446
Italy	7.940	7.986	20.136	5.919	41.982

Source: CNR-IRSA (1999)

Table 8: % of Withdrawals per year (hm³/year) in 1998

	Civil %	Industrial %	Agriculture %	Energy %	Total %
North west	6	9	20	5	39
North east	4	4	13	6	27
Centre	4	4	2	0	10
South	4	2	9	0	15
Islands	2	1	5	0	8
Italy	20	20	50	11	100

Source: CNR-IRSA (1999)

As for the evaluation of water for the ecosystems, the individual River Basin Authorities are required according to the national law to set up specific rules for rivers, under their direct responsibility. These rules have to guarantee the protection of the aquatic biocenosis and aim at assuring a discharge not too far from the natural one. The adopted methods can be based on site-specific hydrological, hydraulic or environmental evaluation and are used to evaluate the minimum vital flow

Trying to estimate which will be the situation in 2015, some forecast data are briefly reported:

Domestic use: (2015 year) $7.6 \cdot 10^9$ m³/year

Agricultural use: $26.2 \cdot 10^9$ m³/year

Industrial use: (2015 year) $13.3 \cdot 10^9$ m³/year

Energetic use : $6.4 \cdot 10^9$ m³/year

Total $53.5 \cdot 10^9$ m³/year

Source: COVIRI (July 2006)

According to the valuation issued by the Committee for the Vigilance on the Use of the Water Resources (COVIRI), for agricultural uses other $0.8 \cdot 10^9$ m³, coming from Southern Italy and from the Islands should be added, so that the total requirements are valued around $5.4 \cdot 10^{10}$ m³/year.

Auto-supply (industry and agriculture)

Water for Industry is generally supplied by direct withdrawals from rivers or from wells. Sometimes households water supply systems are used as well but just for the sanitation purposes and not to feed the industrial process.

Some exceptions occur by industrial withdrawals from Reclamation Boards or from industrial water supply systems, as the Tuscany industrial districts (see chapter 3.2). Agriculture is generally supplied through big storage and supply systems which are usually dedicated to hydropower production too. They consist in dams creating reservoirs along the principal rivers,. Rainfall storage in small and very

small lakes is a very common practice in southern Italy (especially in Sicily) to provide auto supply for crop irrigation.

During the last 30 years it was recognized a rapid increase in withdrawals especially in areas characterized by high profitable and water consuming crops such as in Versilia and Val di Cornia, irrigated through private wells. In the Marche Region the River Basin Authority survey over 70.000 private wells. A similar situation was found in other central Regions where also water quality problems were encountered in irrigating crops in the Volturno, Tevere and Arno river basins.

Total water demand

With about 740 m³/hab/year (IRSA 1999), Italy is one of European Union Member State with the higher level of water abstraction per capita. It is an Italian characteristic that a large part of this amount of abstraction (23%) is from groundwater. Groundwater abstracted is mainly used for civil purposes: groundwater and spring water produce the 80% of the drink water of the Country (COVIRI 2006).

It must be recognized that data are not available as there is lack of detailed information especially on unconventional production and on the imported water/the exported water. Some information are available regarding water demand for households and for agriculture. In particular data, collected at ATO level and reported at Regional scale, are available for the aqueduct service and shown in the following table:

Table 9: Water supply

		Daily supply per capita	
		l/hab./day	t.r.(%)
North	Piemonte	271,0	100
	Valle d'Aosta	222,0	100
	Lombardia	358,3	100
	Veneto	272,4	96
	Friuli V. Giulia	355,5	100
	Liguria	343,7	83
	Emilia		
	Romagna	222,4	100
Center	Toscana	227,1	100
	Umbria	193,5	100
	Marche	223,0	100
	Lazio	272,2	100
	Abruzzo	310,4	79
Sud	Molise	n.d.	0
	Campania	294,7	86
	Puglia	365,0	100
	Basilicata	450,0	100
	Calabria	256,1	63
Islands	Sicilia	235,8	83
	Sardegna	153,0	100
Mean		286,0	94

Source: SRM (Institute for the the Research in Southern Regions) elaboration on data from COVIRI 2006
t.r.: answer ratio expressed as % ratio of the population living in those ATOs which answered over the whole population of the ATOs falling in the reference territory.

The table 9 shows values of the daily supply per capita which is the mean daily water volume which could be abstracted by each inhabitant served by the aqueduct within the considered ATO. The mean value is 286 l/hab/day elaborated for the 94% of the National resident population, with only 9 ATOs missed over 91.

Although Italy is to be considered a land potentially rich of water resources, actually water scarcity situations are very common, especially in the southern Regions. Water scarcity has a very high impact on the social and economic development, especially on agriculture which is the major water consumer. INEA (National Institute of Agricultural Economy) estimated that water needs for crop irrigation in the Italian southern Regions of the so-called “Obiettivo 1” (Abruzzo, Basilicata, Calabria, Campania, Molise, Puglia, Sardegna, Sicilia) is close to $3,7 \cdot 10^9$ m³/year (table 10).

Table 10: Estimated that water needs for crop irrigation in the Italian southern Regions “Obiettivo 1”

Regions	Abruzzo	Basilicata	Calabria	Campania	Molise	Puglia	Sardegna	Sicilia	Total
Water requirements for irrigation (10 ⁶ m ³ /year)	157,03	387,40	317,70	303,06	83,64	789,46	659,80	979,01	3.677,10

Source: INEA 2001

Portion of abstraction from surface water and ground water

In the following table 9 are presented water supply data regarding the total amount of water abstracted and counted (billed through the tariff) and the corresponding source (wells, spring and surface water). Values, reported on Regional level, represent the water consume registered, in terms of cubic meters per years, in those ATOs which answered to the survey.

Table 11: Water supply service

		Abstracted volume	Billed volume	Billed Vol. / Abstr. Vol		Source of abstraction (mean)			
						Wells	Spring	Surface Waters	
Region		10 ⁶ m ³	10 ⁶ m ³	%	t.r.	%	%	%	%
					%				
North	Piemonte	522,57	367,17	70,3	100	61,4	23,0	15,5	100
	Valle d'Aosta	23,51	12,72	54,1	100	21,1	78,1	0,8	100
	Lombardia	1.367,61	1.075,86	78,7	100	79,5	16,9	3,6	91
	Veneto	400,26	272,04	68,0	77	64,4	24,2	11,4	94
	Friuli V. Giulia	210,90	146,30	69,4	100	99,0	1,0	0,0	20
	Liguria	215,14	119,487	55,5	83	32,2	61,7	6,1	83
	Emilia Romagna	496,92	359,68	72,4	100	60,6	6,8	32,6	100
Center	Toscana	396,76	210,51	53,1	100	52,0	20,0	28,0	100
	Umbria	86,44	49,84	57,7	82	62,0	36,9	1,1	100
	Marche	178,05	120,53	67,7	100	15,3	62,7	22,0	100
	Lazio	908,11	521,26	57,4	100	20,2	79,3	0,6	100
	Abruzzo	263,77	136,05	51,6	100	19,0	78,0	3,0	92
Sud	Molise	n.d.	n.d.	n.d.	0	n.d.	n.d.	n.d.	0
	Campania	691,86	321,76	46,5	86	45,0	54,8	0,0	86
	Puglia	540,37	237,63	44,0	100	17,0	27,0	56,0	100
	Basilicata	117,00	40,05	34,2	100	1,0	72,0	27,0	100
	Calabria	254,77	109,88	43,1	63	42,3	38,4	17,4	27
Islands	Sicilia	612,90	336,97	55,0	96	53,6	27,6	18,4	87
	Sardegna	292,90	103,50	35,3	100	16,0	11,0	73,0	100
Total		7.579,83	4.541,23	59,9	94	48,5	34,2	17,2	90

Source: SRM (Institute for the Research in southern Regions) elaboration on data from COVIRI 2006

t.r.: answer ratio expressed as % ratio of the population living in those ATOs which answered over the whole population of the ATOs falling in the reference territory.

7,57983 10⁹ m³ of abstracted water represent the annual withdrawal operated by the industrial manager of the public supply service in 83 ATOs, which correspond to the 94% of the national resident population. Over the 82% of the entire annual volume is groundwater abstraction (wells and springs), about 17% comes from surface water.

Regarding water use in agriculture, water is supplied by:

- aqueduct;
- groundwater;
- surface water bodies;
- natural lakes, artificial lakes;
- treatment plants;
- rain water storage.

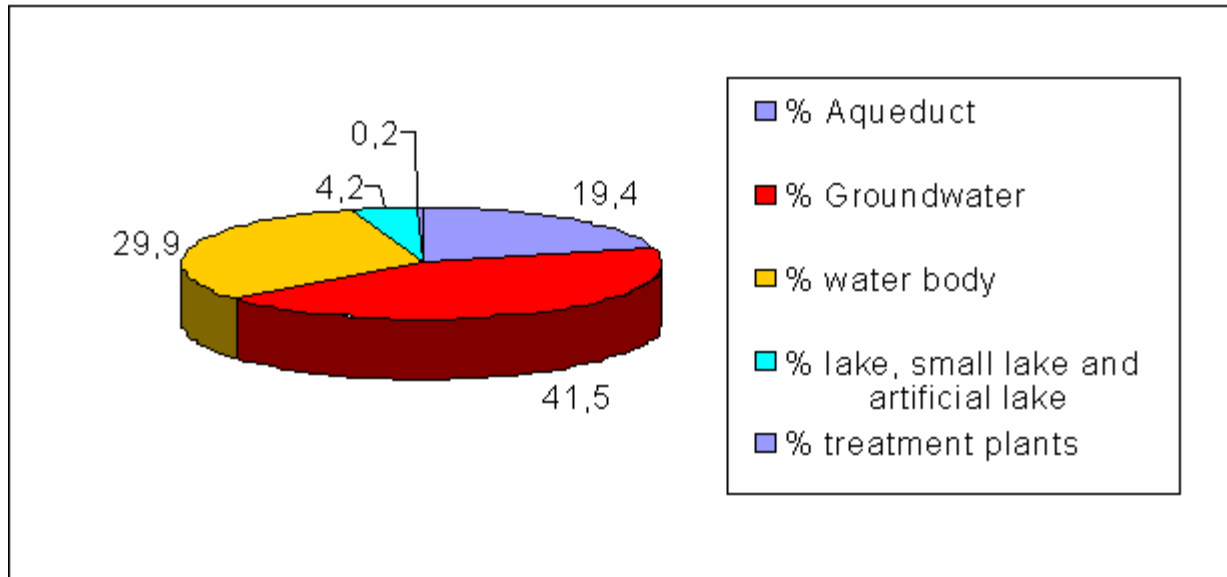
Different sources and geographical distribution are shown in the table 11, below.

Table 12: Water supply typology for irrigation

Geographic area	Aqueduct	Groundwater	Water body	Lake, small lake and artificial lake	Treatment plants	Rain water storage
Piemonte	2273	13995	26429	1460	45	1602
Vale d'Aosta	618	334	4822	216	4	24
Lombardia	5660	6799	25577	1023	56	519
Trentino Alto-Adige	6778	9955	11046	1537	16	453
Veneto	6155	11662	41964	601	89	1311
Friuli Venezia Giulia	1360	3968	6853	98	19	208
Liguria	11150	6572	6074	269	23	2502
Emilia-Romagna	1093	12933	20038	2841	147	618
Toscana	3217	13594	5610	2134	53	2742
Umbria	1134	6018	2521	1517	18	1012
Marche	1044	5382	2439	1441	17	1032
Lazio	10585	23860	8657	541	86	4544
Abruzzo	7572	4341	4568	1499	22	558
North	35087	66218	142803	8045	399	7273
Center	23552	53195	23795	7132	196	9888
Islands	95926	211375	65989	18586	860	27479
Italy	154565	330788	232587	33763	1455	44604

Source: INEA elaboration on ISTAT data; V agriculture census, 2000

Data on wastewater reuse in irrigation often refers to a very common practice which is the direct use of water coming from channels where are discharged wastewater, this practice is improperly called “indirect reuse”. Therefore, the analysis needs best elaboration, in fact, from ISTAT data would result that more than 1.400 withdrawals would come from treatment plants. Considering the above named clarification, in Italy the main water supplying source in agriculture is the groundwater, 41,5%. Groundwater is the main source in central and southern Regions. On the contrary, in the North the main source is surface water, except for Liguria Region



Source: INEA elaboration on ISTAT data; V agriculture census, 2000

Figure 1: Typology water resource for irrigation

Pressure exerted on the resources:

Exploitation index of renewable natural resources

As mentioned in MAP Technical Report Series No. 158, Italian exploitation index of renewable natural resources, is 22 % for the all Country, which means that, at present, the total demand in Italy is dropping. This Index was elaborated by EUROSTAT starting from rough data sent by Italy. The result of this elaboration could therefore be better refined, especially regarding the establishment of future trends.

Non-sustainable water production index

In Italy there are no data on the production of water from non renewable resources such as abstraction of fossil water.

Emissions of organic water pollutants in kg per day

For the civil compartment it is assumed a production pro capita of 0.6 kg/day as BOD₅, whereas for the industrial production, methods for equivalence evaluation exist which vary according to the different industrial activities. The Italian legislation provides for the % reduction of 70-90 % BOD₅ (mg/l) for water treatment plants of 2000-10000 p.e. and of 80 % BOD₅ (mg/l) for water treatment plants of >10000 p.e.

2.3 DEGRADATIONS AND THREATS AFFECTING WATER RESOURCES, FACILITIES, ECOSYSTEMS AND POPULATIONS

Overexploitation of aquifers, especially coastal ones: % aquifers identified to manage ground water, decreases in water noticed

Overexploitation of aquifers in coastal zone is becoming in Italy one of the main pressures on groundwater resources. Strong saline contamination phenomena can affect groundwater under over-exploitation, due to either mixing with saltwater coming from the deepest part of the aquifers or directly from the coast (lateral intrusion).

Overpumping in coastal areas has caused major problems in urban and industrial zones, like the metropolitan areas of Venice-Marghera and Ravenna, where, in order to satisfy industrial and municipal water demand, the local alluvial multilayered aquifer systems have been so seriously depleted that their piezometric surface has been lowered by hundreds of meters. This has resulted in the progressive intrusion of saltwater, which is now found at various depths depending on the zone, and also in land subsidence locally, to the extent that Venice and Ravenna are now threatened by sea flooding. Efforts are now being made to halt groundwater exploitation. The deltaic areas where aquifers are jeopardized to a varying extent by saltwater intrusion include the coastal plains of Tuscany (Maremma, Valle del Magra, Corna, Ombrone, and Albegna plains, Castiglione della Pescaia, and the Island of Elba), Latium (especially the river Tiber delta and the Pontina Plain), Campania, Calabria, Sicily (Augusta-Syracuse, Palermo, and Marsala), and Sardinia (the Flumendosa delta, and the bays of Cagliari and Oristano). Saltwater has also invaded the karst aquifers of Apulia (Gargano, Murgia, Tavoliere, and Salento peninsula), Sicily (Hybleans and Palermo), and Sardinia (Alghero), and the volcanic rock aquifer of the island of Ischia, facing Naples. Over the last forty years, the increased population in coastal areas has exacerbated saltwater encroachment especially during the dry Mediterranean summers, when the tourist population, as well as agricultural water demand, reach a peak. The deterioration of groundwater quality has also led to soil salinisation locally, forcing farmers to switch from profitable to less remunerative but salt-resilient crops.

During the years 2002-2003 groundwater bodies monitoring was carried out in 12 Regions: more than 3.000 points were analysed at least 2 times each year, and a minimum set of 14 chemical-physical standards was determined. Collected data show that nitrates are the main pollutant, often in exceeding the admitted limit concentrations. In Campania Region a project is still ongoing to verify the nitrate pollution origin; isotopic analysis and hydro geological modeling will clarify the underground water contamination process. The water bodies more impacted are located under the more permeable flood planes greatly inhabited, the less impacted water bodies are located along the calcareous mountain chain of Apennines and Alps, where human activities are less intensive and there are natural protected areas.

Alteration in the quality of the water and the ecosystems:

Italian water bodies are affected by a great number of pressures, both natural and anthropogenic. Point sources from civil and industrial compartments and diffuse pollution from agricultural or animal husbandry activities and urban areas are equally widespread and relevant. Groundwater resources, extensively exploited for drinking water supply, agricultural and industrial applications,

mainly carry quantitative stress. With regard to wastewaters discharges, treatment plants are widely distributed, even though some systems are still incomplete and not fully efficient.

