Work-Package 3.5

REPORT ON WATER USES AND WASTEWATER MANAGEMENT IN THE SWMED PROJECT PARTNER COUNTRIES

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1. Introduction

1.1 Water in the Mediterranean

According to the recent UNEP Report *State of the environment and development in the Mediterranean* (www.planbleu.org/actualite/uk/soed2009_Uk.html) effects of Climate change are already visible in the Mediterranean. Since 1970, temperatures have risen by nearly 2℃ in Europe's South-West region (Spanish peninsula, South of France). Temperatures have also increased in North Africa, although this is more difficult to quantify due to less complete information. Rainfall has dropped by 20% in several Southern European regions.

In the 21st century there has been a sharp decline in predicted rainfall: experts forecast a drop between -4% and -27% in Southern Europe and in the Mediterranean, together with Increased periods of drought resulting in more frequent occurrences of day temperatures above 30℃.

The UNEP Report also underlines that climate change in the Mediterranean will more particularly impact water resources, where natural cycles will suffer from increased evaporation and decreased rainfall (sever depletion of run-offs expected for the Rhone, the Po and the Ebro rivers). The issue of water will become a major challenge for sustainable development in the Mediterranean region.

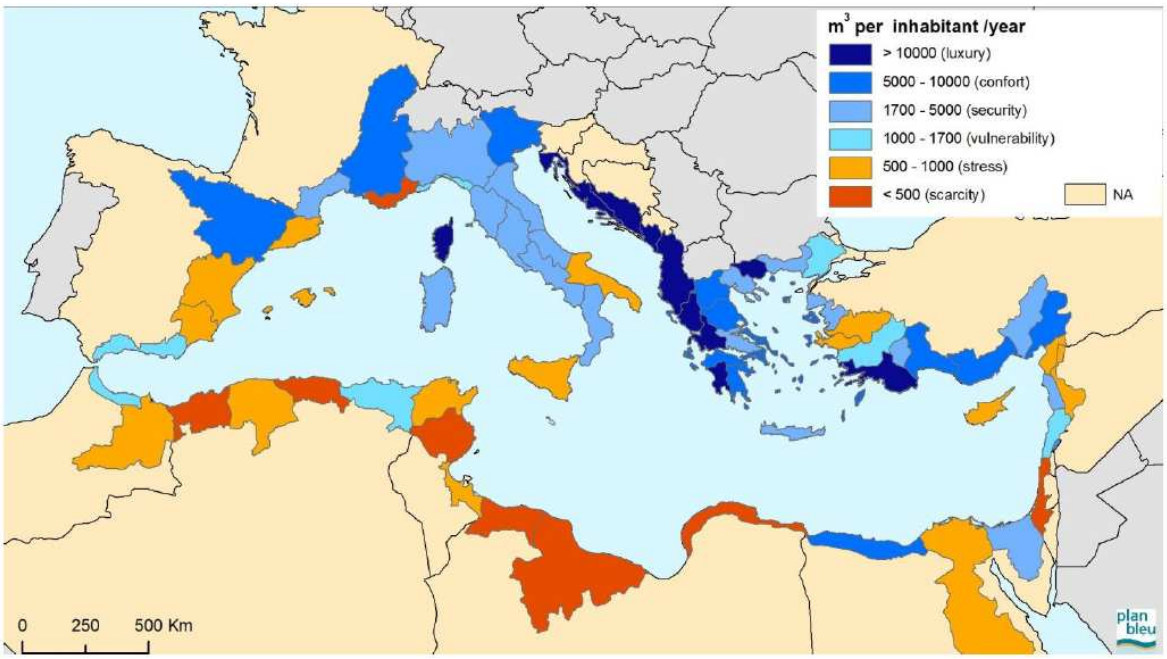


Figure 1 Renewable Fresh Water Resources per inhabitant in Mediterranean elementary river basins (between 1995-2005). Source: Blu Plan UNEP 2009

The region suffers from conjectural or structural water shortages. 180 million inhabitants benefit from less than 1,000 m^3 per year per capita and 80 million

are facing scarcity (less than 500m^3/year/capita). Fresh water deficits are striking in Southern and Eastern Mediterranean countries which necessitates developing other types of non-conventional water resources such as reuse of wastewater, desalination, and technical developments to increase exploitable potential of water resources (reloading of underground water in Tunisia).

Water demand has doubled over the past 50 years (280km^3/year in 2007), with agriculture being the main consumer (64%). Losses, leaks and waste are estimated at 40% of total water demand (particularly in the farming sector). Although countries are increasing their efforts to limit and reduce water losses and wastages, competition for the available water resources remains high, in particular in Egypt, Malta, Syria, Libya, Israel and Palestine. To satisfy growing domestic demand, countries are increasingly overusing a share of non-renewable resources (16 km^3/year), triggering preoccupying salination issues.

As regards infrastructures, although 20 million Mediterranean inhabitants are still deprived of access to improved water sources, access to potable water in the Southern and Eastern Mediterranean countries is above the global average and showing real progress (+75 million inhabitants between 1990 and 2006).
It however appears that the traditional response of increasing supply has now reached its limits and demand-based management is emerging (reduction
of losses and poor usage, improved water use efficiency).

1.2 **A quick view of SWMED partner countries**

Reliable water supply and the protection of aquatic resources through adequate water management are essential to support all aspects of human life and dependent aquatic and terrestrial ecosystems. The use of water across the Mediterranean basin is as varied as are the constituent countries, because of different climates, cultures, habits, economies and natural conditions. Common to all the Mediterranean countries is the need to satisfy the water demand of households, industry and agriculture. Also common to many countries is a limitation on water resources, both in terms of quantity and quality.

According to data collected by SWMED partners, water availability and water use rates show important differences: Italy presents a quite higher values of available water compared to all the other partners (including Malta). A difference confirmed also in terms of water consumption. Despite such differences domestic sanitation systems are almost the same (“western style” bathrooms equipped with flushing toilets, building served buy sewage pipelines) in all the partner countries settlement types, with the exception of rural villages in Tunisia and Palestine.
Western style sanitation systems are diffused in European partner countries by the first half of the last century, while the wastewater collection and treatment system has been more recently developed (from 1970/1980 on) and often not yet completed. Part of the water infrastructure is even more recent (e.g. desalination plants in Malta). Despite the availability of an almost complete water and wastewater management infrastructure, Italy and Malta still present significant problems of resource overexploitation and of natural

water quality. Both problems could highly benefit of a wider use of Sustainable Water Management approaches and technologies.

In Southern Mediterranean partner countries, water and sanitation services and infrastructure have been developed more recently, mainly in the second half of last century. Despite the natural water shortage of the southern coast of the Mediterranean and the difficult socio-political conditions, in both countries (Palestine and Tunisia) water and sanitation service reaches good standards.

Tunisia has achieved a very high access rates to water supply and sanitation services through sound infrastructure policy. 96% of urban dwellers and 52% of the rural population already have access to improved sanitation.. Larger part of the Tunisian population has now access to good quality drinking water throughout the year. The wastewater collection and treatment system has also been impressively improved in recent years, even though could not be considered acceptable, especially in small towns and rural villages. Important improvements of wastewater treatment are expected soon, to allow an intensive reuse of treated wastewater for irrigation: agriculture is by far the most important water user, consuming around 80% of the country's water resources.