Anthropogenic pressure is by far the biggest threat to the integrity of aquatic environments worldwide. The agricultural activities are based on extensive use of organic and inorganic compounds, normally having Nitrogen and Phosphorus as principal components. Careful farming practices may limit nutrients surplus in the soil that often result in water bodies pollution phenomena and eutrophication processes. At national level, overall urban waste production is still increasing, but reportedly at a slower rate. The management of non-point pollution of rivers and its prevention are priority factors in water monitoring and restoration programmes. Atmospheric deposition of sulphur, nitrogen, phosphorus, heavy metals and organic compounds contribute to the overall pollutant loading in the basins. Deposition can affect ecosystems at different levels. On the other hand, eutrophication of aquatic environments is a serious risk and atmospheric depositions contribution cannot be neglected. Furthermore soil contamination, mostly due to landfills and abandoned industrial sites, but also to direct discharge and to the use of polluted fertilizers, determines water pollution from bacteria and heavy metals.

The Italian legislation on water establishes some objectives aiming at the protection and improvement of the water quality, getting a right balance between need and availability of the water resource and increasing the save up of most precious water and the recycle and reuse of the others.

The objectives are reached by the environmental objectives or by the objectives for specific uses of the water resource, by the limit to the discharges and by a more cautious use of the resources.

Looking at the water environmental quality of the freshwater water bodies - rivers, lakes and ground waters - by means of the Italian indicators fixed by the national legislation (the status of quality is divided into five classes – from high (1) to bad (5),) , since 1999, the state of water body quality shows a non critical situation. In fact the majority of the monitoring results assessing water quality seems to confirm that the large part water bodies will fall into the “moderate” class or higher within 2008, which is the intermediate environmental objective set by the National legislation (the final objective is “good status” in 2016). The National legislation charges the Regions with the duty to identify, for all and each water body, the class of quality on the basis of a monitoring and their classification according to the environmental quality objectives. These environmental quality objectives state that, for all surface waters, the ecological, chemical, and environmental status be assessed. The Ecological status is described by: the basic physical and chemical parameters (macrodescriptor) related to the oxygen balance and trophic state; the Extended Biotic Index (for running waters). The Chemical status depends on the presence of micropollutants or dangerous chemicals.

The Environmental status, describing the gap from a reference condition, will then be estimated by combining the previous two indicators. For surface waters, the Environmental status ranks from High to Bad in the following way.

1. High - No or minimal chemical/physical alterations; biological quality equal or very close to a reference ecotype; micropollutants concentrations similar to background values.
2. Good - Biological quality only slightly different from a reference ecotype; micropollutants concentrations producing no short- and long term effect.
3. Moderate - Biological quality moderately different from a reference ecotype; micropollutants concentrations producing no short- and long term effect.
4. Poor - Biological quality noticeably different from a reference ecotype; micropollutants concentrations producing medium- and long term effect.
5. Bad - Severe alteration of biological quality from a reference ecotype; producing severe short- and long term effect.

The national assessment system is now under revision to fulfil WFD requirements. The selection of appropriate biological quality elements for the classification of the ecological status is still ongoing at European level. Methods are not yet available for all the biological elements.

In 2005, the pollution macrodescriptor (basis parameters) level of rivers, monitored over 18 regions, shows an homogeneous trend since 2000, non critical and in accordance with the environmental objectives for 2008 (Figure 2, table 13 in appendix 1).

In 2005 the Ecological Status of Lakes -ESL (it takes into account transparency, dissolved oxygen, chlorophyll a, total Phosphorus, given by an index) has been monitored in 11 regions and 2 autonomous provinces, totalling 107 lakes and 120 monitoring sites. Among the monitored lakes, 44 ranked in class 3 (moderate quality), 37 in class 2 (good quality) and 3 in class 1 (high quality) (Figure 3 in appendix 1).

The chemical quality conditions of ground waters, in 2005, expressed by the Chemical status of ground waters - CSGW indicator (it takes into account the range concentration of the basis parameters, given by an index), is monitored over 9 Italian regions and 1 autonomous province (table 14 appendix 1). The general situation appears hardly satisfactory because, although 50% of cases feature good hydrochemical conditions, with a scarce or limited human impact, the other 50% of the cases show a considerable human impact and poor hydrochemical conditions, as a result of both widespread pollution and natural geological conditions. The principal pollutants in this case are nitrates, heavy metals such as manganese and iron, arsenic, cadmium, mercury, chrome, boron, chlorides and sulphates, pesticides and organic chlorinated compounds.

Wetlands areas:

In Italy there is a large number of elements of surface waters which could be identified as “wetlands”. Many of them are protected areas, according to the prevision of national and international legislation. Just to show how large is the number of wetland elements, in appendix 1, box 1 “CHARACTERISATION OF WETLANDS in the Tevere river basin” there is a study carrying on the exercise of the Tevere Pilot Basin according to article 5 of the 2000/60 EC Directive.

Moreover, according to the Ramsar Convention, in Italy there are 50 Ramsar areas, over 58.507 ha. See figure 4 in appendix 1 the trend since 1975.

Silting up of dam reserves

In June 2004 the Italian Ministry of the Environment issued a decree on the dams management. The purpose of this decree is to guarantee the maintenance of the storage capacity of reservoirs, protecting the quality of the stored water and the downstream water bodies, regulating silting operations. The dam managers are entrusted through this decree with drafting a management plan on the basis of specific criteria established by the decree itself. The management plan should be endorsed by the competent Region and by the competent Authorities (even in the case of small dams). The management plan also includes data and information on sediment quality and quantity and the modality of silting up. Specific indications have to be comprised to fulfil the established indications in the Regional Water Protection Plan to protect the environment in performing such operations. According to this decree, before silting up the dam the manager should give information to the competent authorities and to the public about every step of the sediment management operation.

Degradation cost (separating repercussion costs and repair costs) and of the rise in vulnerability to these risks

Flood risk represents in Italy an issue of outstanding importance, because of the momentous damages caused to its assets and of a very high number of casualties: from 1951 to 2005, 1409 people died for flooding with an estimated damage of 169.23,31 million of euros. Such situation is generally assumed to be the product of the interaction between the sensitivity of the territory (i.e. geological and geo-morphologic configuration, strongly enhanced by the action of the man) and the social and economic configuration of the territory (the abandonment of the mountain areas, the unauthorised building, the disforestation, the occupation of river banks, the unauthorised dragging of sand and gravel, the lacks of maintenance of both the versants and the water streams). The continuous occurrence of such events has led to a management policy to deal with the issue not only during the emergencies but to an actual culture of forecasting and preventing focused on detecting the risk conditions and adopting interventions aimed to minimizing the impact of the events. As a result of quite recent regulatory measures, the perimeter of the high or very high hydrogeological risk areas through the Italian territory is already identified.

2.4. Access to drinking water and to sanitation and collection and treatment of waste water

Availability of resources for drinking water supply is threatened by qualitative factors in the North of Italy and by quantitative factors in the South. Water supplies in the North are relying substantially on underground resources that are increasingly contaminated by agriculture and threatened by the inheritance of unplanned and poorly regulated urban and industrial development during the past decades. In the South, the main challenges regard the need to share storage facilities between drinking water and other uses – what also gave rise to inter-regional disputes – and the still insufficient supply of many areas especially in Sicily. Peak summer demand for tourism is also representing a pressure arising temporary scarcity problems.

Table 15: Population of the inhabited areas according to the satisfaction of drinkable water needs (absolute values)

Year	Adequate supply	Not adequate supply for one three-month period	Not adequate supply for two or more three-month period	Total
1975	26182259	6425764	16105977	48714000
1987	34476460	7273006	10889981	52639447
1999	43716540	4616032	4800117	53132689

Source: ISTAT (1999)

Table 16: Population of the inhabited areas according to the satisfaction of drinkable water needs (percentage values)

Year	Adequate supply	Not adequate supply for one three-month period	Not adequate supply for two or more three-month period	Total
1975	53,7	13,2	33,1	100
1987	65,5	13,8	20,7	100
1999	82,3	8,7	9	100

Source: ISTAT (1999)

Table 17: Municipalities and resident population according to sewerage presence and rate of depuration of wastewaters channelled to sewerage system (absolute values) 2005.

Italian districts	Complete depuration		Partial depuration		Out of depuration		N. of municipalities without sewerage systems	Resident population without sewerage systems
	N. of municipalities	Resident population	N. of municipalities	Resident population	N. of municipalities	Resident population		
Italy	4.567	32.530.898,1	3.013	23.969.143,5	467	1.904.624	54	347.046
North-west	1.908	10.646.805,3	1.011	4.527.534,3	140	374.429	2	2.278
North-east	688	5.476.651	761	5.560.469,2	18	54.017	12	28.139
Center	379	3.556.132	516	7.348.301	107	415.352	1	1.552
South	1.022	9.554.075,3	579	3.507.732,4	163	863.190	25	162.164
Islands	569	3.297.234,1	146	3.025.106	39	197.636	14	152.913

Source: Istat, Sistema delle indagini sulle acque 2005 (Investigations system on water 2005)

Table 18: Municipalities and resident population according to sewerage presence and rate of depuration of wastewaters channelled to sewerage system (percentage values) 2005.

Italian districts	Complete depuration		Partial depuration		Out of depuration		N. of municipalities without sewerage systems	Resident population without sewerage systems
	N. of municipalities	Resident population	N. of municipalities	Resident population	N. of municipalities	Resident population		
Italy	56,4	55,4	37,2	40,8	5,8	3,2	0,7	0,6
North-west	62,3	68,5	33,0	29,1	4,6	2,4	0,1	0,0
North-east	46,5	49,3	51,4	50,0	1,2	0,5	0,8	0,3
Center	37,8	31,4	51,5	64,9	10,7	3,7	0,1	0,0
South	57,1	67,8	32,3	24,9	9,1	6,1	1,4	1,2
Islands	74,2	49,4	19,0	45,3	5,0	3,0	1,8	2,3

Source: Istat, Sistema delle indagini sulle acque 2005

Share of industrial wastewater treated on site

Not available data.

3. Improve efficiency in the sectors of activity using the water demand management policies

First of all it has to be remarked that Italy is dominated by a rigid and formal command and control approach to environmental regulation and the basic policy instrument is represented by use license and authorizations.

The Environmental Action Strategy for Sustainable Development, prepared by the Ministry of Environment in 2002, defines, among the others, these two following priority water management objectives:

- Conservation or replenishment of water resources to fulfil productive, environmental and recreational functions;
- Economic sustainability of water pricing to finance infrastructure development, taking social conditions into account.

Moreover the same Strategy also sets the following operational objectives:

- Reducing leakage in water supply systems, reducing water consumption and re-using treated waste water, particularly in agriculture;
- Implementation of full cost recovery, particularly for sewerage and waste water treatment; moving towards more targeted social pricing of water; amortisation of investment over long term; and ensuring that household water prices are independently regulated and that other types of water use are compatible with sectoral policy objectives.

According to the first priority in water management objectives, for the agricultural sector in northern Italy some progress has been made towards conserving or replenishing water resources.

Use of irrigation water has decreased, particularly in the Po river basin. Discontinuation of high-consumption irrigation practices and diffusion of techniques based on lower consumption (especially in the case of water-intensive crops like rice and corn) have contributed to this decrease. The total area under irrigation remained fairly stable during the 1990s. Irrigated crops still account for 40% of total agricultural value added.

Intensity of water use at the national level remains among the highest in the OECD area. There are still water shortages in the South, where locally abstracted groundwater is used intensively during the summer to supplement the supply from large storage and transfer schemes operated by state-owned organisations and irrigation boards. Excessive groundwater abstraction for irrigation still occurs in the south of the Puglia and Sardinia regions.

Some legislative and economical tools have been enforced to support the Environmental Action Strategy for Sustainable Development and the reuse of industrial and treated waste water has been boosted by the water act in 1994 (“Galli” Act) and the legislative decree of 1999 n. 152. This last decree introduces in the Italian legislation the basic principles, objectives and operational tools proposed by the Water Framework Directive. Among the regulations produced by legislative decree 152/99, the Ministry decree June 12th 2003 n. 185 establishes the technical requirement for treated wastewater reuse.

The reuse of treated wastewater should be safe for human health and not produce negative impacts on ecosystems, soil and plants.

Allowed uses are:

- irrigation for crops, industry, human and animal consumption,

- civil and recreational,
- industrial cooling and washing,

providing the established quality standard. Household water use places Italy among the middle/high-range group countries. Progressive pricing is an incentive to lower consumption, but very low water prices limit the incentive effective. Low prices do not allow for the necessary renewal of public water supply systems. The average age of the pipe network is 35 years. Leakage is high, at around 30% and most sewerage (76%) is combined.

A substantial majority of industrial users abstracts surface or groundwater directly and pay abstraction charges. The chemical industry (38% of total abstraction) is the largest industrial user, followed by the paper (14%), food (13%) and steel (11%) industries. Effort have been made to introduce water-saving technologies in the paper industry, while water consumption per employee has increased in the food industry.

Regarding to the second priority water management objective, the “Galli” Act has been enacted, meeting the main objective of a sustainable water pricing, particularly with respect to financing water infrastructure development. The law provides for vertical and horizontal integration of water and waste services to households and industry (abstraction, public water supply, sewerage, waste water treatment, discharge) within optimal management areas - ATO, to be delineated by the regions. In practise the reform aims at efficiency and improved financing of water services, with appropriate attention to social and equity issues.

The efficiency is achieved by administratively regrouping the population living within optimal management areas (ATO), not necessarily coinciding with river basins or their sub-unit. At present, 93 ATOs are planned and 87 are settled (Figure 5, appendix 2) under the “Galli” act, and pursuant to 1996 Ministry of Infrastructure and Transport (MIT) guidelines, water pricing should aim at full cost recovery – by the integrated water services with the “normalized method”, while maintaining the tradition of social tariffs. The new water pricing system establishes base tariffs that reflect average costs within ATO. Industrial and commercial users do not qualify for subsidised lower-block tariffs, but their base tariff is the same as that for households.

Nevertheless in most of the country substantial new funds are required to cover the national deficit with respect to operating costs for water provision and waste water treatment, and to provide the significant new investment needed.

But full cost coverage would imply a significant increase in average water prices, up to a doubling at the peak of the investment period (after 15 years). The creation of ATOs, which should be semi-independent price-setting bodies, should facilitate the transition to full cost recovery for water and waste water services. Since 1997 emergency public support (in the range of Euros 50 million/year) has been granted to areas with inadequate urban sewage treatment infrastructures. In 2002 the Italian financial law established that ATOs must prepare, as part of their investment plans, a programme of urgent measures to implement the urban waste water treatment directive. Moreover, thanks to the availability of the funds from the Community Support Framework 2000-2006 for the southern regions, it has been a speeding up of the process asked by the “Galli” Act.

Irrigation water management is not covered by the “Galli” Act. The only “environmental taxation” used is represented by abstraction fees, that are due in exchange for the license. Irrigation is managed by collective associations of farmers (Reclamation Boards) set up in the 30s having a public status. In theory there are rules which define the abstraction fees, but in practise the Reclamation boards take their decisions in autonomy, so that the irrigation water management system is very unhomogeneous and fragmentary over the all country. Moreover the agricultural withdrawal system is not completely under control, and abusive withdrawals occur.

3.1. Data and indicators

1) Water for agriculture

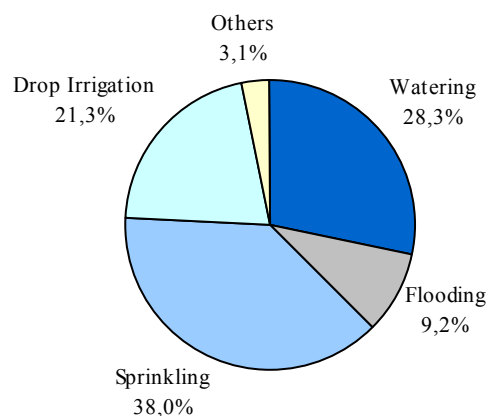
Table 19: Irrigated surface in 1998 and 2003

Irrigated surface	Agricultural irrigated surface	Irrigated surface/ Agricultural irrigated surface	Irrigated surface	Agricultural irrigated surface	Irrigated surface/ Agricultural irrigated surface
1998			2003		
ha		%	ha		%
3.081.600	14.965.300	20,6	2.788.717	13.206.662	21,1

Source: APAT (2006)

Moreover, as previously stated in chapter 2, table 7 and table 8, in 1998 withdrawals (demands) for agriculture purposes were of about 20.136 hm³/year, corresponding to the 50% of total withdrawals.

Figure 6: Distribution of the irrigated surface by different types of irrigation (2003)



Source: APAT (2006)

The price of water for irrigation use varies from 160 Euros/ha/year to 500 Euros/ha/year. It is difficult to give data on price for cubic meter because it could be quite variable, depending on the different irrigation techniques on the crop water needs and on water irrigation network.

2) Domestic water: (including for tourism):

As previously stated in chapter 2, table 7 and table 8, in 1998 withdrawals (demands) for domestic purposes were of about 7.940 hm³/year, corresponding to the 20 % of total withdrawals.

Efficiency index of drinking water use

Table 20: Drinkable water volume – Year 2005 (percentage value)

Italian districts	Water supply/water poured (%)
North west	76,6
North east	73,3
Centre	68,8
South	61,4
Islands	65,2

Source: ISTAT, Sistema delle indagini sulle acque, 2005

Price of m³ of domestic water

The cost for civil users, referred to an average distribution of 200 m³/year, ranges from 0.47 to 1.24 euro/m³, much lower than in many EU Member States (Source: Federgasacqua).

Domestic water cost recovery

Domestic water cost recovery is accomplished through the tariff mechanism. The Italian Water Pricing method, called “normalised” method, is the way to implement an adequate level of service, to support investments, to improve the managing efficiency, to protect the public interest and to control the tariff increase.

The method is based on the definition of a reference tariff for a generic year (T_n) which is composed by the following elements:

$$T_n = (C + A + R)^{n-1} (1 + RPI + K)^n$$

Where:

C = Operational costs

A = Depreciated cost

R = Capital Costs

RPI = Inflation Planned Rate

K = Price limit

n = progressive number of years

In the table presented below is shown the tariff evolution in 30 years. The mean weighted tariff (TMP, the tariff calculated through the mean of the existing managing systems at the beginning of the reference period acting as the basis for the development of the real tariff) vary from 0.80 €/m³ (in ATOs falling in Northern Italy) to 1.02 €/m³ in southern ATOs; the national mean value is 0.93 €/m³. The Real Mean Tariff (TRM, the tariff weighted on the entire period and calculated through the planned costs year by year) vary from 0.89 €/m³ (northern ATOs) to 1.05 €/m³ (in the south); the national mean value is 0.97 €/m³.

Table 21: Mean Tariff evolution media (€/m³) per Geographic Area –

	TMP	TRM	TRM	TRM	TRM	TRM	TRM	TRM
Area		Anno 1	Anno 5	Anno 10	Anno 15	Anno 20	Anno 25	Anno 30
North	0.80	0.89	1.06	1.26	1.40	1.40	1.36	1.31
Center	0.89	0.96	1.10	1.27	1.35	1.31	1.16	1.11
South	1.02	1.01	1.17	1.30	1.34	1.33	1.29	1.22
Islands	1.01	1.05	1.20	1.36	1.45	1.45	1.38	1.15
Total	0.93	0.97	1.13	1.29	1.38	1.37	1.29	1.19

Source: Blue Book 2006

Number of rural towns and territory equipped with a water efficiency plan

There are not national data on the implementation of water efficiency plans. An exhaustive case study is presented in box 2, appendix 2, just for Emilia Romagna Region.

3) Water for industry (including energy)

At moment there are difficulties in collecting data at national level on water use in industry.

3.2. Retrospective analysis

As a result of the water demand management policies above reported and in order to put into practice the operational objectives, according to the legislation on water resources, mainly local administrative bodies are entitled to adopt and support, also with financial provisions, programmes aiming at reusing treated wastewater, developing separate networks for industrial and agricultural wastewater, promoting awareness raising campaigns, involving all the stakeholders which could be involved in.

As it can be read below, some experiences, data, political instruments and best practices are reported for the agricultural, industrial and civil sectors (box 3).

Box 3

A local approach for a retrospective analysis The reuse of treated urban wastewater: case studies in southern Italy

The problem of water supply in southern Italy, and particularly in Puglia region, has been addressed since the end of the eighteenth century when water scarcity begin to affect the region constraining social and economic development. The fast development of the region, the changes in traditional agriculture practices and land use, the groundwater over-abstraction (causing saltwater intrusion) together with the climate changes, led to frequent water shortages in Apulia and in the coastal areas of Basilicata, causing conflict between the two regions.

Over the last four decades, the response to these problems has included improvements of water infrastructures and the construction of large reservoirs aimed at the regulation of resources allocated for agricultural, hydro-electrical and industrial sectors. The present stress on the groundwater resources in Puglia region, requires an optimization of the water demand management, also considering the use of non-conventional water in order to reduce fresh water demand.

In this context the study “Definition of technical, economic and operational optimization of wastewater treatment finalized to be reused in Puglia region” has been commissioned by the Italian Ministry of Environment to Sogesid S.p.A.¹, in order to support the water resources conservation policy in regions stressed by a water scarcity emergency. The study has been based on the following phases: identification of non-conventional water demand and treated wastewater sources; analysis of best advanced treatment technologies available for wastewater reuse; economic analysis of additional treatment costs; evaluation of case studies.

The scenarios for treated wastewater reuse in the region depend not only on the definition of the effluents quality, and consequently on the advanced treatment process required, but also on the costs involved and on the environmental risks and benefits connected.

The results obtained in the study and particularly in the case studies, underline the advantages of reutilization projects in areas with existing water scarcity or water stress, with special regard to those areas where environmental benefits are also generated.

The definition of non-conventional water demand was carried out for the whole region, giving priority to the areas with already stressed water resources, identifying the water treatment plants as well as the potential users and other possible benefits deriving from the reuse (environmental, social, etc.). Twenty-two case studies have been identified and analyzed; for each case study it has been developed a preliminary plan considering: additional process required, treatment techniques and operational costs, water conveyance systems and distribution infrastructures, social and environmental benefits and any other element interesting the project feasibility.

The analysis was finalized to the identification of an economic threshold below which the expected advantages justify the additional investments needed for advanced treatment.

Benefits can also be increased at local level through different forms of incentives and, above all, by quantifying the value of water resources that will be available when substituted by treated wastewater.

It has been therefore crucial to define benefits and environmental risks connected to wastewater reuse policies.

The following basic criteria have been considered for the economic analysis:

- Type of reuse (irrigation, integrated irrigation, industrial);
- Improvement works required in the plant, with or without primary treatment;
- Additional advanced process treatment;
- Estimated costs, with regard to plant dimensions and population equivalent (p.e.) served.

All the economic evaluations have been based on the Italian national legislation on water reuse and water protection.

The result of the analysis can be summarized as follows :

A. The required costs for advanced wastewater treatment in order to respect the quality limits required for water disposal in surface water bodies, range between a maximum of 79 € per capita for plants of 2.000 p.e. and a minimum of 20 € per capita for plants of 500.000 p.e.

B. The additional costs for improving the effluent quality, in order to respect the limits for disposal over soil, are negligible.

C. The difference between the additional costs in cases A and B is dramatically reduced with the economy of scale obtained in large treatment plants (above 100.000 p.e.)

D. The cost-benefit evaluation depends on the size of the treatment plant and on the tariff policy (incentives and income from additional fresh water made available).

E. Any project in arid or semiarid regions with demand for non-conventional water (agriculture,

¹ Sogesid S.p.A. is a company fully controlled by the Ministry of Economy and Finance.

industry, environment), presents considerable benefits from the implementation of a wastewater reutilization policy.

F. The environmental benefit (e.g.: groundwater abstraction reduction) has a central role in a comprehensive evaluation of a reuse project.

G. The suitability of reuse project changes in relation to treatment plant size and the typology of disposal (into a river or on the soil) of the treated effluent.

Water for agriculture

An increasing diffusion is experimented by water policy measures inspired to the “voluntary approach”. In the agricultural sector, other forms of subsidy are used, as compensative measures (eg in the case of “respected areas” around drinking water sources) or in the logic of “management agreements” aimed at reducing agricultural pollution. These have received a strong impulse from the CAP, and especially from Reg. 2078/92. In fact some Regions have adopted criteria that privilege sensitive areas, protected areas, river corridors etc. for the application of these schemes; but the implementation is usually much less strict. Incentive effects are therefore very often diluted: elected areas are too large, incentives paid are too low, measures are not always well supported by technical assistance and promotion.

Other applications of the voluntary approach that might have beneficial effect on water policy targets – although again not generally targeted specifically to these – are the voluntary programs aimed at the diffusion of biologic agriculture and/or reduced application of pesticides and fertilizers.

The growing commercial success of “environment-friendly” agricultural products – not only in the field of biologic agriculture, but also in the development of high-quality market niches in particular agricultural *filières* is also fostering a rapid development of less polluting farming techniques; yet it must be noted that this development hardly concerns the areas where intensive farming is more diffused, but more often those areas that are usually defined as “marginal”.

Finally, some “greening” of the agricultural sector – even with respect to water – is promoted by means of technical assistance, more or less formalized into “Codes of Good Practice”. The Code of Good Practice for the Protection of Groundwater from Nitrate has been released at the national level, yet every Region can adapt and integrate it according to local specificity. The adoption of the Code has been entirely voluntary so far; the new act implementing Dir. 91/676, however, will make it obligatory within Nitrate vulnerable areas. Other fields of action of technical support agencies and/or local public services operators include, for example, the creation of dedicated services for collective management of livestock waste; separate collection of toxic waste originating from agriculture (eg pesticide packaging; used oil).

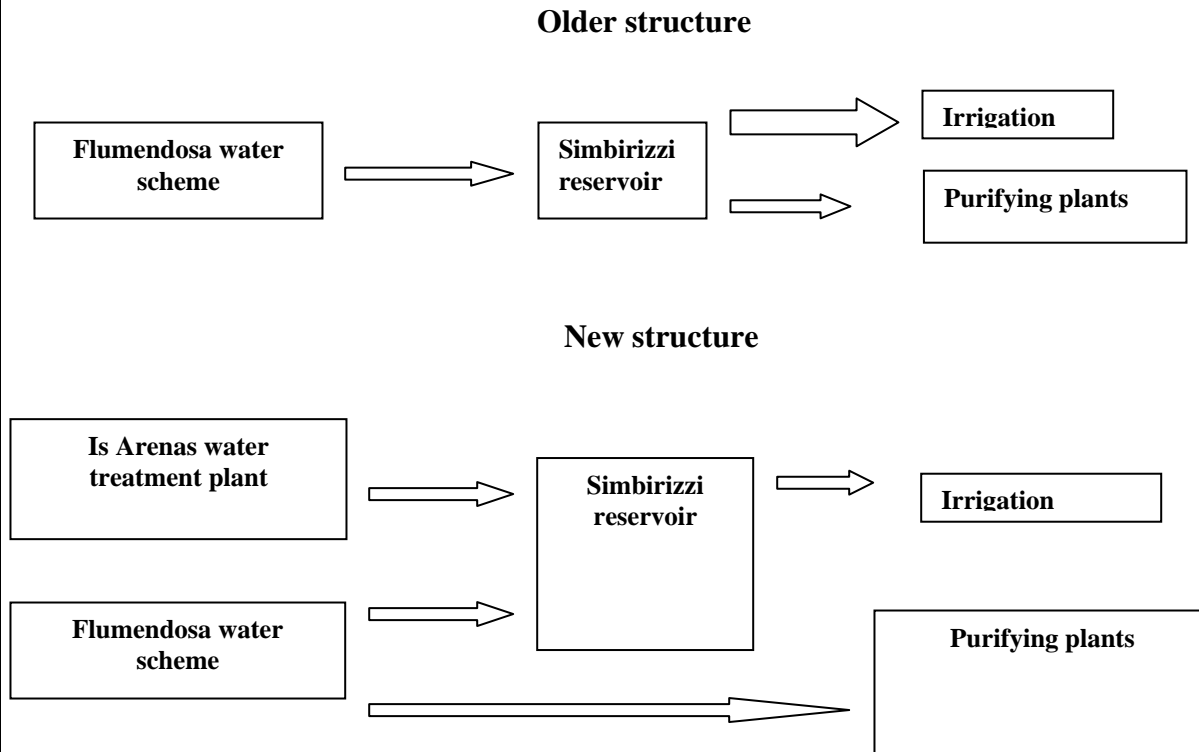
Specific aspects regarding how to reduce water consumption are carried on locally both by a further spread of more efficient irrigation techniques and by the improvement of the irrigation management. In fact, knowing the crops’ water need during the different growing phases allows to rationalize the water supply according to the time requirements of the crops, avoiding useless loss.

Moreover, as already stated, the Ministry decree June 12th 2003 n. 185 establishes the technical requirement for treated wastewater reuse, especially devoted also to allow uses for irrigation for crops, and animal consumption.

An example of water reuse in agriculture is shown in box 4.

Box 4

Is Arenas water treatment plant



By the creation of the Is Arenas water treatment plant with a power of about $40/60 \cdot 10^6 \text{ m}^3/\text{year}$, in the new structure, it has been possible to reuse, especially for irrigation purposes, the waste water of Cagliari. The use of these waters covers the 80% of the demand of about 8000 ha.

For domestic water, including for tourism

The already mentioned “Galli” Act aims specifically at full cost recovery – by the integrated water services with a “normalized method”, while maintaining the tradition of social tariffs; in fact the law provides for the abstraction, the public water supply, sewerage, waste water treatment, and discharge, for households including tourism and it is major rule for promoting efficiency plans to be made by the Local Authorities.

Moreover, some voluntary measures exist, carried on by NGOs or by tourist trade, or by public/private partnerships, as reported in the following boxes 5 and 6 and table 21

Table 22: European Ecolabel numbers for domestic water, including for tourism

Product group	n. European Ecolabel licences	n. European Ecolabel products
Tourist accomodation service	27	27
Laundry Detergents	7	30
Camp site service	2	2
Hand dishwashing detergents	3	8
Detergents for Dishwashers	4	12

Box 5



“There is not water to lose” the experience of Bagnacavallo city (Bologna)

Aim:

- quantify the effective water saving which is possible to pursuit in a midium size town council by the free distribution of flow reducers to the citizens and realization of a campaign of education and information for the involvement of the citizens. Actions:
- realization of a informative campaign;
- intervention for water saving in the town council buildings;
- free distribution of flow reducers to all the families which live in the Castel San Pietro Terme town council (about 8400 kits);
- free involvement of non domestic users;
- measurement of the water saving obtained;
- support for an international cooperation project.

Promoters:

- Province of Bologna;
- Town council of Castel San Pietro Terme;
- Emilia Romagna Region;
- ATO 5;
- Hera Imola-Ravenna;
- Legambiente.

And with the collaboration of University of Bologna.

Town council participation:

- Local Agenda 21;
- Schools;
- NGOs;
- Plumbers.

Time:

- April 2006: start of the communication campaign;
- May-october 2006: distribution of flow reducers;
- November 2006 – November 2007: monitoring of the consumption of the users.

Box 6

The 'Flepy' Project **Tools and products for Environmental Education**

“Flepy” is addressed to children between 3 and 7 years old. It was originally created for the Flemish Environment Agency (Belgium). With the co-operation of the European Commission (DG Environment), the project was translated and adapted to be used in 12 Countries, members of the “Green Spider Network”, among which Italy. Promoted in Italy through the network of the Environmental Agencies (APAT / ARPA / APPA), the Flepy Project has had a great success in many schools, developing projects and very creative activities among



children.

Flepy is a fantasy and colourful character, able to swim and to fly, who meets the matters of the pollution of air and water and becomes friend of children to fight for a better, green and healthy world.

In the distributed educational kit, there are different tools such as booklets, posters, stickers, video, a card game, a pupil and a Manual for educators.

For industrial water and energy

In order to push industrial management to adopt the suggested best practice a tariff reduction policy for industrial users was proposed proportioned to the reused water volumes as well as to the quality level of those waters.

As well as for agriculture, in the industry sector an increasing diffusion of a “voluntary approach” is experimented and some “management agreements” have been adopted by Regions for sensitive areas, protected areas, river corridors etc for the application of these schemes.

In fact industry as well as agriculture enjoys large water management related subsidies.

For water supply, this is in particular the case of dedicated supply schemes, developed in the past mostly for fostering industrial development (eg in the South), and in recent times for environmental reasons, in order to prevent negative effects from individual abstractions and achieve closed-cycles through direct recycling.

These schemes have been typically realized through mixed public and private undertakings involving local institutions; these often contribute at least to the initial investment, when not to the operational costs.

Similar institutions – with a higher frequency of unbalances even for operational costs – is well diffused in the sewerage segment. Industrial premises have as well enjoyed public support (eg through direct contributions or low-interest loans) during the phase of massive development of sewage treatment equipment following the law 319/76.