With a share of 45%, agriculture is the sector which uses most of the scarce water resources existing in Palestine. The r 40% is mostly used for households, through a water service quite spread throughout the country; the rest 15% is referred to industrial activities. A 2011 survey carried out by the Palestinian Central Bureau of Statistics reports that the number of households in the Palestinian territories connected to the water network increased from 85% in 1999 to 91.8% in 2011. In the West Bank, 89.4% of the households were connected while the connection share in the Gaza Strip was 96.3%. Concerning sanitation, cesspits were used by 39% of households, while access to the sewer network increased to 55% in 2011, up from 39% in 1999. The growth of sewer network is presently causing environmental problems due to either non availability of treatment plants or insufficient capacity to treat all the produced wastewater by the existing treatment plants, producing severe water pollution (mainly in Gaza) as evidenced in some recent studies.[1]

[1] Foul Play Neglect of Wastewater Treatment in the West Bank" B'Tselem 2009 Treated Wastewater Reuse in Palestine Y. Mogheir , T. Abu Hujair, Z. Zomlot, A. Ahmed and D. Fatta in Water Values and Rights (Proceedings of the International Conference on Water Values and Rights held in Ramallah, Palestine, 2-4 May 2005).

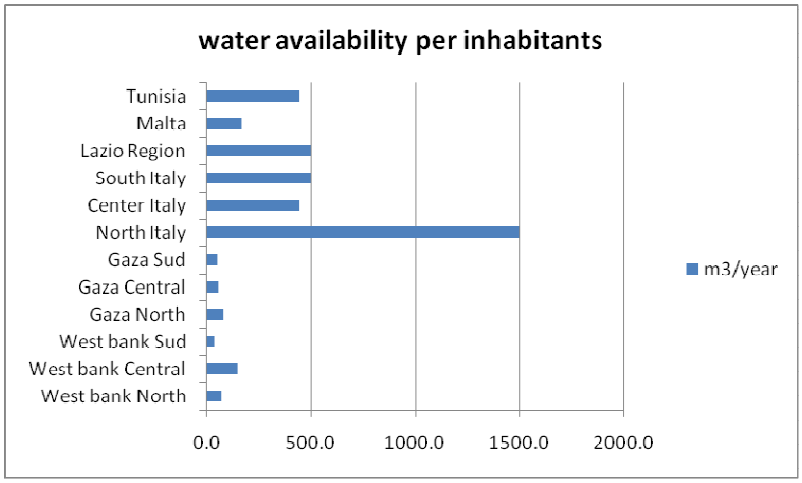
2. General information concerning water related problems in the country and in the project area

2.1 Water availability

As shown in the following table, the water availability is very different among the various countries. With the exception of Italy, all the countries appear to be in a condition of water scarcity as per UNEP classification of Figure 1.

Water availability per person	m^3/year	l/day
Palestine		
West bank North/Gaza North (including domestic and industrial)	70,6	193
West bank Central/Gaza Central (including domestic and industrial)	59,7	164
West bank South/Gaza Sud (including domestic and industrial)	40,5	111
West bank North/Gaza North (including agriculture too)	84,4	231
West bank Central/Gaza Central (including agriculture too)	148,5	407
West bank South/Gaza Sud (including agriculture too)	55,2	151
Italy		
North Italy	1500	4110
Center Italy	500	1233
South Italy	450	1370
Lazio Region	500	1370
Roman Castle area (potable water) (*)	222	610
Latina Province (potable water) (*)	200	550
ATO Ragusa (*)	154	422
Malta (including treated wastewater and harvested rainwater)	170	466
Tunisia	450	1233

(*) urban use only



Palestine, and especially West Bank South that presents the lower value (only 40,5 m^3/year per person, with a per-capita potable consumption of 20-30 l/day), shows the most critical situation. If in Central West Bank the water available is a little bit higher (about 150 m^3/year per person including agricolture, much less than the 500 m^3/year per person fixed by UNEP as the upper limit of water scarcity conditions), the value in Gaza (55-85 m^3/year / person mostly (80%) of poor quality or brackish) is very critical, considering also that the groundwater (the primary source of water supply in Gaza) is significantly affected by salinity and polluted.

Italy shows a situation of security in the North, even though the excessive water withdrawal often create several impacts on water bodies and a decrease in their water quality; also groundwater sources are in most case polluted in many industrial areas. The Centre and the South instead show value very close to water scarcity conditions. The collected data for the studied area of Ragusa, Latina and Roman Castles are referred to urban use only; considering Lazio data representative of Central Italy data, probably in Ragusa the water availability is around 350 m^3/year per person or less.

Malta has very limited resources: it is one of the 10 countries which are most impacted by water scarcity having the highest Water Competition Index in the world, 24,800 inh/hm^3*year (Margat & Vallee 2000, in Mangion & Sapiano 2005). Water scarcity is therefore an important issue in the island and it is addressed from the Government differentiating the withdrawal source (7% from rainwater harvesting, 34% from desalinization processes and 56% from groundwater abstraction. Treated sewage effluent is an alternative source of water that is yet to be fully exploited and this can potentially account to 24% of Malta's demand. Tourism consumes around 5% of the overall demand.

Given its geographical situation, Tunisia is under the influence of two climates: the Mediterranean in the northern region and the arid in the southern one which are the cause of the timing and spatial variability of water resources. Thus the average rainfall ranges from less than 100 mm in the south to more than 1,500 mm in the northern region of the country. Tunisia is already under water stress since several years (table 1). In this context Tunisian water strategy appears based to answer one substantial question: How to fit resources and needs in the frame of an economic development? Starting from this question and concerning resources, all necessary actions are integrated in the water strategy: resource mobilization, ground water recharge, wastewater reuse, desalination etc. In another side many incentive and actions are considered to master the demand as water saving, water pricing, education etc. Based on retroactive studies, clear objectives for water mobilization and water saving are adopted at the national level and integrated in their regional context and international challenges such as climatic change, Mediterranean depollution, millennium development goals (MDGs) etc.

Evolution of water resource and demand (in million m3) in Tunisia

Water	1996	2010	2020	2030
Demand	2 528	2 689	2 721	2 760
Resources	2 767	3 300	3 106	3 121

Indeed, the level of water resources is 4,700 million m^3 of which 650 million m^3 are non renewable resources (13.8%). The repartition of the conventional resources is given by table follow figures. The surface water is estimated to 2,700 million m^3 and the groundwater is about 2,000 millions m^3.