Some voluntary measures carried on by public/private partnerships or by industries are reported in boxes 7 and 8.

Box 7

Tuscany industrial districts: the Prato experience

Textile industries are among the most water consuming and polluting industries. The produced wastewater needs a very efficient removal process of COD, nitrogen compounds, and toxic molecules. Main pollutants are represented by: surfactants, cleaners, organic solvents, fats, oils, dyes, heavy metals (mainly non ionic) and salts. Moreover the wastewater composition is largely changing because of the very numerous different processes used in the textile.

Reuse of such wastewaters in textile processes requires a still more severe removal of salt (chlorides, sulphates, fluorides) and organic biodegradable (to prevent microbiological growth and piping corrosion) and not biodegradable molecules.

The poor biodegradability and the relevant biotoxicity of such compounds require highly efficient wastewater treatment processes including chemical physical final treatment (ozone of membrane separation processes).

This picture supports the great deal of work made to improve the management of textile wastewaters.

In the Prato district the industrial area of 150 ha represents one of the largest private agglomeration of small-medium industries in Italy: 350 sites, 30 of which rule a wet cycle process. The industrial settlement is nearby the big Baciacavallo wastewater treatment plant. The main water source for the area is represented by groundwater. In order to protect this valuable water resource, the reuse of treated wastewater has been considered an effective possibility.

Wastewater from the Baciacavallo treatment plant is bleached adding flocculants to precipitate dyes before the two-step filtration. Removal of precipitated dyes is enhanced through a bio filtration process (oxygen to favour growing of micro organisms for final dyes decomposition). Chlorination sanitizes the filtered water for final storage.

Recycling of recovered water suffers for an increase of salt content up to a level preventing the inflow in the wastewater treatment plant.

Integration of recovered water with fresh water is needed. Feeding is provided by fresh water from Bisenzio River and from about 15 wells drilled on the river catchments. A 35 km industrial pipe providing up to 7.000.000 m³/y of water collects the recycled water. Recovered volume cover the industrial need of the first area served by the process while making free for potable uses the needs of 1/3 of the population.

Improvement of the wastewater treatment plant through the use of ozone and phytodepuration will increase the availability of the recovered water to 10.000.000 m³/y which correspond to the potable needs of half the population of Prato city.

The experience of the first industrial area served by the recycling scheme will be applied to a second area covering up to 250 ha more.

Industrial costs for recovered water are much higher than for natural freshwater but due to the financially supported tariffs promoted by the mentioned legislation for the industrial use of the recovered water the economic balance can be achieved.

Box 8

CECINA Pilot River Basin: MEASURES ADDRESSING WATER IMBALANCES MANAGEMENT

In 2001 the Cecina river basin in Tuscany was selected by the Ministry of the environment to take part in the European Network of Pilot River Basins for the experimental implementation of the Water Framework Directive.

In the context of this Pilot River Basin exercise for the WFD implementation, water resources availability issues came out immediately, and became priority issues.

Testing activities stressed the relevant pressures of industrial and civil water demand on river basin water resources which cause lack of water during the summer months.

Cecina river has always had an unstable stream flow, causing flood during winter months and drought during summer months.

From the hydrogeologic point of view, the river basin is characterized by variable precipitation strictly dependent by seasonal fluctuation, with an high rainfall level in wintertime and dry climate in summertime.

From the orographic and lithologic point of view, the high and middle river basin is characterized by steep slopes and clay outcrops and, consequently, middle-low permeability ground. The alluvial mattress of the river bed is made of gravel and present high permeability, but its thickness is very limited. Gravel and sand pits, which have been closed since few years, caused, in some parts of the river, geomorphologic modifications and a reduction of the alluvial mattress.

Ultimately, Cecina river Basin is characterised by a seasonal, torrential flow. The orography determines low “corrivation time”, causing fast water recharge but also fast water drainage in the alluvial soil. This effect is much more emphasized by anthropogenic pressures.

Due to its natural characteristics, Cecina River Basins is stressed by high water unbalances in summertime, especially from June to the first days of October, worsened by a relevant gap between anthropogenic demand (for industrial, civil and agricultural uses) and a limited water resources availability.

Water scarcity on Cecina River Basin must be intended as recurrent seasonal imbalance between water demand and supply which causes groundwater resources depletion and compromises the minimum vital flow.

During the **Pilot River Basin** exercise, a Water Balance has been drawn up, in order to quantify the river flow deficit.

The balance has the following formula: $R = F + E \pm X$

R = rainwater

F = river flow

E = evapotranspiration

X = flow deficit

The final result of the water balance is that the flow deficit is estimated between 17,6 and 20,6 10^6 m³/year in front of a total flow of 131,435 10^6 m³/year (table 1).

	R	F	E Turc	X = R-(F+E)
mm	830,67	207,05	595,78	27,84
10⁶ m³	527,311	131,435	378,203	17,672
			E Thornthwite	
mm	830,67	207,05	591,08	32,54
10⁶ m³	527,311	131,435	375,215	20,661

Table 1

As regards the minimum natural flow, it can be defined as the minimum river flow under undisturbed conditions; it has been evaluated by calculating the $Q_{7,10}^2$ (= 7,8 l/sec). The minimum natural flow results from the sum of $Q_{7,10}$ and the water abstractions (=84,7 l/sec) and it has been evaluated in 93,5 l/sec.

This information confirms the strong impact of the abstractions on the water flow and constitutes an important basis for the definition of effective answers. These answers consist of a series of coordinated measures coherent with a common integrated water resources government.

First of all, a telemeter net has been installed in order to control the main industrial water users. This measure is a fundamental basis for the water users control and management.

Secondly, Tuscany Region (Cecina river basin authority) endorsed a water quantity preservation measure for the reduction of water abstraction: new authorisations shall grant a reduction of abstractions at least of 17 % on total consumptions.

This administrative/planning measure has been defined together with a strategic program of actions concerning the integrated river basin environmental protection. These actions are included in a "Framework Agreement" endorsed by the competent institutional authorities (both national and local) on water and soil protection.

In this context, it has been implemented the Aretusa Project which aims to reduce the water stress due to industrial abstractions on the coastal aquifer. The project consists of a reclamation plant for industrial reuse of wastewaters from the WWTP of Cecina and Rosignano municipalities. The water services manager (ASA) together with the Solvay group (the most important industry on the river basin), has considered the possibility to reduce abstractions through waste waster re-use technologies. According to the ASA estimate, on the basis of the capacity of the two treatment plants, the Cecina plant must supply about 2.400.000 m³ and the Solvay plant 2.453.000 m³ of water per year. At the moment the project implementation grants a water abstraction reduction of about 4 million m³/year. Solvay grants a reduction of the withdrawals from the river bed aquifer of the same quantity (4 10⁶ m³): 2 10⁶ m³ of the 4 10⁶ m³ not abstracted are made available for potable use.

² $Q_{7,10}$ is the minimum average flow for seven consecutive days with a ten years recurrence time

Table2: ENVIRONMENTAL BENEFITS OF ARETUSA PROJECT

WATER ABSTRACTIONS REDUCTION	POLLUTANT REDUCTION FROM WWTPs DISCHARGES	REDUCTION OF THE POTABLE WATER DEFICIT																																			
<p>INDUSTRIAL ABSTRACTIONS (Jan-2002)</p> <p style="text-align: right;"><i>m3/year</i></p> <p>- Cecina wells:.....800.000</p> <p>- Riparbella wells:.....1.200.000</p> <p>- wells and surface waters:</p> <p>Montescudaio:3.700.000</p> <p>TOT6.700.000</p>	<p style="text-align: center;">EXISTING LOADS</p> <table border="1" data-bbox="578 575 1138 926"> <thead> <tr> <th></th> <th colspan="2">Cecina</th> <th colspan="2">Rosignano</th> </tr> <tr> <th>Loads</th> <th>m3/y</th> <th>2,400,000</th> <th>m3/y</th> <th>2,453,000</th> </tr> <tr> <th></th> <th>mg/l</th> <th>t/year</th> <th>mg/l</th> <th>t/year</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		Loads	m3/y	2,400,000	m3/y	2,453,000		mg/l	t/year	mg/l	t/year	COD	100	240	100	245	BOD ₅	30	72	30	74	N	35	84	60	147	P	10	24	10	25	<p>Current deficit in Cecina e Rosignano municipalities: 1.500.000 m3/year (data from ASA)</p>
	Cecina		Rosignano																																		
Loads	m3/y	2,400,000	m3/y	2,453,000																																	
	mg/l	t/year	mg/l	t/year																																	
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N	35	84	60	147																																	
P	10	24	10	25																																	
<p>REDUCTION OF ABSTRACTIONS</p> <p>TOT:.....4.000.000 [m3/year]</p> <p style="text-align: center;">% on</p> <p>total:.....60%</p> <p>%groundwaters.....nearly 100%</p>		<p>ARETUSA CONTRIBUTE: 2.000.000 [m3/year] available for potable uses</p>																																			

3.3 Prospective analysis

As anticipated in chapter 1 and stated in the previous part of chapter 3, the aim of the Italian Government on water demand policies is to make progress in term of efficiency and effectiveness. Speaking about make progress, it means going on with the following operational objectives:

- Reducing leakage in water supply systems, reducing water consumption and re-using treated waste water, particularly in agriculture;
- Implementation of full cost recovery, particularly for sewerage and waste water treatment; moving towards more targeted social pricing of water; amortisation of investment over long term; and ensuring that household water prices are independently regulated and that other types of water use are compatible with sectoral policy objectives.

The operational objectives have been taking into practise by all the measures which have been already explained in the Report. In particular it has to be mentioned the “Integrated Water Service” (integrated management from the abstraction to the discharge), organized in selected “optimal

management areas” (ATO) covering the totality of the national territory, where water is managed with an industrial approach aiming at improving the technical and economic efficiency of the service itself. Under the ATO control it will be easier to achieve the following water policy elements:

- Use water more efficiently by upgrading existing water distribution systems and implementing demand management measures (including increases in the prices of water resources and water services) for households as well as agricultural and industrial users;
- Carry out the consolidation of water utilities;
- Undertake urgently an increased investment effort in both drinking water supply and waste water treatment, on the basis of a new funding regime which will cover full capital and operating costs of providing water services;
- Ensure the proper functioning of new and existing waste water treatment plants and promote better compliance with discharge permit conditions.

Moreover, by the specific law on water reuse (Law.185/2003), for domestic, agricultural and industrial uses it has been given a new impulse in order to reduce water consumption, recycling the water resource.

Among the pool of measures developed by Italy there are also the River Basin Authorities, which play an active role in the planning exercise, defining the water balance between water supply and water demand, the minimum flow supporting dependent ecosystems (DMV), drafting risk and hazard maps and preparing the Hydro - Geological Configuration Plan (PAI).

Even if there is a quite well defined path for better water demand policies, it is too early to estimate certain data and it needs a longer time to give reliable scenarios both in term of percentage of water resource saving and in economic terms. A concrete improvement of water management will be probably linked to the finalisation of the legislative reform for the whole environmental matter. This reform will allow a complete transposition of the European Water Framework Directive, setting a new scenario for water management a river basin district scale. It is expected that available plans and tools already developed under the existing legislation will be updated and completed at the light of the WFD requirements.

4.Towards integrated policies for water resource and demand management. Take into account the environmental objectives, integrate WDM in water policies

Despite the fact that there has been quite a delay in making progress in the water management policies, even if in a fragmentary and not complete way, the Italian management of the water resource is going toward an approach coherent to the sustainable development.

According to the Environmental Action Strategy for Sustainable Development, which defines, as well as the following priority water management objectives of chapter 3, also an acceptable chemical quality for all water bodies by 2008 and good quality by 2016, the Italian policy in water sector has been much modified in the last decade by a number of legislative acts. Since the early ‘90s the higher degree of complexity and decentralisation achieved has been leading to some conflicting attempts to integrate the water policy regimes.

Tentative efforts to integrate water management are made at two separate and conflicting levels: at the water basin level and at the local one.

The concrete aspects of the Italian management of the water resource has to be met into the regional plans which focuses on the following aspects: at the water basins level, through the creation of the Water Basin Authorities (AdBs), responsible for water planning in the water basins under their authority, and at local level, through the creation of the ATO, responsible for setting up locally the integrated water services.

By the law 183/89 the individual AdBs are required to set up specific rules for rivers under their responsibility, adopting an integrated approach to water and land conservation problems. Both planning and management of water and land conservation must be conceived within a single vision for the whole territory of each hydrographic basin by the River Basin Plan, which is conceived as the main tool to collect relevant information and to identify the actions necessary for hydraulic defence and soil conservation, utilization of water resource and pollution control of water bodies. The law established that the River Basin Authorities be entrusted with the coordination of all planning, construction and control activities in water fields within the river basin.

With the law 225/1992, Italy has organised the civil defence as a National “Service”, coordinated by the Prime Minister’s Office and composed by State administrations, central and peripheral, by the regions, by the provinces, by the local councils, by the national and territorial public authorities and by every other institutions and organization, public and private, existing on national territory. The Department of Civil Defence intervenes, jointly with the competent Ministries and with Regions involved, in events that, due to intensity and extension, must be faced with exceptional means and power. It prepares, jointly with the Regions and the local institutions, water emergency plans and gives guidance to Commission delegates for the destination of the available resource. Lastly, with the D.P.C.M. of the 27th February 2004, the authorities are identified with whom rests the decision and responsibility of alerting the civil defence system at various levels. The institutional bodies and the territorial units involved in the activity of risk forecast and prevention and emergency management are defined.

According to the “Galli” Act, already mentioned, in chapter 3, it has been asserted the general principle that all surface and groundwater resources must be considered public. This law has also introduced important innovations stating firmly that water resource must achieve the criterion of efficiency and of effectiveness, also taking into account the criteria of solidarity and of environment protection.

Moreover, through the Legislative Decree 152/99 Italy has adopted into Italian law the European Directives 91/271 on Urban Wastewater Treatment and 91/676 on the Protection of Water from Agricultural Pollution and has anticipated part of the actions asked by the 2000/60 Directive. In fact the Legislative Decree 152/99 has defined the stages for achieving environmental quality objectives, including the analysis of present conditions and classification of environment status, the identification of restoration objectives and the implementation of the necessary actions in water bodies.

By the Ministerial Decree of the 28th July 2004, guidelines for the arrangement of the water balance are defined, including criteria for the uses census and for the definition of the minimum vital flow: this decree takes into account the previous legal acts on water planning and management and gives accurate indications for the water balance definition; in particular it specifies the spatial and temporal scale, the basic data, the information flow management and the activities required for the evaluation of natural water resources. This decree establishes that the useful water resource shall be calculated taking into account the M.V.F.

Finally, last April Italy took into force the Water Framework Directive also known as 2000/60/EC Directive.

According to the 2000/60 Directive, Italy is going to define the basin districts, on the basis of the water basins already defined by the law 183/89. Moreover, each basin districts will define the River

Basin Management Plan, which will include the driver, pressure and impact analysis, monitoring and classification of water bodies, economic analysis of water uses. In order to reach the goals, asked by the Directive, all the process must involve the public participation which can generally be defined as allowing people to influence the outcome of plan and working process.

Italy has been involved in the WFD Common Implementation Strategy working actively in several Working Groups and in the pilot river basins testing exercise .

4.1. Taking into account of the environmental objectives in the water policies

Water quantitative protection and water resources management are closely linked to qualitative aspects. The achievement of the objectives for a good ecological status would be very difficult or nearly impossible without properly considering quantitative aspects. On one hand, quantitative actions are essential in order to guarantee ecosystems (typical habitats, dilution, prevention of extreme situations) and on the other hand, pollution diminishes available resources creating imbalances within the hydrological cycle and causing conditions of water stress. But in term of compliance regimes, the good quantitative status only concerns groundwater bodies. In this sense, an integrated protection of water resources is needed to achieve the good ecological status. WFD implementation will be probably introduce the need of extra efforts in river basins management, especially in water scarce Regions. As already anticipated in chapter 2, the delay of the Italian government in transposing the European Directives and updating the national legislation has caused the overlap with the implementation of the new and very important Water Framework Directive 2000/60. For this reason, since 1999 by the Legislative. Decree 152/99, Italy has anticipated most of innovative aspects of the WFD. Among these innovative aspects, there are the environmental objectives for all water bodies. According to the 152/99, within 2008 all water bodies must reach the and within 2016 all water bodies must reach the environmental state of “good” quality. Respectively, it means that all the biological elements of a water body diverge moderately from the ones which usually represent the associated ecotype; the environmental state of quality of “good” means that the biological elements of a water body show just little level of alteration caused by the human impact and they diverge slightly from the ones which usually represent the associated ecotype.