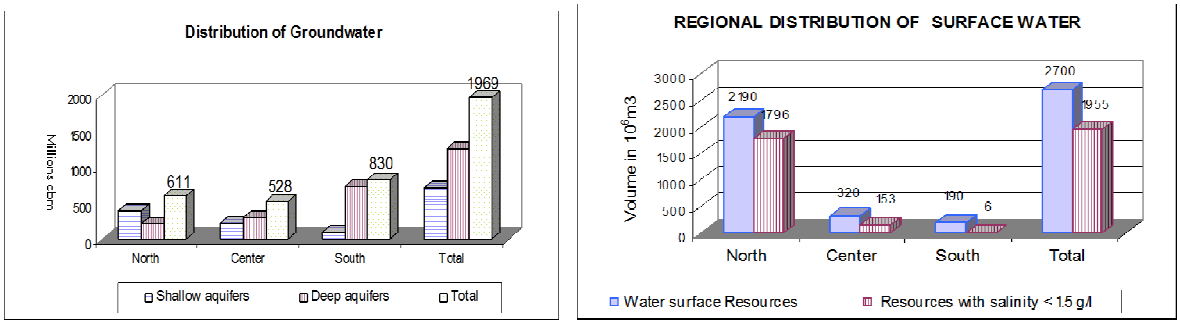


Figure 2: Repartition of the conventional water resources in Tunisia (Louati, 2010)

Therefore the per capita annual water ratio is only about 450 m^3 which is relatively low according to international standards which consider that countries with less than 1000 m^3 per capita and per year are poor in water sources. The ratio of drinking water served reached 100% in the urban areas and 92% in rural areas without water rationing even during shortage periods. Furthermore irrigated agriculture developed over 335,000 hectares that is 7% of the cultivated land, producing on the average 32% of the total agricultural production value. Tunisia engaged in an ambitious mobilization strategy (1990-2000) and succeeded to manage the existing resources in order to satisfy all the demands especially during water shortage periods which are preponderant in a dry or semi- dry climate. Given the population growth and the socio-economic development, the demand pressure on the water resources will be more and more important. The surface water resources are highly variable in time and space, of which 80% came from the northern regions of the country (figure 1). To manage variable supplies, Tunisia balances surface and groundwater stocks. It uses dams and groundwater reserves to store surplus water. Only 8% of water resources (deep ground water) are available in the south and often with high salt concentration. Water is transferred, using Mejerda-Cap Bon Canal distribution networks to centre of country (Nabeul, Sfax, etc.).

Agriculture is the largest user of water (about 80%) and most of the cities, industries and tourism activities are located in the coastal area.

The Tunisian Ministry in charge of Agriculture and Water Resources has developed a model to help operate the country's water systems and manage the risks associated with both droughts and floods under various planning scenarios.

The water sector remains one of the priority sectors in the objectives of economic and social development of Tunisia. Thus, the efforts made have allowed providing the country with a large water infrastructure: 27 dams, 200 hill dams, 766 hill lakes and over 3,000 wells and 151,000 surface wells mobilizing 83% of the total exploitable water resources.

The rate of drinking water supply throughout the country in 2010 reached 98% divided as follows: (i) 100% in urban areas and (ii) 95% in rural areas (98% by the year 2014).
Overall, Tunisia is now reaching the limits of its potential in terms of resource mobilization or hydro-agricultural development. The next phase will focus on good management and economic valorization of acquired already important.
A program relating to investments in the water sector (PISEAU) was established to reinforce technical aspects economic and institutional factors of the management of agricultural water demand (expansion of the economy of water tariff , participative management, etc..), develop the use of non conventional water, preserve and protect water resources against pollution.

2.2 **Water use per sector**

The distribution of the total water consumption is rather different from region to region; the higher contribution is given from the agricultural sector, especially in Tunisia where it represents the 80% of the overall water.

Country / Region	Agricultural %	Industrial %	Energy production %	Household %
Palestine				
West Bank	45%	15%	0	40%
Gaza Strip	46%	NA	0	NA
ITALY	50%	17%	11%	22%
Lazio Region	40%	12%	3%	45%
ATO RAGUSA	42%	3%	*n.a.*	55%
Malta	45%	19%	Not applicable	36%
Tunisia	80%	5%	Not applicable	15%

In the country or region characterized by the most critical conditions of water availability, the percentage of household consumption is higher, considering that the resources addressed to agricultural fields are limited.

Malta has a higher percentage of industrial water consumption but one notes that this comprises also the tourism industry which alone account for around 10-11% of the water consumption from the official water distribution network. It is noted that most tourist facilities on the island have their own sources of supply (desalination of seawater) the production of which adds to the official water supply. Available estimates put this self supply at the same levels of the water acquired through the public supply.

Industrial and commercial establishments account for around 8% of the total demand. Half of this demand is generated by the beverage and food industry. Of particular concern is the mining and quarrying industry due to its dependence on groundwater.

Water distribution to the domestic and industrial sectors is undertaken through the distribution network of the main public utility (the Water Services Corporation). Since

1994, the utility has launched a wide leak detection and pressure management campaign which today has seen the municipal water demand reduced to around 60% of the 1994 levels. In the case of the agricultural sector, self-supply through wells (boreholes) prevails and thus the main efficiency concerns are related to irrigation technology; where however most of the highly irrigated land is fitted with drip or sprinkler irrigation. The use of flood irrigation is limited.

About Ragusa data, it is to be underlined that the data is referred to the water supplied by the public irrigation consortium of Ragusa; data on private water sources for agriculture (boreholes, ecc) are not available, so probably the percentage of water delivered to agriculture is higher.

In Tunisia the Water Use has been monitored in the last years and the values are reported in the following table with some modelled estimations for the near future:

Evolution of water demand per sector in Tunisia (in million m3)

Sector	1996	2010	2020	2030
Drinking water	290	381	438	491
Industry	104	136	164	203
Tourism	19	31	36	41
Irrigation	2 115	2 141	2 083	2 035
Total	2 528	2 689	2 721	2 760
Resources	2 767	3 300	3 106	3 121

2.3 **Population served by public (collective) water distribution network**

The coverage of the water distribution network is almost complete in every country or region.

Country / Region	Resident population	Fluctuant population	Population served	Water available for distribution per person (l/day/person)
Palestina				
West Bank	2.275.982		2.194.944	102
Gaza Strip	1.535.120		1.535.120	120
Italy	60.050.000		58.800.000	371
Lazio Region	5.626.710		5.626.710	469
Latina Province	655.750	369.050	1.024.800	350
Roman Castles	357.544	46.746	404.290	566
ATO RAGUSA	313.901	157.433	298.991	263,5
Malta	417.617	30.520	448.137	176,6 (*)
Tunisia	10.266.000		9.752.700	111

(*)water produced and distributed

In Tunisia, by the end of 2006, the access to safe drinking water became close to universal (approaching 100% in urban areas and 90% in rural areas).

Water access in west bank is relatively safe and sufficient, even if South West Bank villages show values significantly lower. As specified at page. 5, the 2011 survey carried out by the PCBS reports for the year 1999 an 85% of connected households in the Palestinian territories to the water network, with an increase to 91.8% in 2011. In the West Bank, 89.4% of the households were connected while the connection share in the Gaza Strip was 96.3%. In Gaza the water available by the distribution network is 120 l/day per person, but this number is not a representative or an indicative one since 90% of the quantity provided for the household consumption is polluted.

In Lazio region the quantity of distributed water is very high (470 l/day per person); some part of the Region, as Roman Castel, has a great disponibility of springs and it reflects in a high use of the resources, with a procapita availability of 560 l/day. These data are referred to the water input in the distribution network for municipal use and include water losses.In Sicily the value is calculated as the total daily water availability (without water losses) divided by the sum of resident and fluctuant population, considering then the more critical periods (summer): the result is 260 l/person per day.

In Malta until the early seventies, groundwater was the only source of potable water; today it accounts for only half as seawater desalination inevitably provides for the shortfall in drinking water demand (in 2010/11, desalination contributed about 56 percent of the water supplied to the public distribution system). In the last decade the domestic sector has registered an increase in consumption caused by higher living standards and touristic activities.

A table with detailed data about the Tunisian water distribution network is shown in the next page.

Number of customers	2,226 million
Water quantities produced	490,8 million m³
Water quantities distributed	448,6 million m³
Water quantities consumed	366 million m³
Global network efficiency	76,1 %
Adduction network efficiency	91,6 %
Distribution network efficiency	82,7 %
National service rate	98 %
Service rate in urban areas:	100 %
Service rate in rural areas (SONEDE)	48,3 %
National service rate in rural areas (SONEDE Rural Engineering)	93,5%
National connection rate	82,3 %
Connection rate in urban areas	99,2 %
Connection rate in rural areas	43,6 %
Specific water consumption	
All uses	113 liter / day / capita supplied
Household connected	121 litter / day / inhabitant connected
Number of water samples for sanitary control	47 082
Number of brackish water desalination plants	4
Network length	43 520 km
Adduction pipe length	8480 km
Distribution pipe length	37202 km
Number of regional directions	38
Number of staff	6 868
Salaried workers	5 908
Temporary workers	960

2.4 Water losses by public (collective) water distribution network

The following table shown the water losses estimated for the distribution networks.

Country / Region	Distribution network water input (m^3/year)	Water delivered according to water bills (m3/year)	Water losses
Palestine			
West Bank	85.000.000	60.300.000	29%
Gaza Strip	96.300.000	53.100.000	45%
Italy	8.143.000.000	5.533.000.000	32%
Lazio Region	9.641.190.000	6.224.440.000	35%
ATO 4 Latina	*118.168.924*	*42.576.517*	64%
ATO RAGUSA	44.061.431	*21.720.339*	51%
Malta	29,669,162	*15,551,437*	47,6%
Tunisia	417.200.000	345.200.000	17%

In Malta network losses seems drastically reduced in the last years; in 2003 the real losses was about 28% and 16% are only apparent (difference between water bill and flow meter measures due to metering errors, water theft, billing anomalies).

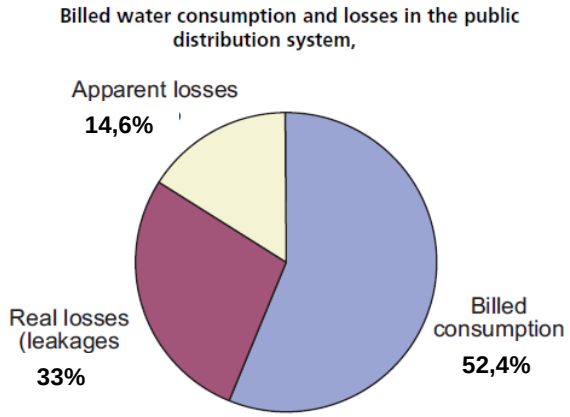


Figure 3 – Billed water consumption and losses in the public distribution system in Malta, 2011

The same considerations could be made for Ragusa region, where the flow meter measures indicates a real losses of 35%, however a high value. For Latina province instead the flow meter data are not available.
In Palestinian water losses are a significant issue, considering the scarcity of available water; in Gaza water losses are about 50% of the input water.

The lower value is in Tunisia, where only a 17% of water losses is reported.

2.5 Reservoir regulation capacity of public (collective) water distribution network

In the following Table the reservoir capacity for each partners country are listed.

Name of the community or of the distribution network	Name or other identification of the reservoir	volume (m^3) for 2010
PALESTINE		
1- West Bank Water Department under the supervision of Palestinian Water Authority (included the wells belong the village council and municipalities)	Ground water wells ,(Northeastern Aquifer Eastern Aquifer, Western Aquifer)	71.559.000,00
	Spring Discharge)	26.767.000,00
2- Mekorot (Israeli company)	Ground Water	West bank 56.000.000
	National Water Carrier (Surface)	Gaza 4.880.000
ITALY / ATO RAGUSA	68 reservoirs	86.558,00
MALTA	Maltese Water Services Corporation (national distribution network)	400.000,00
TUNISIA		
SONEDE (Supply water)	Storage capacity	1.000.000,00
water surface	27 dams, 200 hill dams and 766 hill lakes	2 700 million m3

2.6 Sources of water used by public (collective) water distribution network

In our studied countries and regions we can observe different situation with a prevailing extraction from groundwater.

In countries with sufficient aquifers, the most part of water for public water supply is generally abstracted from groundwater. Groundwater has historically provided a local, and least-cost source of drinking water for public supply and private domestic use. As groundwater is generally of superior quality to surface water and requires less treatment, groundwater reserves are increasingly being exploited in preference to surface water sources and in some occasions this should led to over-abstraction and a lowering of the groundwater table resulting in the degradation of spring fed rivers, destruction of wetlands and, in coastal areas, intrusion of saline water into aquifers.

Country / Region	Ground water	Spring water	Surface water (run-on-the river or reservoir)	Non conventional resource (desalination, reuse)	Water aquired or imported
Palestine					
West Bank	41%	15%	11%	1%	32%
Gaza Strip	97%	0%	0%	0%	2,5%
Italy					
Tiber river basin	14%	86%	0%	0%	0%
Other smaller Lazio river basin	71%	23%	6%	0%	0%
ATO 4 Latina	77%	23%	0%	0%	0%
Latina Province (*)	52%	47%	1%		
Roman Castles (*)	64%	33%			3%
ATO RAGUSA	74%	20%	0%	0%	6%
Malta	44%	0%	0%	56%	0%
Tunisia	39%	0%	57%	4%	not applicable

(*) from Aqueduct plan, water distribution for urban use

In West Bank the extracted groundwater is more than 40% of the total; note also that a further 32% is acquired from Israel (the great part of this volume is at the same time groundwater).
In Gaza almost the total of water withdrawal comes from groundwater; it should be noted that the aquifer replenishment potentiality in the coastal aquifer in Gaza is about 55 MCM/Year and therefore the aquifer is overexploited in a range of three times more than its replenishment potentiality; this led, due to the saline water intrusion and a poor sanitation service, into a significant damage to the aquifer makes less than 10 % of the aquifer as suitable for domestic purposes.
In the future it is provided the expansion of desalination capacity with the immediate introduction of short-term low-volume desalination with a combined capacity of 13 MCM/y, followed by the construction of a regional desalination plant, with initial capacity of 55 MCM/y, to be located in the middle of Gaza. In the future, extensions to the same site, or the construction of a second plant, will see capacity increase to 130 MCM/y to accommodate growing demand.

In Lazio there are some substantial differences if we analyze an important river basin (as for example the Tevere Basin) and areas characterized by smaller basin; in the first case the number of springs is very high and consequentially the percentage of spring water source. In the second case groundwater withdrawal is predominant, even if the amount from spring sources remains high.