In box 9 an example of reclamation of the wetland of “Torre Guaceto Reserve” is shown according to the aim of taking into account the natural water needs for the ecosystems.

Box 9

Reuse of effluents from the Carovigno Treatment Plant

The project is located close to “Torre Guaceto Reserve”. The reserve is a wetland of international interest being included into the Ramsar Convention, being a Special Protection Area (79/409/EC Directive) as well as a marine reserve and Site of Community Importance (92/43/EC Directive).

The extensive agricultural activity represents one of the major components of the local economy. The agricultural production is oriented to water intensive crops and consequently to a high water demand. The agricultural area included in the reserve represents approximately 864 ha (78%) and the naturalistic area 250 ha (22%).

The inadequate management of the aquifer, with a consequent over-abstraction, is the principal cause of the environmental deterioration affecting the “Wetland” of “Torre Guaceto Reserve”. The very high concentration of salt in the groundwater has led to the reduction and even extinction of some very particular and rare macro-invertebrate species.

Carovigno Treatment Plant represents a potential source of non-conventional water which could be used in the agriculture zone in spite of groundwater. The treated effluent is planned to be disposed into a channel which is a “sensitive water body” and so (the advanced treatment processes required are designed to fulfill the limits foreseen by Directive 91/271/CEE.

The annual volume of treated wastewater in the Carovigno Treatment Plant is approximately 3.7 million m³/year, the available volume during the irrigation period is estimated to some 2.8 million m³/year.

The total demand for irrigation water in the “Torre Guaceto Reserve” is estimated to be 0.7 million m³/year, while the estimated total water demand for the environmental rehabilitation of the Natural Reserve is estimated to some 2,9 million m³/year.

In order to reach the required effluent quality, the project foresees additional treatment, and other interventions like rehabilitation/extension of the irrigation network and pumping stations, monitoring systems, storage tanks, emergency marine pipeline for disposal of untreated effluent in case of plant failure etc.

The effluent supplied to the Wetland Area will be conveyed into a disposal area with an overland flow treatment technique, using vegetative biotypes like *Phragmites australis*. The total estimated cost of about 1.8 million € has a very high cost – effectiveness ratio, taking into consideration the benefits from the environmental rehabilitation of the Natural Reserve Area.

Expected effects of the project :

- reduction of water abstraction from stressed aquifers;
- limitation of saltwater intrusion into the wetland;
- habitat protection;
- recharge of wetland through a controlled effluent disposal;
- reduction of the nutrients load on the Sensitive Area.

4.2. Taking into account of water demand management (WDM) in the water policies

The evolution of the Italian legislation on water shows Italian Government’s strong effort aiming at pushing all stakeholders towards a more efficient water policy taking into account the water demand management. The main tools which help and direct this policy are legislation, as the already mentioned

Ministry decree June 12th 2003 n. 185 which establishes the technical requirement for treated wastewater reuse, but also economic helping, as the financially supported tariffs promoted by the mentioned legislation for the reuse of the recovered water. Moreover, the European Directives have given a huge impulse on the water demand management; certainly the 2000/60 is the one that better has outlined the route which has to be gone along. By the draft report art.5 requested by the Water Framework Directive, the majority of the National Water Basin Authorities (eg Tevere, Po, Cecina) have already carried out an economic analysis of river basin with the principle aim of assessing the value of water in the main water-demanding sectors (irrigation, industrial use, household use, hydropower use). The economic analysis is a fundamental part of the river basin plans. As the WFD is an important opportunity to render river basin planning and management an important measure for the concerted development of sustainable policies, the draft report art. 5 have given a concrete chance to face it out by a deep monitoring and knowledge of the territory, also discovering which are the main concerns of the basins, but it is too early to imagine possible trends for water demand by 2015/2025.

For the majority of the Water Basin Authorities it has been realized that a problematic issue is the non-authorized withdrawal of groundwater. Another issue that seems hard to deal with concerns local realities, where different territorial actors, such as hydropower plant managers and farmers, are continuously in conflict with each other. In fact we cannot solve these problems exclusively by supporting control policies and imposing sanctions. For this reason the most efficacious way to solve this problem appears to be the participation in the pre-adoption phase of the river basin plan, as it has already experimented in the Tevere Basin.

Finally, it is possible to say that Water Demand Management (WDM) is a combination of measures to motivate people and their activities to regulate the amount, manner and price in which they access, use and dispose of water, thus alleviating pressure on freshwater supplies and protecting quality. As freshwater supplies dwindle, conservation and efficient use, of both quantity and quality of water, become imperative. Water demand can be managed through a number of wide-ranging measures and practices: non financial (e.g. awareness, technology) or financial (e.g. incentives, pricing), mandatory (e.g. regulations) or optional (e.g. market systems).

In the following box 10 a case study shows some of the above-mentioned water policies elements; moreover a good example was the 2003 drought in northern Italy .

During the summer of 2003 a severe drought occurred in the Po River Basin causing serious critical situations determined by:

- low snow precipitation during winter period
- particularly high temperatures, above zero, causing premature snow melt
- prolonged periods of insufficient precipitation, aquifers and reservoirs insufficiently replenished

For the first time on that occasion a solution has been found to face a situation, which due to its severity and duration can be considered almost an emergency, through ordinary means, and through a voluntary commitment from all the interested economic players (many of whom have mutually conflicting interests),. Without using emergency powers or derogations typical of Civil Protection instruments, the Po River Basin Authority creates a shared path, in which on one hand there is an equilibrium in the expectations of the local stakeholders and on the other hand the attributes and the competence of the institutions are well established.

Box 10

Basilicata Region

Experience and Instruments for the Prevention of water shortage and hydraulic risk

BRIEF DESCRIPTION

In Basilicata Region (Southern Italy) there is a system of water resources governance for the prevention of water crisis risk, which provides for the active and synergistic participation of all subjects involved in the water sector programming, planning and management activities: Basilicata Region, Interregional River Basin Authority of Basilicata, Authority of Optimal Territorial Ambit of Basilicata (AATO), the Administrator of the Integrated Water Service (Acquedotto Lucano S.p.A.) and Acqua S.p.A (company for raw water transfer) but that has seen the active involvement of the Basilicata Universities and Research Institutions, as well as some different categories of users.

A real "Basilicata System" has been constituted for water resources government and management. In line with the European Community Laws and Italian water sector tools the "Basilicata System" aims at realizing the best planning, programming and management of the natural systems and the appropriate infrastructures to develop the water distribution service for various uses (drinking water, industrial, for productive and irrigation activities, for tourism etc.) through an intense comparison and a logical organized context, shared and supported by all above-mentioned public bodies and corporations.

Such aim arranges a sustainable and jointly liable use of the water resources between the different users in Basilicata and Puglia Regions, also composing the existing conflicts on the water uses in the area. Moreover the "Basilicata System" allows the water resources governance in a region subject to water crises.

Basilicata is rich of water resources but it represents an area subject to water crisis and desertification phenomena, connected to more and more frequent extreme climatic events involving a precarious situation regarding water supplying for civil uses, for agriculture and other productive activities. The drop in rainfall in autumn and winter does not allow an effective filling of dams, limiting the water availabilities in the Basilicata and Puglia Regions that depends nearly in exclusive way from the accumulated resources in the dams localized in Basilicata.

In this area there is an economic risk connected to water crisis risk, because the water deficiency penalizes the prevailing economic activities in the area (agriculture, tourism, tertiary sector, and moderately industry). In addition the risk of water crisis in Basilicata is connected to the complex water infrastructure system realized for storage and distribution of waters in Basilicata and Puglia Regions. In order to avoid water and economic crisis situations it has been associated to the planning of the measures/actions a stacked tariff system, that will provide, in the next future, for facilitated rates in favour of lower social class.

TECHNICAL TOOLS

Among the most important actions for prevention of water crisis risk there is the realization of a programme for the control of numerous water losses in various sites of Basilicata Region. The most considerable activity is the rational functioning of Potenza City water net and the predisposition of a modern remote control system that enables a real, direct and constant check of the water flows during the distribution. Moreover, the advanced programs involve the important plan "Complete Evaluation of civil, industrial, agricultural volumes and users and measurement of water supplied" (approved by CIPE in date 20/12/2004), finalized to the realization and the empowerment of the civil, agricultural and industrial users monitoring system in Basilicata for a better planning and management of the same resources.

This monitoring and remote control system, whose realization has got off a good start, represents an

effective and efficient method for the continuous monitoring of water resources and its uses. It also induces a greater managerial efficiency of the water systems with the aim of a corrected water resources planning and management. It constitutes, moreover, an early warning system about the risks connected to water resources (*deficit*) and therefore a tool for water crisis prevention in the Basilicata. In a such context, the General Director's Environment Office and the Ministry of Infrastructures - Nets Direction are putting into action all procedures for the "Computer Science Portal" realization. This system allows to search information about natural water springs and rivers and their capacities in order to define water concession and derivation procedures.

Remarkable importance has the program of actions counted in Law 443/2001(*Water Resources Objective Law*) whose realization has allowed to modify structurally the water resources supplying and distribution system in Basilicata and its neighbouring regions. The realization of interconnection works between hydraulic system components makes more efficient and flexible the entire system of water pipelines.

ELEMENTS OF GOVERNANCE

The "Basilicata System" for water resources governance aims at ensuring sustainable and jointly liable use of resources among the different users in regional and extra-regional area, through the adoption of suitable planning and programming instruments for the governance of water resources shared between Basilicata and Puglia Regions, such as:

- the Basilicata Water Protection Plan, for the definition and monitoring of surface and ground water bodies quality and availability;
- the River Basin Plan for the Water Budget and Minimum Vital Outflow of Interregional River Basin Authority of Basilicata, finalized to: 1) the determination of the water budget at scale of hydrographic basin and hydrogeological structures; 2) the definition of the river minimum vital outflow, 3) the location of structural and not structural actions for sustainable water resources uses;
- the Ambit Plan and the Paper of Service Quality from the Authority Of Optimum Territorial Ambit of Basilicata (AATO), finalized, the first one, to the planning and programming of the interventions for water infrastructures, to the drafting of the Economic-financial Plan, to the managerial-organizational model and the tariff plan, and the second one to the protection of the rights of the citizens.

The Basilicata water resources are subject to conspicuous transfers towards Puglia Region, therefore in addition to the above-mentioned planning and programming instruments, particular importance for water resources governance has the Agreement on the Shared Water Resources (Law 36/94) signed in 1999 by the Basilicata Region, the Puglia Region and the Ministry of the Public Works (currently Ministry of Infrastructures), for water transfer regulation, assuring a sustainable use among the inhabitants of the two regions.

The Agreement represents, in Italy, the first organized and, at the moment, the only shape of regional reciprocity, a concrete application of jointly liable federalism for the use of a limited and precious resource. It represents a very innovative institutional instrument in order to bring back the traditional formulations of southern Italy "water politics" in a legal regimen of co-decision, overcoming the anachronistic and unjust division between production places and water use places, establishing new methods for the water costs and environmental compensation. The Agreement has resolved old conflicts and incomprehension and, recently through the definition of the raw water rate, it has been finally established a suitable and reliable method in order to allocate costs among Puglia users. Before this Agreement, the Basilicata Region supported high costs in order to store, to distribute, to conserve and preserve water for future generations.

Moreover, using water tariff proceeds, it has been possible: to realize environmental maintenance and conservation works of the regional territory; to support, without increases for the Basilicata budget, energetic costs necessary for supplying water to the neighbouring regions. Finally it will be possible to carry out territorial re-balance actions in favour of sites and of communities supporting the burden of water supplying, having been deprived of portions of territories in order to ensure water storage.

The synergistic action between Basilicata Region, Interregional Water Board Authority of Basilicata, Authority of Optimum Territorial Ambit of Basilicata, Administrator of the Integrated Water Service (Acquedotto Lucano public limited company. and Acqua PLC. corporation) has carried programming and realization of important and necessary works to ensure the flexibility of Basilicata water infrastructure system, in order to prevent or to face situations of water deficit, as well as to monitor water resources. The Basilicata System for the water resources governance has involved moreover the development of a water service "tariff model", that includes facilities for the

lower social class and important environmental compensation attributes. Moreover Basilicata provided itself in 1996 with the Regional Law No.5, modified in 2005 (Regional Law No 5) for water concessions regulation.

RELEVANCE FOR INTERNATIONAL POLICIES OF COOPERATION

The Basilicata System for water resources governance aims to ensure a sustainable and jointly liable use of resources between the different users in the Basilicata Region, but also between its neighbouring regions. It also allows “the governance” of water resources uses in a complex area for physical and socio-economic characteristics, subject to water crisis phenomena in relation to taking place and drawing out of dry season.

For its characteristics, the “Basilicata System” for water resources governance can be considered a "model" to be experimented in countries characterized by analogous problems in the Mediterranean basin (countries along the southern and eastern sides of the Mediterranean basin). In this area which is recurrently subject to water deficit in relation to climatic conditions, important hydraulics infrastructures are essential for water resources storage and distribution in order to prevent hard social conflicts for the water resources sharing among different users and neighbouring countries.

5. Taking into account of water demand management in the cooperation and development aid policies

Water represents one of the main concerns of the Italian foreign policy, as shown by the significant commitments undertaken by Italy Johannesburg Plan of Action, later reinforced on the occasion of the last World Water Forums and the G8 held in Evian and by the adoption of the Mediterranean Strategy for Sustainable Development and by the signature of the Il Cairo Declaration at the last Euro-Mediterranean Ministerial Conference on the Environment.

Since at international scale water resource policies embody a milestone of human and sustainable development, Italy has been engaged in the ambitious effort of promoting a coherent approach for a sustainable management of the water resource.

Most of the ongoing projects on water resources financed by the Italian Ministry for the Environment and Territory are devoted to the Mediterranean area, both for the Northern Mediterranean countries and for the Southern and Eastern Mediterranean countries.

They are focused on different subjects and aspects of the water resources but, in all of them, it is possible to recognise an approach through the sustainable development: from a better management of the water resource in agriculture, to a right increase of the water availability, or a good management of the river basins taking into account both the ecological and environmental aspects and the human aspects. The involved countries are: Algeria, Egypt, Bosnia & Herzegovina, Albania, Serbia & Montenegro, Croatia, Slovenia, Fyr of Macedonia, Cyprus, Greece, Israel (table 23 in appendix 3)

Moreover, the Italian Ministry of Foreign Affairs finances several projects on water resources, in the Mediterranean area, devoted to the implementation of water supply and sanitation, to the river basins protection and to integrated water demand management. The involved countries are Algeria, Egypt,

Lebanon, Jordan, Morocco, Syria, Palestinian Territories, Tunisia, Albania, Croatia, Macedonia, Serbia & Montenegro (table 24 in appendix 3)

Capacity building, improvement of dialogue among stakeholders, at national and local level, and between technical and political institutions, difficulties in collecting data and information necessary to plan programmes and projects which are beheld in terms of ensuring their long term sustainability and availability of financial resources: these are the main obstacles encountered. But they have also proved to be success factors, once these difficulties have been overcome; of course, in addition to the achievement of the goals, objectives and expected outputs fixed in the financed projects.

Some examples of best practises carried on by the Italian Ministry for the Environment are reported in the following boxes (box 11 and box 12).

Box 11

EGYPTIAN – ITALIAN ENVIRONMENTAL BILATERAL COOPERATION PROGRAMME

INNOVATIVE MEANS OF INCREASING WATER RESOURCES (NORTH SINAI)

Partners:

Italian Ministry for the Environment (MATTM), Egyptian Environmental Affairs Agency (EEAA), Ministry of Defence (MoD), North Sinai Governorate.

- *Region Affected:* village of Bir Gifgafa, in the North Sinai Governorate
- *One goal:* to relieve water shortage and related problems in Bir Gifgafa
- *Two key items:* groundwater abstraction and desalination

The Need - Good quality water: a scarce resource

The Nile is the main source of water in Egypt supplying about 98% of the country's fresh water needs. Throughout the Nile Valley and Delta water is abstracted directly from the river, its canals or from wells recharged by the river. The water is used to supply irrigation for farmland, drinking water and industrial activities.

In the oasis, along the northern Mediterranean coast and in the Sinai peninsula water is supplied by local groundwater. This groundwater is limited in volume and of poor quality constraining the development of these areas.

Bir Gifgafa is a village located in the North Sinai Governorate. Its 10,000 inhabitants do not have sufficient water to meet their needs. Problems due to lack of water are aggravated by inadequate systems for water distribution and wastewater treatment.

The Project - Build an effective water system

The project "*Innovative Means of Increasing Water Resources*" is part of the Memorandum of Understanding for environmental cooperation signed in 2003 between Italy and Egypt.

The main objective of the project is to relieve water shortage related problems in Bir Gifgafa, through the development of an action plan which will focus on two key items: groundwater abstraction and desalination.

The specific objectives of the project are the following:

- Access of water availability and demand in north Sinai according to requirements socio-economic ;
- Identify renewable/non renewable water resources and develop an integrated model to plan a sustainable policy of water use and reuse in the area;
- Supply the population of Bir Gifgafa with both drinkable desalted and brackish water through the design and the construction of one new well, a new drinking water treatment plant, a new water main and a water distribution network for the village, and the refurbishing of the existing water tower.

In order to achieve these objectives, the following actions will be undertaken within the project:

- Creation of a model for economic and social development by using innovative tools to supply drinking water to deprived areas;
- Technical assistance to upgrade the national development plan providing for Egypt the expansion of the existing communities and the establishment of new settlements in the desert areas outside the Nile Valley;
- Use of innovative methodologies and tools to supply water to desert areas in order to faster new settlements;
- Reuse of treated waste water by means of environmental friendly technologies in order to maximize the benefit of available water;
- Transfer of know-how to the Egyptian technicians through targeted training;
- Preparation of guidelines and a manual on the technology implementation;
- Assessment of the potential of replicating the project in other desert areas of northern Africa;
- Dissemination of the results of the pilot project development by using innovative tools to supply drinking water to deprived areas

In concrete the project will be implemented through the construction of:

- well
- water supplying main
- desalination plant
- dual distribution network (one for the provision of desalinated water for drinking purpose and the other for brackish water for toilets and other uses)

MATTM contribution: 1.250.000 €

Box 12

**EGYPTIAN – ITALIAN ENVIRONMENTAL BILATERAL COOPERATION
PROGRAMME**

“Italian-Egyptian capacity building in the optimization of water networks”

PROJECT TYPE

Water supply and distribution

OBJECTIVE

The project aims at strengthening the capacity of Egyptian utilities to provide high quality water supply services in a sustainable manner. This will be achieved through the transfer and demonstration of advanced methodology to control and manage water losses. The involvement of key stakeholders – water utilities and national authorities responsible for water protection and management – will deepen the cooperation and foster exchange of experience.

BENEFICIARY SUBJECT

The Holding Company for Water and Wastewater of the Arab Republic of Egypt (HCWWW)

PROJECT DESCRIPTION

The goals of the project will be achieved through the following tasks:

1. Project introduction and stakeholder involvement (introductory workshop)
2. Training on best practice on leakage management (class training)
3. Data gathering and assessment
4. Pilot demonstration (training on the job)
5. Presentation of results (final workshop)

PROJECT BENEFITS

The project will result in decrease of water losses in the pilot area and facilitate future reduction of non-revenue water in the water distribution networks of participating utilities.

In addition, the utilities staff will benefit from the transfer of know-how on leakage control and management strategies.

PROJECT DURATION

12 months

PROJECT BUDGET AND FUNDING

- Total budget: 400.000 EUR
- Contribution by the Italian Ministry for the Environment and Territory (MATTM): 300.000 EUR

Contribution by the beneficiary (HCWWW): 100.000 EUR (in kind)

6. Overview and conclusion

In the last century water resource in Italy has progressively abandoned the nature of “free good” to enter the public domain. In addition water is more and more felt as scarce and non-totally renewable resource. Problems of water scarcity and droughts are becoming more severe, involving regions, in central and northern Italy, not usually affected by this kind of problems. For this reason public concern on water resource management is growing fast. This process of development of public rights on water resources has witnessed a substantial acceleration in the last 2 decades, in particular due to the increased role of the EU as a driver of environmental policy and to the regional and international commitments; in fact, the largest part of environmental legislation in Italy can be regarded as a consequence of the implementation of European Directives.

Although the Italian legislative and institutional framework of water policy is now broadly coherent with the rest of Europe, the distance between legislation and a concrete implementation is very large, partly due to the delay in the development of environmental policy, partly because of structural difficulties (e.g. prevalence of non-point impact sources).

While the legislation now explicitly requires full cost recovery for all public water services, the reform of the pricing system and of the regulatory structure is still lagging behind. The delicate issue of access to water at a reasonable price is not definitely solved yet: a significant part of the population, especially in the South, is still relying on insufficient water deliveries; at the same time irrigation remains the largest user of water, and still the demand largely exceeds the available resources.

Moreover, even if water demand management policies seem to have taken a new route, there are still problems to solve. For these questions there is still need of implementation as fragmentation, localism, poor integration, poor level of industrial development, scarce orientation to supply rather than demand management, lack of alternatives to command-and-control regulation, financial weakness must be overcome as soon as possible. Even supposing that public subsidies continue to be necessary for supporting a correct water resources management, the main problem at present seems to look for flexible alternatives, and to use subsidies as a complimentary – not substitutive – financial resource. This means for example the need to develop a “co-financing” mechanism aimed at awarding those efforts best channelled towards planning objectives, rather than continuing with the past tradition of authoritative investment decisions arising from regional plans.

Moreover it is strongly perceived the need to implement the use of modern irrigation techniques like drip irrigation, micro-sprinklers and other water saving devices.

However, substantial research is still required to develop improved irrigation techniques, particularly those adapted for the use of marginal waters, in addition to associated technology transfer activities, which will be essential to further increase irrigation efficiency. There is also a need of determining the socio economic and environmental impacts of these new techniques, and assessing the social and political impacts of diverting agricultural water to municipal and industrial uses.

Furthermore it is important to assure the adequacy of water quality if irrigation water is to be replaced with treated wastewater.

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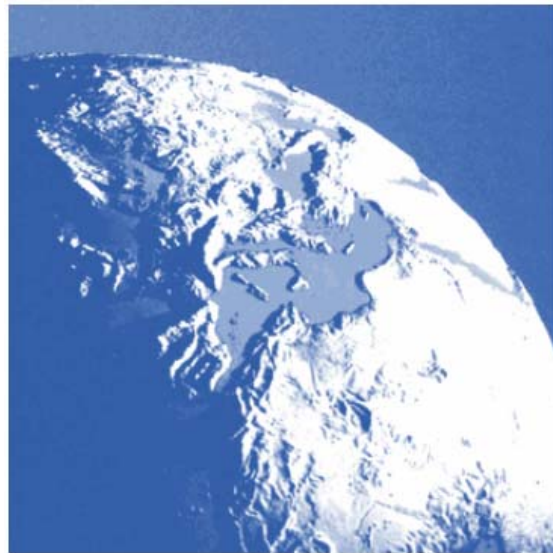
APAT

**Agenzia per la protezione
dell'ambiente e per i servizi tecnici**

MATTM

**Ministero dell'Ambiente e della Tutela del
Territorio e del Mare**

**Mediterranean Strategy
for Sustainable Development
Monitoring progress and promotion of
Water Demand Management Policies**



Italian National Report

APPENDICES

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Appendix 1

Chapter 2. Major changes in the water situation in Italy

Box 1

CHARACTERISATION OF WETLANDS in the Tevere river basin

Application of the “Wetlands horizontal guidance” of 2000/60 Directive

Methodological Approach

The application of the guideline on wetlands in the context of the implementation of the requirements set by Article 5 of the WFD was mainly focused on the identification of wetlands within the Tevere river basin. The identification was carried out with reference to the EC guidance document on wetlands, taking into consideration the following aspects:

1. wetland ecosystems in protected areas;
2. surface water elements functionally significant to the preservation/achievement of good ecological status in the river basin’s water bodies;
3. the interaction between surface waters and groundwater;
4. relationship between surface waters and pressures and impacts analysis in the river basin.

The first aspect (protected areas, point 1) is of secondary relevance for the purpose of the identification exercise because wetland ecosystems in protected areas are already subject to a complex and coordinated set of norms that regulate planning and management and that assure the protection of these ecosystems, for which no further analysis is necessary. The methodology proposed in the guidance document, in the paragraph on wetland identification (chapter 2), was used to identify wetlands described in points 1, 2, and 3.

In the light of these schemes and of the above-mentioned criteria, wetland identification was conducted following a specific methodological approach for each of the following categories of wetlands:

- a) Wetlands related to inland surface waters
- b) Wetlands related to coastal waters and deltas/estuaries
- c) Wetlands directly dependent on groundwater

a) Wetlands related to inland surface waters

The first identification of wetlands examines inland surface water elements, taking into account the following aspects:

1a. functional parts of a water body, such as river and lake riparian hydromorphological quality elements. The identification of these elements as wetlands automatically implies their inclusion within the boundaries of the water body and consequently the application of the Directive also to these elements.

2a. small elements of surface water or torrents that are **not** classified as water bodies or protected areas, but that are hydraulically connected to a water body and that in relation to the pressures/impacts analysis or on the basis of other assessments, contribute to the achievement of good ecological status in the water body to which they are connected.

3a. other ecosystems that influence water bodies and have the characteristics of wetlands.

The following approach is suggested for the operational identification of these wetland typologies in the Tevere river basin:

Category 1.a

This category is associated to **wetlands comprised in the fluvial and lacustrine zones**, more precisely to the riparian elements comprised in areas inundated by **floods with a period of return of 50 years**.

These areas are identified as wetlands and therefore form an integral part of the water body:

- areas comprised in the above-mentioned zone, characterized by an elevated degree of naturalness and functionality (defined and quantified in accordance with the fluvial functionality index, FFI);
- areas comprised in the above-mentioned zone, that are not characterised by an elevated degree of naturalness and functionality, but that may be of strategic importance to the preservation/achievement of good ecological status in the water body, and that may therefore be preliminarily indicated in the list of supplementary measures, with reference to the recreation and restoration of wetland areas (Annex VI, part B, point vii), within the programme of measures.

Category 2.a

This category refers to **wetlands outside the fluvial and lacustrine zones**, but connected to the river basin's water bodies. For the identification of this category of wetlands we must take into account both the hydromorphological characteristics (in accordance with the description contained in paragraph 2.1 of the guidance document, "**what is a wetland**") and the functional relationship with the associated water bodies, taking into consideration the pressures/impacts analysis (paragraph 6.2, table 10 "**relationships between DPI and wetlands**").

In the first instance, (taking account of the above-mentioned considerations), the following elements were examined:

- *Torrents and ditches* considered during testing of the Horizontal Guidance on the Identification of Water Bodies (HGIWB), that were not identified as separate water bodies, because they were not regarded as "significant" (for example, due to a very fluctuating flow regime) or that do not fall under the "types" defined in accordance with Annex II of the WFD.
- *Small lake surface water elements* considered during testing of the HGIWB, that were not regarded as separate "water bodies" because they were not considered as "significant" elements of surface water (for example, because they are too shallow or because of their temporary characteristic) or that do not fall under the "types" defined in accordance with Annex II of the WFD.

Category 3.a

Contrary to other categories, there is no explicit reference to this wetland category in the WFD. The guidance document refers to wetlands comprised in the water body's drainage area. This case regards wetlands that do not form part of a riparian area and do not constitute hydromorphological quality elements of a water body, but directly or indirectly influence the water body's qualitative status. These wetland areas comprise water-meadows, wet meadows, abandoned fields or also artificial structures such as constructed wetlands for wastewater treatment.

- The identification of these elements is very difficult in this phase and it is limited to listing very extended constructed wetlands.

b) Wetlands related to coastal waters and deltas/estuaries

The identification of coastal wetlands is carried out examining coastal water bodies characterised by biological quality elements, including taxa and communities traditionally associated to the wetland typology, in accordance with the above-mentioned description. In particular, wetlands can be identified within the following two categories:

Category 1b

Elements of coastal or transitional water, that have already been identified as water bodies during the application of the guidance document on “Water Bodies” (HGIWB), that have the characteristics of wetlands.

Category 2b

Coastal or transitional wetlands, that were not considered as coastal or transitional water bodies during the application of the guidance document on “Water Bodies” (HGIWB), but have important characteristics and functions for the achievement/preservation of the quality status of water bodies (for example, Castel Porziano).

c) Wetlands directly dependent on groundwater

Wetlands also comprise surface water elements, that are not part of and are not connected to surface water bodies, but depend on groundwater. The following typologies are proposed:

Category 1c

Endoreic basins (for example, Colfiorito, Norcia, Castelluccio).

Category 2c

Wetlands associated to springs (characterized by a riverbed – for example, Ninfa).

Category 3c

Aquifer outcrops (for example: dune lakes, coastal marshes).

Category 4c

Intra-calderic volcanic lakes.

Category 5c

Small elements of surface water in volcanic canyons (canyons with macrophyte vegetation).

Category 6c

Wetlands associated to flysch

The above-mentioned approach was started during 1A phase of the testing activity and it led to the first identification of 7 wetlands listed in the following table.

This identification is to be considered as the first step of a long and complex process. An exhaustive identification of the river basin’s wetlands will probably require many years and the

following data and information:

- Literature data and historical maps;
- GIS data for the first localization;
- Field surveys and expert judgement;
- Monitoring data on the essential characteristics of the proposed wetland areas.

Wetland	Wetland Horizontal Guidance Typology	Tevere River Basin Category
Nazzano (Ramsar site - Italian Wetland Inventory 1/LAZ/A/67)	Wetland area forming part of the riparian zone hydromorphological quality element of a river water body	1a
Alviano (oasis - Italian wetland inventory 3/UMB/D/63)	Wetland area forming part of the riparian zone hydromorphological quality element of a river water body	1a
Castelporziano Presidential Reserve (ZPS IT6030084-SIC IT6030027/8)	Ecosystem significantly influencing the quality or quantity of water reaching surface water bodies	2b
Piana Colfiorito (Ramsar zone- Italian Wetland inventory 1/ UMB/A/61)	terrestrial ecosystem directly depending on bodies of groundwater	1c
Marcite di Norcia	terrestrial ecosystem directly depending on bodies of groundwater	1c
Doganella (SIC IT 6030018)	terrestrial ecosystem directly depending on bodies of groundwater	5c
Rascino	terrestrial ecosystem directly depending on bodies of groundwater	1c

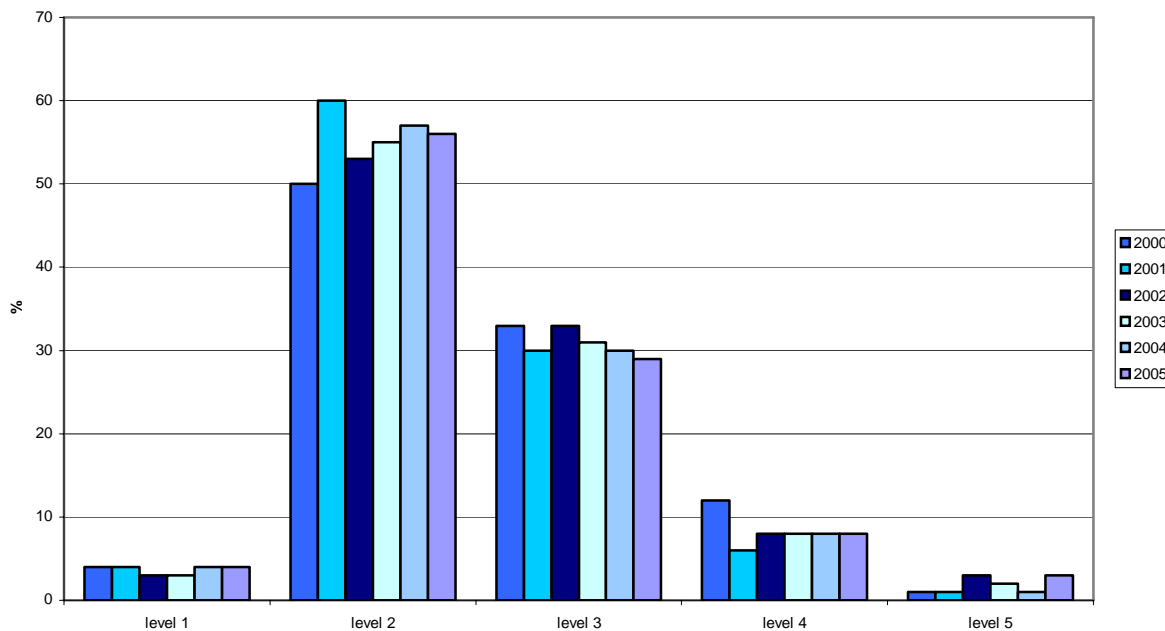
Table 5: Selected limiting values for secondary effluents from wastewater treatment plants according to law n.185/2003