In Malta, the presence of limited groundwater resources has reinforced the recourse to alternative sources as rainwater harvesting, treated sewage effluent and desalinization processes (34%).

In Tunisia the main source is surface water, more than half of the water come from there; the 4% of desalinization is referred to public desalination plants of mostly salty groundwaters located in the South of Tunisia (the biggest is in Gabes)

2.7 Quality of water used by public (collective) water distribution network

Country / Region	Low quality water (that require heavy treatment to produce potable water	High quality water (that could be distributed after coarse filtration and chlorination
	(m^3/year)	(m^3/year)
Palestine	not available	not available
Italy / Lazio Region	0	*118.168.924*
Italy / ATO RAGUSA	*1.018.350*	*48.171.249*
Malta	*0*	*28.893.577*
Tunisia	salinity < 1,5 g/l : 50% of resources	salinity > 3 g/l : 16% Gethermic and fossil water resources: 4,8 m3/s; 70% in the south. Water temperature is between 35 and 75℃; and salinity is raged between 2.1 and 4.2 g/l.

Based on available data, most of municipal water distributed in Lazio Region is of good quality. A few municipalities located in volcanic areas use groundwater aquifers naturally rich in arsenic, that requires difficult and expensive treatment.

Delivered Water quality

Country / Region	Number of water samples not complying with potable quality national standards	Number of water samples complying with potable quality national standards
West Bank	19% (from the network, household and resources) number of samples 5810 according to Ministry of Health report 2005.	WHO > 5%
ATO RAGUSA	*n.a.(*)*	*n.a.*
Malta	0	50
Malta	39	11

(*) In general there are no specific problems for potable water quality in the Ragusa Province. Some wells close to the coastal zone have problems concerning marine water intrusion due to an overexploitation of aquifers, but detailed data are not available.

Several contaminants pose instead great problems in the water of Gaza. Integration of water data and GIS maps for all parameters in 2010 revealed that there is probably no drinking water in Gaza according to the WHO standards. Increased water demand from population and economic growth, environmental needs, land use changes, urbanization, groundwater mining, deterioration of water quality, pollution from local and diffuse sources, environmental hot-spots and impacts on public heath and ecosystems are all factors that can create a severe water quality crisis as well as water shortage problems.

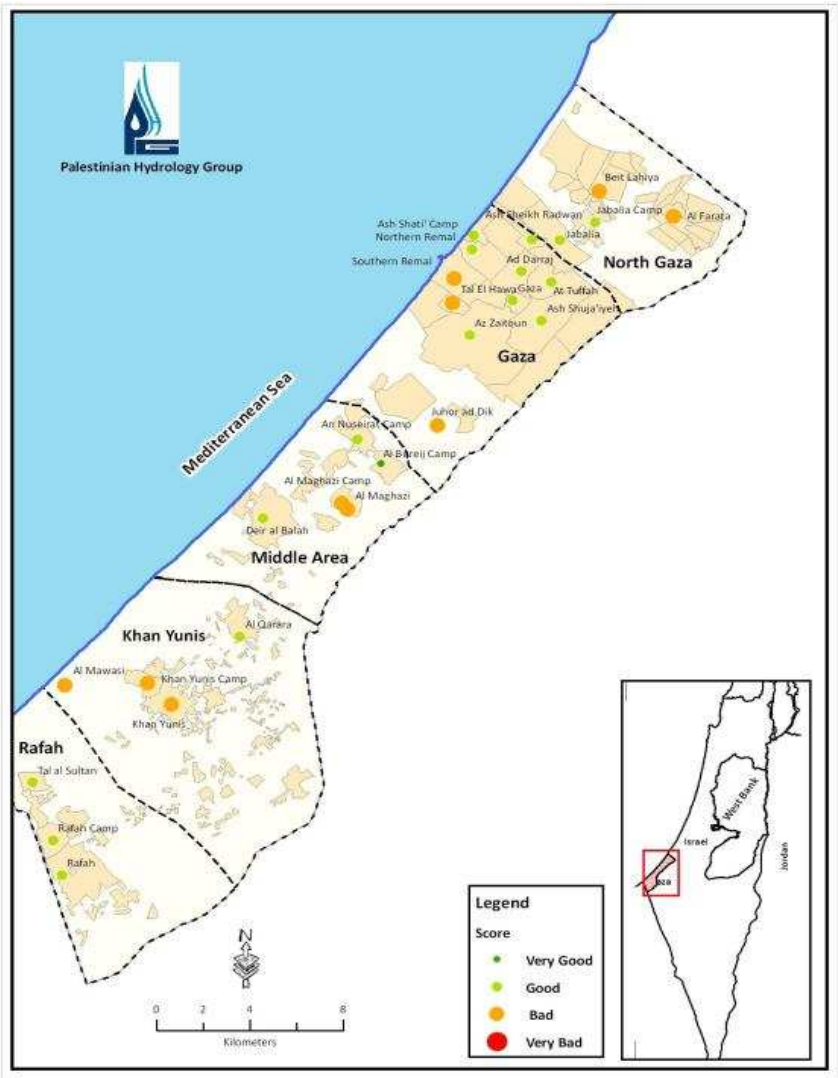


Figure 4 - Drinking water quality in Gaza (Water Sanitation and Hygiene Household Survey Gaza, UNICEF April 2010)

The water resources in Tunisia are characterized by high salinity (the average is about 1 g/l). Only 50% of water resources present salinity below 1.5 g/l, and 16% more than 3 g/l. Tunisia is characterized also by their geothermic and fossil water resources, estimated at 4.8 m^3/s (70% in the south). The temperature is between 35 and 75 ℃ and the salinity is ranged between 2.1 and 4.2 g/l.

In Tunisia the distributed water undergoes a double bacteriological control by the relevant services of SONEDE and the Public Health Ministry. The results of tests are in accordance with the recommendations of the World Health Organisation (WHO). The quality of the water distributed in the South - East of Tunisia has been improved thanks to the achievement of the brackish water desalination plants of Gabes, Zarzis and Djerba, ordered by his Excellency the President who has constantly shown interest in the living conditions of citizens and was always keen to ensure a good quality drinking water. In the context of developing non conventional water resources, SONEDE (national water Distribution Utility) operates 4 desalination stations (Kerkena, Gabès, Jerba and Zarzis). The Kerkena station allows the desalination of water with a 3.6 g/l of salinity and has a production capacity of 3.300 m^3/d. Gabès station allows the desalination of water (3.2 g/l) with a capacity production of 22.500 m^3/d. As for the Jerba and Zarzis stations, they allow the desalination of water with a salinity content of 6 g/l and have a production capacity of 15.000 m^3/d. The four stations use a reverse osmoses. In the addition SONEDE undertook and planning of 10 new desalination stations with a total capacity of 36.000 m^3/d, located at Gabès, Médenine, Gfsa, Touzeur and Kébili Governorates, and upgrading the water desalination of Gabès station to 34.000 m^3/d. .

2.8 **Sanitation service and waterborne diseases**

In Palestine, despite that 85% of urban communities are connected to sewer networks, more than 60% of Palestinian Marginalized communities suffering from poor sanitation especially in Gaza where population density is very high.