Class	Parameter	Unit	Limiting value
Chemical and Physical parameters	pH		6- 9,5
	Total suspended solids	mg/l	10
	BOD5	mgO2/l	20
	COD	mgO2/l	100
	Total Phosphorus	mg P/l	2
	Total nitrogen	mg N/l	15
	Ammonia	mg NH4/l	2
	Metals (Al, As, Ba, Be, B, Cd, Cr tot., Cr VI, Fe, Mn, Hg, Ni, Pb, Cu, Se, Sn, Tl, V, Zn)	mg/l	From 0,001 (Tl, Hg) to 3 (Sn)
	Chloride	mg/l	250
	Sulphate	mg/l	500
	Mineral oils	mg/l	0,05
	Phenols tot.	mg/l	0,1
	Chlorinated solvents tot	mg/l	0,01
	Aromatic organic solv	mg/l	0,04
	Benzene	mg/l	0,001
	Surfactants tot.	mg/l	0,5
	Trihaloalkanes tot	mg/l	0,03
Chlorinated pesticides (single molecules)	mg/l	0,0001	
Phosphorated pesticides (single molecule)	mg/l	0,0001	
Others			
Microbiological parameters	<i>Escherichia coli</i>	UFC/100ml	10 (80% of samples) 100 (max single value)
	Salmonella		0

Table 6: Regional distribution and use typology for waste water treatment plants according to the law n.185/2003

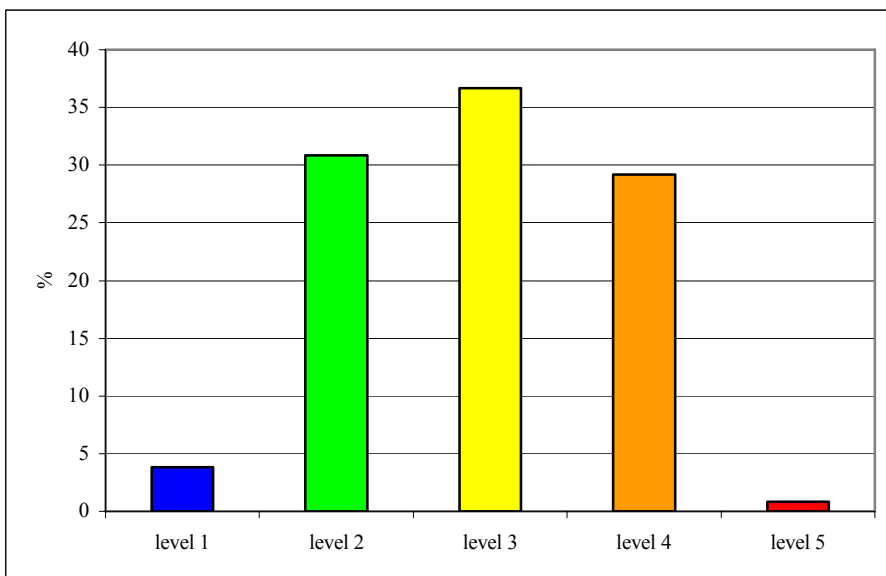
Region/Province	N. of waste water treatment plants	Foreseen use typology
Bozen	3	Agriculture
	2	Industry
Veneto	26	Agriculture
	1	Industry
Friuli Venezia Giulia	1	Agriculture
	1	Industry
Lombardia	41	Agriculture
	4	Industry
Emilia Romagna	24	Agriculture
Liguria	8	Agriculture
	1	Industry
Tuscany	19	Agriculture
	12	Industry
Lazio	4	Agriculture
	1	Recreational use
Umbria	5	Agriculture
	1	Industry
	1	Both agriculture and industry
Marche	2	Industry
Abruzzo	31	Both agriculture and industry
Molise	5	Both agriculture and industry
Campania	2	Both agriculture and industry
Basilicata	5	Industry
	2	Agriculture
Puglia	47	Agriculture
	5	Industry
	6	Both agriculture and industry
Sicily	20	Agriculture
	4	Both agriculture and industry
	1	Industry
Total	285	

Figure 2: Percentage distribution of the quality classes of pollution macrodescriptor level of rivers



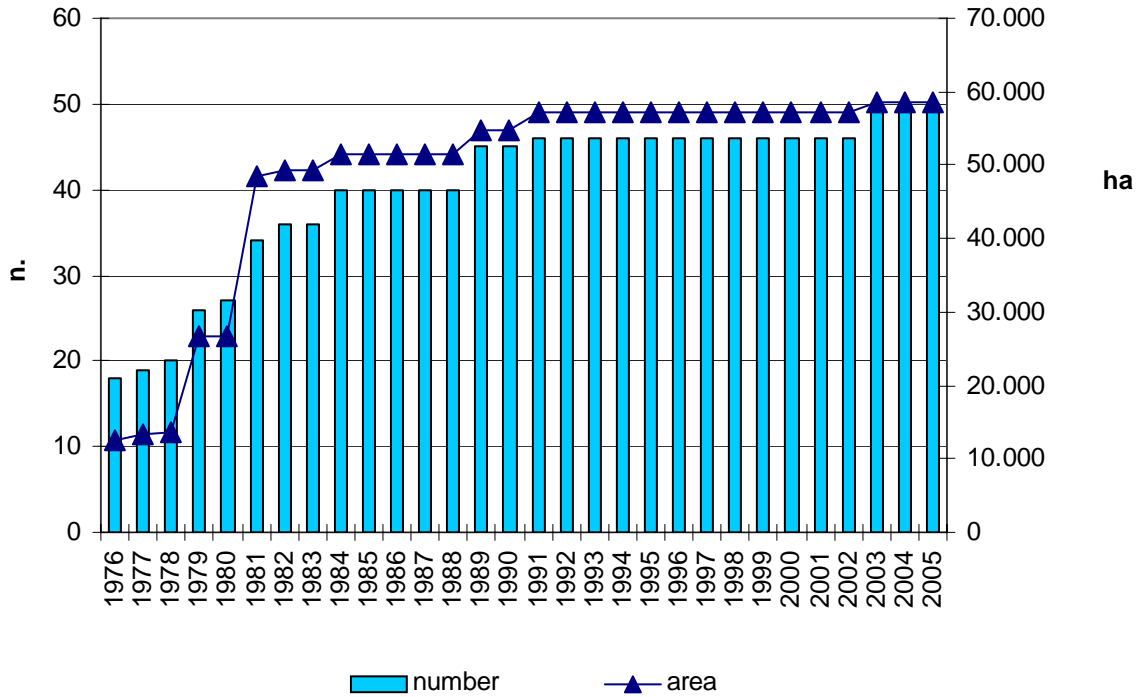
Source: APAT (2006)

Figure 3: Percentage distribution of the stations according to the 5 quality classes of the Ecological State of Lakes index (2005)



Source: APAT (2006)

Figure 4: Number and area of Ramsar wetlands since 1975



Source: APAT (2006)

Table 13: Level of pollution from macrodescriptor calculation

Parameters	Level 1	Level 2	Level 3	Level 4	Level 5
100-DO (% sat.)	≤ 10	≤ 20	≤ 30	≤ 50	> 50
BOD ₅ (O ₂ mg/L)	<2,5	≤4	≤8	≤15	>15
COD (O ₂ mg/L)	<5	≤10	≤15	≤25	>25
NH ₄ (N mg/L)	<0,03	≤0,1	≤0,5	≤1,5	>1,50
NO ₃ (N mg/L)	<0,3	≤1,5	≤5	≤10	>10,0
Total phosphorus (P mg/L)	<0,07	≤0,15	≤0,3	≤0,6	>0,60
<i>Escherichia coli</i> (UFC/100 mL)	<100	≤1000	≤5000	≤20000	>20.000
Score to give for each parameter (75° percentile of the year)	80	40	20	10	5
Pollution macrodescriptor level	480-560	240-475	120-235	60-115	<60
Quality level and colour given	High	Good	Moderate	Poor	Bad

Source: Legislative Decree 152/99

Table 14: level of quality of the ground waters monitoring stations (2000-2005)

Level of quality	2000-2001		2002		2003		2004		2005	
	n.	%	n.	%	n.	%	n.	%	n.	%
Level 1	171	8,5	200	6,4	188	6,8	167	6,1	148	5,7
Level 2	833	41,2	1.249	39,8	836	30,2	895	32,6	790	30,2
Level 3	256	12,7	376	12,0	364	13,2	400	14,5	384	14,7
Level 4	424	21,0	735	23,4	594	21,5	649	23,6	646	24,7
Level 0	338	16,7	581	18,5	786	28,4	637	23,2	647	24,7
TOTAL	2.022	100,0	3.141	100,0	2.768	100,0	2.748	100,0	2.615	100,0

Source: APAT (2006)

Appendix 2

Chapter 3. Improve efficiency in the sectors of activity using the water demand management policies

Figure 5: The map of the ATO - Subdivision of Italy in optimal management areas



Source: Committee for the Vigilance on the Use of the Water Resources, Year 2003 published by ISTAT-System of Surveyings on water(2004)

So

Total ATO	93
Installation Authority of Ambit	87
Infrastructural recognitions effectuated	84
Reliance management of the Integrated Water Service	55*

Source: Relation anniversary to the Parliament on the Status of the Water Services Year 2004, Committee for the Vigilance on the Use of the Water Resources (Rome, December 2005)

* Data supplied by the Committee for the Vigilance on the Use of the Water Resources

Optimal Territorial Ambits(ATO)

Code	Name	Settled Authority of Ambit	Infra Structural recognitions	Reliance management of I W S*	Code	Name	Installation Authority of Ambit	Infra structural recognitions	Reliance management of the IWS*
1	ATO 6 Alessandrino	yes	yes	yes	48	ATO 2 Basso Valdarno	yes	yes	yes
2	ATO 5 Astigiano, Monferrato	yes	yes	yes	49	ATO 3 Medio Valdarno	yes	yes	yes
3	ATO 2 Biellese, Vercellese, Casalese	yes	yes	no	50	ATO 6 Ombrone	yes	yes	yes
4	ATO 4 Cuneese	yes	yes	no	51	ATO 5 Toscana Costa	yes	yes	yes
5	ATO 3 Torinese	yes	yes	yes	52	ATO 1 Toscana Nord	yes	yes	yes
6	ATO 1 Verbano, Cusio, Ossola, Pianura Novarese	no	yes	no	53	ATO 1 Perugia	yes	yes	yes
7	ATO UNICO Val d'Aosta I	yes	yes	no	54	ATO 2 Terni	yes	yes	yes
8	ATO BG Bergamo	yes	yes	yes	55	ATO 3 Foligno	yes	yes	yes
9	ATO BS Brescia	yes	yes	no	56	ATO 2 Marche Centro - Ancona	yes	yes	yes
10	ATO CdM Milano	yes	yes	yes	57	ATO 3 Marche Centro - Macerata	yes	yes	yes
11	ATO CO Como	yes	yes	no	58	ATO 1 Marche Nord, Pesaro Urbino	yes	yes	no
12	ATO CR Cremona	yes	yes	no	59	ATO 4 Marche Sud - A. P. - Macer.	yes	yes	yes

13	ATO LC Lecco	yes	no	no	60	ATO 5 Marche Sud - Ascoli Piceno	yes	yes	yes
14	ATO LO Lodi	yes	yes	no	61	ATO 3 Lazio Centrale - Rieti	yes	yes	no
15	ATO MN Mantova	yes	yes	no	62	ATO 2 Lazio Centrale - Roma	yes	yes	yes
16	ATO MI Milano	yes	yes	yes	63	ATO 5 Lazio Mer.- Frosinone	yes	yes	yes
17	ATO PV Pavia	yes	yes	No	64	ATO 4 Lazio Meridionale - Latina	yes	yes	yes
18	ATO SO Sondrio	yes	yes	No	65	ATO 1 Lazio Nord - Viterbo	yes	yes	yes
19	ATO VA Varese	yes	no	no	66	ATO 1 Aquilano	yes	yes	yes
20	Bolzano- Bozen (a)	no	no	No	67	ATO 2 Marsicano	yes	yes	yes
21	Trento (a)	no	no	No	68	ATO 3 Peligno Alto Sangro	yes	yes	yes
22	ATO AV A.Veneto	yes	yes	yes	69	ATO 4 Pescarese	yes	yes	yes
23	ATO B Bacchiglione	yes	yes	yes	70	ATO 5 Teramano	yes	yes	yes
24	ATO BR Brenta	yes	yes	No	71	ATO 6 Chietino	yes	yes	yes
25	ATO LV I. Venezia	yes	yes	No	72	ATO UNICO Molise	yes	yes	no
26	ATO P Polesine	yes	yes	yes	73	ATO CI Calore Irpino	yes	yes	no
27	ATO VC V.Chiampo	yes	yes	yes	74	ATO NV Napoli Volturno	yes	yes	no
28	ATO VO Veneto Or.	yes	yes	No	75	ATO SV Sarnese Vesuviano	yes	yes	yes
29	ATO V Veronese	yes	yes	no	76	ATO S Sele	yes	yes	yes
30	ATO CEN Centrale	no	no	no	77	ATO UNICO Puglia	yes	no	yes
31	ATO OCC Occid.	no	no	no	78	ATO UNICO Basilicata	yes	yes	yes
32	ATO ORGO Orientale- Gorizia	yes	yes	yes	79	ATO 1 Cosenza	yes	yes	yes
33	ATO ORTS Orientale- Triestino	no	no	no	80	ATO 2 Catanzaro	yes	yes	no
34	ATO GE Genova	yes	yes	yes	81	ATO 3 Crotone	yes	yes	no
35	ATO IM Imperia	yes	yes	No	82	ATO 4 Vibo Valentia	yes	yes	no
36	ATO SP La Spezia	yes	yes	No	83	ATO 5 Reggio Calabria	yes	yes	yes
37	ATO SV Savona	yes	yes	no	84	ATO 7 Agrigento	yes	yes	yes

38	ATO 5 Bologna	yes	yes	yes	85	ATO 8 Caltanissetta	yes	yes	yes
39	ATO 6 Ferrara		yes	yes	86	ATO 2 Catania	yes	yes	no
40	ATO 8 Forli-Cesena	yes	no	yes	87	ATO 6 Enna	yes	yes	yes
41	ATO 4 Modena	yes	yes	yes	88	ATO 3 Messina	yes	yes	no
42	ATO 2 Parma	yes	yes	yes	89	ATO 1 Palermo	yes	yes	yes
43	ATO 1 Piacenza	yes	yes	yes	90	ATO 5 Ragusa	yes	yes	No
44	ATO 7 Ravenna	yes	yes	yes	91	ATO 4 Siracusa	yes	yes	No
45	ATO 3 R.Emilia	yes	yes	yes	92	ATO 9 Trapani	yes	yes	No
46	ATO 9 Rimini	yes	yes	yes	93	ATO UNICO Sardegna	yes	yes	yes
47	ATO 4 A.Valdarno	yes	yes	yes					

Source: *Committee for the Vigilance on the Use of the Water Resources, Year 2003 published by ISTAT-System of Surveyings on water(2004); Relation anniversary to the Parliament on the Status of the Water Services Year 2004, Committee for the Vigilance on the Use of the Water Resources(Rome, December 2005). * Data supplied by the Committee for the Vigilance on the Use of the Water Resources.*

(a)The Constitutional Court has declared the constitutional illegitimacy of article 8 (territorial Organization of the water service integrated) codicils 1, 2, 3, 4 and 5 of law 36/1994, for the part in which it extends to the province independent of Trento and Bolzano, with sentence of the 7.12.1994, n. 412.

Box 2

Number of rural towns and territory equipped with a water efficiency plan

Case Study

Integrated water management approaches on supply side measures in Emilia Romagna Region

Water conservation and water demand management in Emilia-Romagna is a good case study to illustrate integrated water management approach. Emilia-Romagna region (44° latitude) is situated in northern Italy in the valley of the Po river, bounded by Apennine mountains to the south and the Adriatic Sea to the east. The climatic conditions of the region are related to the climatic general conditions of the Po valley (surrounded by the Alps and the Apennine) and are mostly influenced by the mountains and the sea, leading to a high spatial variability of the precipitation fields. For the region, but also for the whole Mediterranean zone, the water uses for irrigation are generally predominant. In December 2005, the Regional Legislative Assembly approved the Regional Water Protection Plan anticipating the Directive 2000/60 somehow. The “Water Saving and Conservation Programme” is an integral part of the Water Protection Plan. The Region, together with Basin Authorities, has established the Plan objectives for each drainage basin with reference to the WFD. By 2016, every significant surface and ground water body must reach the “good” ecological quality status. In order to assure the fulfilment of this objective, each classified surface water body, or a portion of it, must acquire at least the requisites of “sufficient” status by 31st December 2008. For quantitative aspects, priority objectives are eliminating water deficit in groundwater and maintaining a minimum flow in rivers.