In Italy according to data available on the website of ISS (Higher health institute), waterborne diseases are not a major health problem, where the mortality rate due to infection of any kind (bacteria, virus, parasites) is in the last years around 5%. In Regione Lazio the rate is always below the national one.

In Tunisia according to the study on Health and Environmental National Plan (PNSE 2010), “the data available on exposition of the population to waterborne diseases is insuficent. It will be completed by a specific inventory of preocupant contaminants (virus, parasites, compounds of disinfection, pesticides, etc.). The number of wastewater treatment plants (WWTPs) amounted to 109 WWTPs (december 2011). The quantities of treated wastewater are estimated as 236 million m^3. These quantities are distributed throughout the national territory according to housing, industrial and tourist density. The morbidity linked to water pollution stay under evaluation, particulary long-term sanitary risks. The low rate of connecting of housing in rural areas to the sewage network should incite to the realization of several epidemiological studies to encircle better the diseases with enteric transmission."

2.9 **Wastewater treatment**

Sanitation issues and the state of the art are very different between the various country and in some case within the country. If Malta treats all its wastewater, Central Italy presents a relatively high rate of untreated sewage and probably also Sicily if we consider that several treatment plants have only a primary stage. Tunisia presents a good percentage of connections to the sewer network and to WWTPs in urban more developed area, whereas in rural area the sewer network is often absent and sanitation level is very poor. In Palestine several small and medium WWTP of various types are developing, increasing the percentage of treated wastewater, but many areas still suffer of poor sanitation.

Country / Region	**treated**	**untreated**
Palestine		
West Bank	40%	60%
Gaza Strip	40%	60%
Italy	76%	24%
Lazio	65%	35%
ATO 4 Latina	96%	4%
Latina Province	70%	30%
Roman Castles	67%	33%
ATO RAGUSA	93%	7%
Malta	100%	0%
Tunisia	62%	38%

In Palestine domestic and industrial wastewaters are still collected mainly in cesspits or, to a much lesser extent, in sewerage networks. Most communities in the rural area in the West Bank lack adequate sewage systems to dispose of their wastewater. In some villages and refugee camps black wastewater is collected in cesspits, while grey wastewater is discharged via open channels. In 2004 the majority of the collected wastewater from the sewered localities was discharged into nearby wadis without any kind of treatment. About 65 % of the West Bank population was not served with sewerage networks, and uses mainly cesspits and occasionally septic tanks. The other 35 % was served with sewerage networks, but less than 6% of the total population was served with treatment plants. The recent planned projects should increase this percentage, but the situation remain very critical, considering also the great part of Israeli settlements in West Bank produces untreated wastewater that impact on Palestinian territories.
Currently the most diffused technologies are lagoons and aerated lagoons. Gaza City has WWTP by lagoons that treat a part of the city sewerage. The sizing of these lagoons was often insufficient and currently many of them are overloaded and malfunctioning. Three treatment plants with tertiary treatment are under construction in North beit Lahia, Sheikh Ejelin and in the city of Gaza. Another new treatment for tertiary treatment is planned for 2016 in Khan Younis.

More than 75 per cent of the households are connected to a wastewater network, as per 2010 Unicef survey. Communities in areas such as Juhor ad Dik, Al Qarara and Al Mawasi, which are not connected, rely on cesspits at the household level. These cesspits are emptied once filled using the CMWU cesspit emptier and the sludge is emptied at the sewage treatment plant. As the cesspits are not water tight, potential exists for water contamination due to infiltration of sewage.

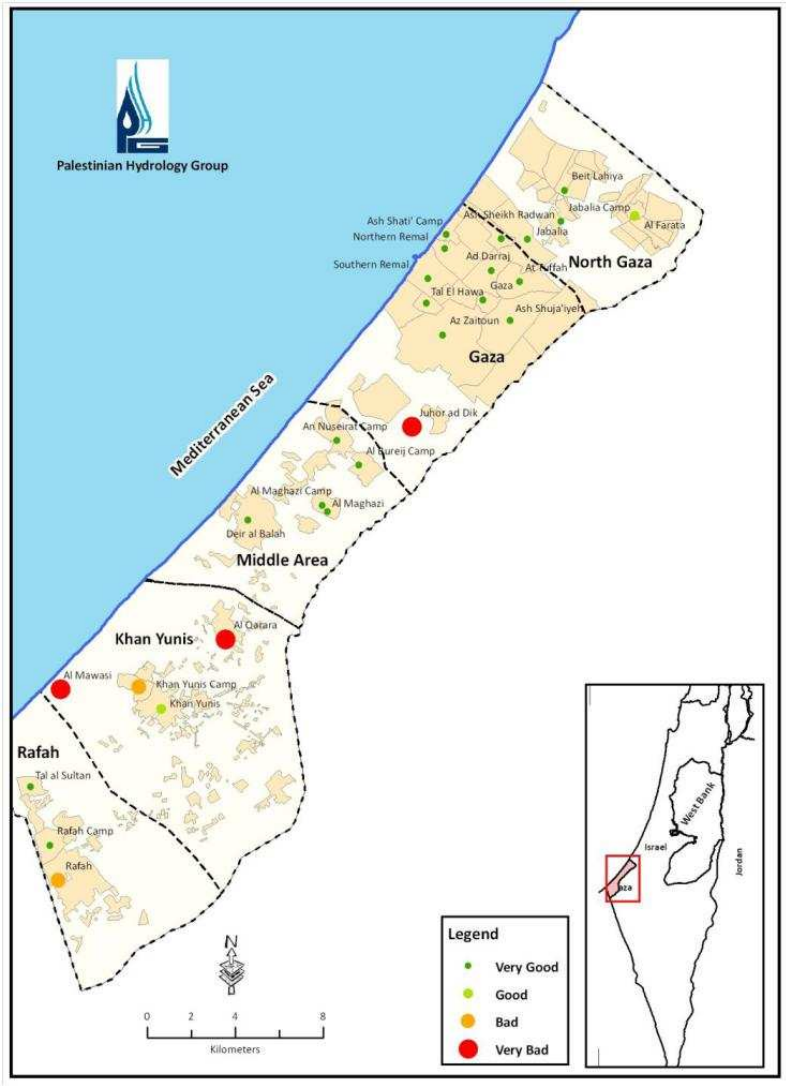


Figure 5 - Wastewater quality in Gaza Water (Sanitation and Hygiene Household Survey Gaza, UNICEF April 2010)

In Italy the percentage of treated wastewater is quite high and the higher coverage is in North regions. As per Aqueduct Plan, in Lazio region the total resident population at 2015 will be almost 6.000.000 of persons. The total nominal capacity of WWTP is 6.144.282, less than the total equivalent population considering also commercial and industrial wastewater connected to the sewer network (8.700.000 as reported by ISTAT 2008 and less also than the total of resident and fluctuating population (about 7.000.000 in 1996 considering Acqueduct plan data).