WATER SAVING AND CONSERVATION PROGRAM

The structure of such a program is presented in the following figure.

In Emilia-Romagna region, the withdrawals (in million m³) in the 70's, the 80's and in year 2000 were estimated as presented in the following tables.

Total withdrawals in the middle of the 70's

	Civil Uses	Industrial Uses	Agriculture Uses	Total
Groundwater	350	240	150	740
Surface water	negligible	290	852	1142
Total	350	530	1002	1882

Total withdrawals in the middle of the 80's

	Civil Uses	Industrial Uses	Agriculture Uses	Total
Groundwater	310	227	193	730
Surface water	170	337	681	1188
Total	480	564	874	1918

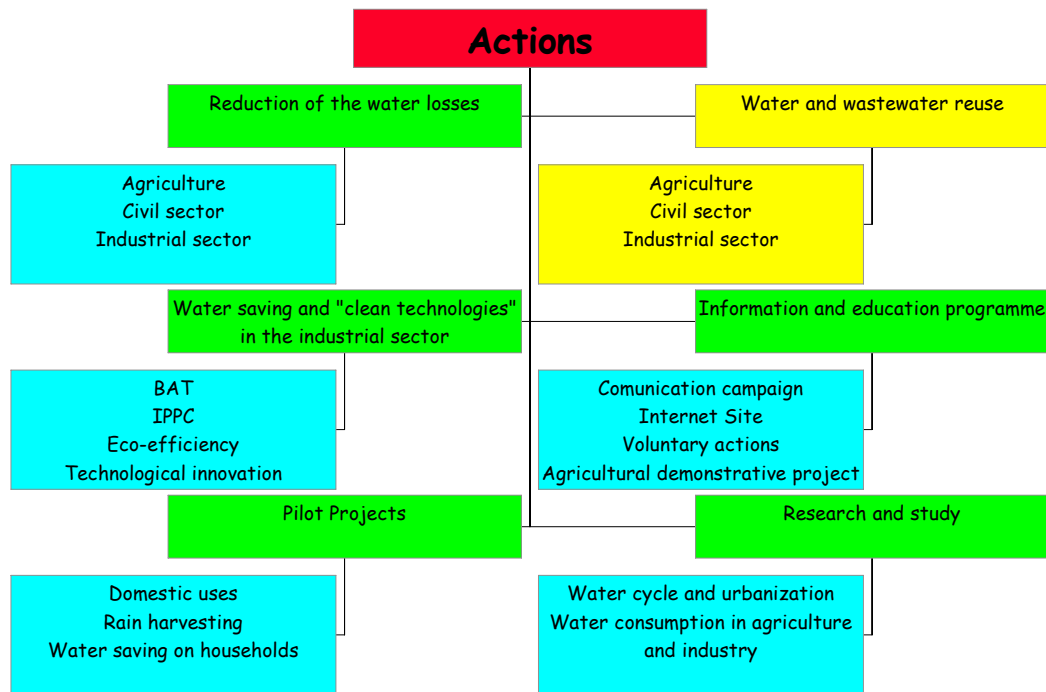
Total withdrawals in the year 2000

	Civil Uses	Industrial Uses	Agriculture Uses	Total
Groundwater	282	171	222	675
Surface water	205	62	1183	1450
Total	487	233	1405	2125

There is a modest increase of the total withdrawals, with a strong replacement from the industrial uses to the irrigation uses and, partially, to the civil uses. An important decrease in the groundwater withdrawals is observed. It is also interesting to note that the civil withdrawals are stable since the 80's. The increase in surface water withdrawals depends on the regional policies developed to answer the subsidence problems posed by the unsustainable uses of groundwater in the south-eastern part of the region (Bologna, Ravenna and the coastal zone), using a canal (Canale Emiliano Romagnolo, CER), which can take about 60 m³/sec from the Po river for agricultural uses, the Ridracoli Dam builded at the end of the 80's for civil uses and a stronger regulation of groundwater withdrawals. Nowadays the groundwater annual deficit is estimated to be around 25 Mm³/y, with the worst problems in Bologna and also in Parma. Considering the surface water, the estimated deficit due to the future application of the Minimum Flow (MF) is around 47 10⁶ m³/y. The average regional consumption for domestic uses is 170 l/capita/day (l/c/d). The estimated overall (real and apparent) leakage from the civil networks is 123 10⁶ m³/y, which means about 26 % of the civil withdrawals.

The application of MF is the most demanding task. The need to keep a higher volume of water in the rivers impacts the actual use of resources with particular significance during summer when the water flow is low while the water demand is at the highest level. In most of the cases, it is needed to revise "historical" water withdrawal, that were already present in the last centuries for irrigation and old mills, and in the 20th century for drinking purposes. The level of the conflicts is therefore pretty high.

The regional strategy is based on a twin track approach and, considering the regional situation and water balance, is firstly based on the development of new regional policies for water conservation and the demand management, not forgetting the infrastructural development where necessary (for instance the local connexions with the Canale Emiliano Romagnolo). The Conservation Program also includes a need to define a Regional Drought Contingency Programme. The main Conservation Program actions are as shown in figure below.



Water saving and conservation program.

WATER AND ENERGY SAVING PROGRAM

Energy production and use are responsible for the bulk of greenhouse gas emissions. Europe has committed itself in the Kyoto Protocol to reduce those emissions which come from fossil fuels burning, mainly coal, oil and gas. In its 2005 Green Paper on energy efficiency “Doing more with less”, the European Commission set out a strategy to improve energy efficiency and to encourage greater use of new, renewable sources of energy. The total final energy consumption in the EU in 1997 was about 930 Mtoe. A simplified breakdown of this demand shows the importance of buildings in this context : 40,7 % of total energy demand is used in the residential and tertiary sectors, most of it for building-related energy services. Space heating is by far the largest energy end-use of households in member states (57 %), followed by water heating (25 %). The planned water savings in Emilia-Romagna will directly bring an energy saving for the domestic water heating of about 12 %, which means 3 % of all the energy needed in the residential sector (2,7 Mtoe/year in Emilia-Romagna region), which is about 1/6 of Kyoto commitment in the residential sector of the region.

RESULTS OF THE REGIONAL CONSERVATION PLANNING

The demand scenarios “business as usual” show an 8 % population growth for civil water uses, stability in the unitary consumption and a “natural” reduction of water losses (26 to 20 %). The industry is

declining since the 70's. For agriculture, irrigated surface is still growing, but technological efficiency at the field is increasing with an almost stable demand (no clear indication from CAP). With the above conservation measures and assumptions, which must lead to a reduction of domestic consumption of 170 l/capita/day (l/c/d) to 150 l/c/d by 2016, plan measures would allow, in 2016, groundwater abstraction levels essentially depending on recharge capacity, also enabling to progressively offset current piezometric anomalies. As for surface waters, critical aspects are linked to irrigation uses of Apennine waters ; plan measures will foster resource deficit reduction in view of MF application.

REGIONAL PLAN FOR DROUGHT MANAGEMENT

The plan also outlines the first elements pertaining to the Regional Plan for Drought Management. The report presented by IPCC predicts changes in the regional distribution of precipitations, leading to drought and floods, changes in the occurrence frequency of climatic extreme events, particularly heat events. Climate changes that were observed during the last decades in the region seem to be consistent with the predictions and have social impacts even at a local scale. The Water Regional Plan takes care about those aspects in order to define, for the first time in the Emilia-Romagna region, a Drought Contingency Program at the regional and local scales. Studies realized for the planning, using indicators like Standard Precipitation Index (SPI), showed that the last 15-20 years were years of growing drought. Anyway this specific risk must be afforded as in other sectors (floods, etc) with a planning strategy which shall be implemented after the plan adoption and asking the local actors to define their Contingency Programs following the regional guidelines within 2006.

Appendix 3

Chapter 5. Taking into account of water demand management in the cooperation and development aid policies

Table 23: Ongoing Projects promoted by the MATTM, in the “Water Resources Management” sector

COUNTRY	PROJECT TITLE	PROJECT DESCRIPTION	MATTM CONTRIBUTION
Algeria	Sahara	<p>A set of water related projects are included in the “Sahara project” in order to increase water availability and to fight the process of desertification of the Sahara Region.</p> <p>The “Integrated Water Model” project</p> <p>The “Foggara” project aims to improve the water resources of the traditional underground irrigation channels</p> <p>The “Timimoun” project aims at treating waste water with renewable energy plans (solar mainly) for agriculture use</p> <p>The “Adrar” project aims to identify the best technologies for the reuse of irrigation water and for reforestation.</p>	<p>595.000</p> <p>330.000</p> <p>922.000</p> <p>760.000</p>
Algeria Egypt Eritrea Vietnam Yemen	Water Program for Africa and arid and water scarce zones (WPA)	The main objectives of the program are: to contribute to the achievement of water security in water-stressed environments by providing rural population with fresh water; to satisfy water needs for nature and food production by a more efficient integrated water management; to alleviate poverty and health risks by providing modern water services	1.500.000
Bosnia & Herzegovina, Albania, Serbia & Montenegro, Croatia, Slovenia	ADRICOSM-EXT	The project aims to enable local authorities in developing an integrated river basin management system to couple with the marine coastal area transport, envisaged by the ADRICOSM Project.	Financed by the Ministry of Foreign Affairs and implemented by the IMET

COUNTRY	PROJECT TITLE	PROJECT DESCRIPTION	MATTM CONTRIBUTION
Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Fyr Of Macedonia, Moldova, Romania Serbia & Montenegro	International Workshop on Transboundary Water Management in South-Eastern Europe: The Complementary Roles of the EU Water Framework Directive and the UNECE Water Convention (Belgrade 2 and 3 March 2006)	The workshop is developed under the Work Plan 2004–2006 of the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes. The workshop also endeavours to identify proposals for future joint action to be further developed within the Work Plan 2006–2009 of the UNECE Water Convention and other processes and projects carried out in the region.	30.000
Croatia	NERETVA	The main objective is to ensure environmental restoration and sustainable development of the Neretva River Delta by implementing a comprehensive ecosystem–based approach in managing international waterways (water and sanitation)	742.000
Egypt	Project for environmental sound management of the South Sinai coast line (Sharm el Sheikh in particular)	Integrated strategy for both environmental conservation and environmental education in the Ras Mohammed National Park	2.550.000
Egypt	Innovative means of increasing water resources	The project aims at serving the South Sinai: El Gafa village and El-Hasna Center areas with sufficient amount water for drinking and agriculture use. (water and sanitation)	1.250.000
Egypt	Italian-Egyptian capacity building in the optimization of water networks	The project aims at strengthening the capacity of Egyptian utilities to provide high quality water supply services in a sustainable manner. This will be achieved through the transfer and demonstration of advanced methodology to control and manage water losses. The involvement of key stakeholders – water utilities and national authorities responsible for water protection and management – will deepen the cooperation and foster exchange of experience.	300.000
Europe (Norway, Cyprus, Greece, Italy, United Kindom)	Tool for Integreted Linkage DEtection (TILDE)	Methodological research on water system loss	120.000
Israel	Polishing municipal secondary effluent for stream rehabilitation	Waste water depuration through biological and physico-chemical process and downstream reuse of the reclaimed water (water and sanitation)	1.177.362

COUNTRY	PROJECT TITLE	PROJECT DESCRIPTION	MATTM CONTRIBUTION
Israel	Multifunctional Tool for Research and Environmental Management in the Mediterranean and Red Sea (MED – RED)	Comparative studies to assess the Artificial Marine Structures (AMS) impacts on the macrofauna and flora in a natural habitat. Physical and biological parameter measuring, productivity definition, pollution effects assessment, social and ecological evaluation, AMS impact analysis.	875.738
Israel	Integrated approach to the remediation of polluted river sediments	Development of technical and economic procedures to reclaim river basin (Kishon river, in particular) from heavy metal and organic pollutants	1.191.806
Serbia & Montenegro	Due Diligence of Water and Sanitation Services in Pancevo Municipality	The ultimate goal of the project is the optimisation of the use of water resources and the decrease of pollutant's load into the groundwater and river Danube, according to international and national standards. The specific goal of the project is the identification and technical and financial analysis of the investments required for the rehabilitation and upgrading of water and sanitation facilities, in order to access to international funding sources	470.000
Serbia & Montenegro	Implementation of the Wastewater Treatment Facilities in Pancevo Municipality	The final goal of the project is the implementation of the new WWTP(s) serving the town of Pančevo and the other villages in the target area. Specific project activities include: full preliminary design; cost-benefit analysis; financial analysis; technical assistance in the research of funds for the implementation of works; terms of reference for the public tendering.	380.000

Table 24: Italian Ministry of Foreign Affaire Programmes

COUNTRY	PROJECT TITLE	Italian Ministry of Foreign Affaire contribution (euros)
Albania	Restoration pumping systems for reclamation of areas with frequent seasonal flooding.	1.950.000,00
Albania	Restoration pumping systems for reclamation of areas with frequent seasonal flooding.	50.000,00
Croatia	Integrated development programme in Eastern Croatia	2.633.930,19
Croatia	Eastern Croatia: cooperation programme	25.822,84
Macedonia	Programme for environmental protection of the river Radika valley	536.481,12
Macedonia	Programme for environmental protection of the river Radika area	150.000,00
Macedonia	Programme for the environmental protection of the Radika river valley	6.800.000,00
Serbia & Montenegro	Improvement, management and control of the water and environmental resources at Nis	771.019,00
Serbia & Montenegro	Improvement, management and control of the water and environmental resources at Nis	70.000,00
Algeria	Carrying out of three main sewers in Algeri and improvement of the Oued El Harrach	3.673.661,21
Egypt	Support to the environmental programme	838.265,20
Egypt	Italian-Egyptian environmental programme	1.123.600,00
Egypt	Italian-Egyptian environmental programme- UNDP component	8.010.527,00
Jordan	Institutional strenghtening in the water sectors	72.469,00
Lebanon	Integrated agricultural project in the Baalbeck Hermel region	798.886,73
Lebanon	Integrated agricultural project in the Baalbeck Hermel region. Local Management Fund	1.262.737,11
Lebanon	Integrated agricultural project in the Baalbeck Hermel region for training	204.000,48
Lebanon	Carrying out of a water integrated system for waste water in Zahle	15.706.279,64
Lebanon	Waste water draining in Zahle	103.291,37
Lebanon	Water supply and waste water draining in Jbeil province Aid credit	39.089.097

COUNTRY	PROJECT TITLE	Italian Ministry of Foreign Affairs contribution (euros)
Lebanon	Water supply and waste water draining in Jbeil province. Local Fund	394.050,00
Lebanon	Water supply and waste water draining in Jbeil province (Experts)	732.000,00
Morocco	Management of natural resources in Taza province	2.649.170
Morocco	Purifying water process in rural areas. Local Fund	3.982.630,00
Morocco	Purifying water process in rural areas. Experts Fund	758.475,99
Syria	Rationalisation of Irrigation systems in Ras-el-ain. Experts Fund	20.658,28
Syria	Rationalisation of Irrigation systems in Ras-el-ain region. Aid credit	9.296.000,00
Syria	Rationalisation of Irrigation systems in Ras-el-ain region - IAM Contribution	2.301.366,70
Palestinian Territories	Establishment of National Environmental Institute. The programme is part of the multilateral process for peace	330.193,00
Palestinian Territories	Environmental programme TAP-	1.023.959,41
Tunisia	Protection of waters and soils in the Kairouan, Siliana e Zaghuan Governorates	11.152.336
Tunisia	Integrated programme for the improvement of Sahara and South Tunisia	615.054,04
Tunisia	Promotion of the human development at local level	1.000.000,00
Tunisia	UNIDO contribution for technical assistance for the <i>mise a niveau</i> of the industrial sector	2.960.385,00
Tunisia	Monitoring and evaluation of the technical assistance for the <i>mise a niveau</i> of the industrial sector	15.000,00
Tunisia	Protection and improvement of the environmental resources of the North-west region CONTRIBUTION TO THE PROGRAMME	733.861,00
Tunisia	Protection and improvement of the environmental resources of the North-west region	80.400,00