Tavola A.58 segue - **Carico inquinante potenziale espresso in termini di abitanti equivalenti per fonte di inquinamento e regione - Anni 2005 e 2008**

REGIONI	Fonti di inquinamento										
	Popolazione residente	Popolazione domiciliata nella regione e residente in altra regione	Popolazione in case sparse	Lavoratori e studenti pendolari	Popolazione potenziale presente in strutture alberghiere	Popolazione potenziale presente in abitazioni private	Abitanti equivalenti relativi alle attività di servizio, di ristorazione e bar	Abitanti equivalenti relativi alla micro industria	Abitanti equivalenti relativi alla piccola, media e grande industria	Abitanti equivalenti totali urbani (Aetu)	Abitanti equivalenti totali (Aet)
	ANNO 2008 (b)										
Piemonte	4.416.919	147.372	-281.869	-5.198	165.971	703.691	1.053.036	887.872	7.564.327	7.087.793	14.652.120
Valle d'Aosta/Vallée d'Aoste	126.522	4.311	-3.872	231	47.486	84.712	64.314	43.854	183.937	367.558	551.495
Lombardia	9.692.541	270.361	-180.250	3.123	306.297	934.988	2.593.827	1.564.713	15.529.969	15.185.600	30.715.569
Liguria	1.612.443	67.102	-58.405	523	153.962	481.828	547.411	274.027	725.626	3.078.890	3.804.516
Trentino-Alto Adige/Südtirol	1.012.962	27.159	-93.491	311	344.037	241.382	356.239	323.227	1.809.308	2.211.826	4.021.134
Bolzano/Bozen	*496.384*	*9.595*	*-70.400*	*523*	*193.123*	*47.735*	*179.957*	*72.465*	*721.458*	*929.382*	*1.650.839*
Trento	*516.579*	*17.564*	*-23.091*	*-212*	*150.914*	*193.647*	*176.282*	*250.762*	*1.087.850*	*1.282.444*	*2.370.295*
Veneto	4.858.944	121.290	-409.202	-2.736	621.114	563.122	1.442.212	995.392	7.150.071	8.190.136	15.340.207
Friuli-Venezia Giulia	1.226.499	45.484	-38.586	456	149.607	177.345	379.786	199.344	1.818.244	2.139.934	3.958.178
Emilia-Romagna	4.306.891	173.238	-413.346	4.587	425.019	598.848	1.393.065	879.060	9.134.910	7.367.361	16.502.272
Toscana	3.692.433	146.387	-285.136	-144	435.346	536.004	1.140.486	943.867	4.758.210	6.609.244	11.367.453
Umbria	889.336	36.746	-113.174	-1.730	63.693	107.946	206.836	219.667	970.094	1.409.320	2.379.414
Marche	1.561.321	48.141	-201.832	-138	217.262	254.779	405.770	448.478	2.444.129	2.733.781	5.177.909
Lazio	5.593.864	229.786	-318.765	2.596	266.749	948.845	1.458.908	492.809	3.857.201	8.674.792	12.531.993
Abruzzo	1.329.331	42.721	-120.885	461	99.410	404.629	307.950	405.083	1.727.791	2.468.700	4.196.492
Molise	320.817	7.644	-39.936	257	13.094	110.396	62.371	77.880	498.089	552.523	1.050.612
Campania	5.812.176	112.355	-296.095	-2.604	183.939	788.342	785.113	1.421.354	3.676.067	8.804.580	12.480.647
Puglia	4.078.124	77.644	-150.665	-2.181	203.332	1.069.885	596.822	946.506	2.313.586	6.819.467	9.133.054
Basilicata	590.801	11.357	-71.407	2.351	34.647	146.375	94.372	124.088	363.184	932.584	1.295.768
Calabria	2.008.208	46.867	-123.706	-1.189	192.762	900.085	268.086	602.328	505.088	3.893.441	4.398.529
Sicilia	5.033.741	135.890	-151.198	789	174.403	1.662.119	663.900	939.769	2.042.491	8.459.412	10.501.903
Sardegna	1.668.309	54.954	-70.250	-5	187.789	464.957	365.510	381.098	1.131.281	3.052.362	4.183.643
Italia	**59.832.179**	**1.806.809**	**-3.422.070**	**-240**	**4.285.919**	**11.180.278**	**14.186.014**	**12.170.415**	**68.203.605**	**100.039.304**	**168.242.909**
Nord-ovest	15.848.425	489.146	-524.396	-1.321	673.716	2.205.219	4.258.587	2.770.466	24.003.859	25.719.841	49.723.700
Nord-est	11.405.295	367.171	-954.625	2.618	1.539.777	1.580.697	3.571.302	2.397.022	19.912.534	19.909.257	39.821.791
Centro	11.736.953	461.060	-918.907	584	983.050	1.847.574	3.212.001	2.104.821	12.029.634	19.427.136	31.456.770
Sud	14.139.457	298.588	-802.694	-2.905	727.184	3.419.712	2.114.715	3.577.239	9.083.807	23.471.295	32.555.102
Isole	6.702.050	190.844	-221.448	784	362.192	2.127.076	1.029.409	1.320.867	3.173.772	11.511.774	14.685.546

Fonte: Istat, Elaborazione "Stima del carico inquinante potenziale delle acque reflue urbane in termine di abitanti equivalenti"
(b) I dati aggiornati al 2009 non sono ancora disponibili.

Source: "RAPPORTO ANNUALE ISTAT 2011", relatively to 2008; see Aetu (Total Urban Population Equivalent)

The total potentiality is lower than Italian data respect to the total population (70%), even if a percentage of persons are residents out of the towns and furnished by simple on site treatment (as biologic tank and infiltration trench, domestic wastewater treatment or in a little number small constructed wetlands); moreover many agglomerations smaller than 2000 p.e. aren't probably served by a secondary treatment.
In Latina Province the untreated percentage is referred principally to fluctuant population especially in the coastal area during summer; in Roman Castles area the untreated percentage is referred in part to fluctuant population, but the nominal capacity of the WWTP cover only the 76% of the total resident population. Most of the plants are activated sludge type.
The Ragusa percentage is high but it is to be underlined that it include also WWTP constituted by only a primary treatments and the overall treatment efficiency is considered poor in many parts of the area. Most of the plants are activated sludge type, but there are also some trickling filters.

Malta shows the total coverage of sanitation demand with high efficiency level considering also that in many cases wastewater are reused for irrigation.
The oldest public wastewater treatment plant is located at Sant' Antnin, l/o Zabbar, constructed in 1983 and upgraded in 1996 to a treatment capacity of 17 000 m^3/day of raw sewage. Currently, the plant treats an average of 3 500 m^3/day in winter and 10 500 m^3/day in summer; the treatment includes preliminary, primary, secondary and tertiary

treatment facilities supplemented with disinfection. The treated waters are used for agriculture (about 75%) and for industry.

In recent years, three wastewater treatment plants have been commissioned with the result that all the wastewater produced in Malta is being treated prior to discharge into the sea. The biggest of these three plants is located in the southern region of Malta and has a capacity to treat up to 58.000 m^3/day. The other two plants are located one in the northern region of Malta at Cumnija, with a capacity of 6.700 m^3/day, and another at Ras il-Hobz in Gozo, with a capacity of 6.000 m^3/day. These two relatively small plants are intended to produce water mainly for agricultural use.

In Tunisia ONAS has constructed from its creation until now 109 wastewater treatment plant (December 2011) located in their majority in the coastal side and city; in these areas the rate of connection to the public sewerage network in urban zone has reached 89.3 % nevertheless the rate of connection to wastewater treatment plant in 2010 was 86.8 %. The treated volume in urban areas increased progressively in the last year reaching the 97,5% of the total volume in 2010, as shown in the following graph.

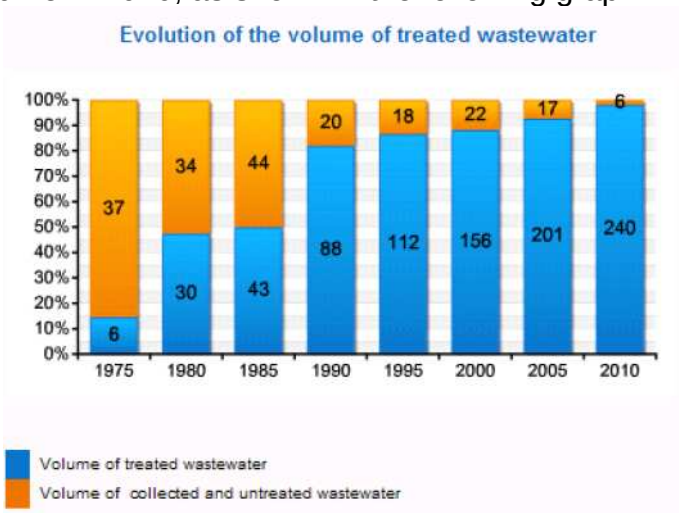


Figure 6 - Rate of connection to the public sewerage network and wastewater plants in Tunisian urban zone (Source: ONAS report 2010)

The quantities of treated wastewater are estimated as 236 million m^3. These quantities are distributed throughout the national territory according to housing, industrial and tourist density. 47% of the wastewater treated is located in the Governorates of the greater Tunis and Produced by not more 6 plants.

The most diffused secondary treatment is activated sludge (83%), trickling filter (1%), wastewater stabilisation ponds, lagoons (8%), and aerated lagoons (8%). Some WWTP are equipped by tertiary treatment (disinfection by UV, maturation ponds, sand infiltration, artificial recharge of aquifer).

Despite the high rate of connections in urban zone, the sanitation of population settlements in rural zones is very poor, even if ONAS is developing some programs to

improve network and WWTP coverage in many rural districts. In a ONAS study led to identifying 600 such zones which are in need of sanitation, 2% of households are connected to the sewerage network; 23 % of households are furnished by septic tanks; 75 % of the population dispose of wastewater in the wild.

2.10 Water and sanitation service costs

Country / Region	Sector	Average price (€/m3)
Palestine	not applicable	Al- Bireh municipality: 0,3 Euro /m^3
Italy	Tariff for the whole water service (including distribution, wastewater collection and treatment)	1,44
Lazio / Rome		1,08
Lazio / Viterbo		1,57
Lazio / Latina		1,54
ATO Ragusa	Water supply	0,66
	Sewage	0,09
	Wastewater treatment	0,27
Malta	Residential	1,47 – 5,41
	Domestic	2,30 – 5,41
	Non-Residential	1,75 – 2,50
Tunisia	Water supplì	0,43
	Sanitation services	0,47

Italy is currently one of the cheapest country in Europe for water and sanitation service costs, with an average national price of less than 1,5 €/m^3.

In Malta the higher costs depend by the major expenses for potabilization due to the massive presence of desalination processes.

In Palestine West-bank the Municipalities and regional water utilities set and collect water tariffs for domestic use. Water fees for domestic water supply vary considerably among different localities. Tariffs ranged from 0.15-0.2 $ in Qalqiliya and Jericho to 1.0-1.2 $ in Dura, Ramallah area. The Heinrich Böll Foundation reports an average tariff of US$ 1.20 per m^3. Differences are partly due to the level of services, water availability and distribution costs. Some localities in the North (i.e. Jenin area) and due to frequent and periodic water shortages (some areas report receiving water only a few hours per day) purchase water by tankers. Such localities are paying US$ 5/m^3 of the additional purchased water.
A water-pricing policy is under preparation; currently, increasing block tariffs are applied in the Palestinian territories and there is no price differentiation according to the purpose (residential, commercial, industrial).
In Gaza water is pumped in most case privately from the coastal aquifer and the overall water cost is consequently very low but also the quality is very poor: trucks circulate daily. The average expense for drinking water is about 7 €/month per person. The tariffs for

Gaza municipality water depends by the consumption and the average rate is about 0.2-0.3 €/m^3.

In Tunisia pricing for drinking water is similar to other countries in MENA Region; the price of drinking water in Tunisia is uniform throughout the country. It contains a part of a fix contribution and a proportional part dependant on the consumption of water. Regularly, SONEDE reviews the tariffs, taking inflation and contribution to investments into consideration. Sanitation fees are invoiced and collected by SONEDE. In 2010, the fees of drinking water and sanitation service in Tunisia are splitted depending the total consumption and the type of use, in the previous table we have assumed average values for households.

2.11 Water Saving and Water Reuse

Country / Region	Reuse field	Applications
PALESTINE		
Palestine	Agriculture	Edible Crops (small quantities mainly in Gaza)
	Environment	Stream flow (case of wadis)
	Groundwater recharge (nature)	Recharge for potable aquifer (by nature since the raw or treated wastewater flow by gravity to the Wadis.
ITALY		
Italy / Lazio		Several experiences of municipal wastewater reuse for irrigation or industrial purposes exist in Italy and many Regions are planning to increase the quantity of reused water, mainly for irrigation. The water safeguard plan of Lazio Region envisages the reuse of wastewater treated by all larger treatment plants, even though, up to now only few significant experience has been realized in Lazio like as: 1. "Industrial Reuse of effluents from the Cassino, Piedimonte San Germano and Villa S. Lucia wastewater treatment plants" Realised by Consorzio Industriale Cosilam of Frosinone in 2012; 2."Realisation of the reuse system for agricultural practices for the wastewater of Latina and Sermoneta Municipalities (L.R. 4 28/04/2006)" Realised by Consorzio di Bonifica dell' Agro Pontino (works in progress in 2012); 3. "Realisation of the reuse system for agricultural practices for the wastewater of Borgo Hermada - Terracina Municipality – managed by Consorzio di Bonifica dell'Agro Pontino, Realised by Regione Lazio Area Risorse Idriche (works in progress in 2012). According to info provided by Acqua Latina in June 2012 no water reuse occur in ATO 4 Lazio Meridonale. Several projects to reuse water of existing WWTP are presently undergoing in Lazio Region and reuse practice is expected to increase drastically in a few years.

Sicily/ Grammichele	Irrigation of agriculture	Small plant (1500 inh) treated by constructed wetland (CW)
Sicily/ ATO RAGUSA	Agricultural and landscape irrigation	There are not specific applications in the ATO. Some reuse projects have been planned. An indirect and not-controlled wastewater reuse occurs withdrawing water from rivers where wastewater are discharged (e.g. Irminio river).
MALTA		
	Irrigation	Agriculture
		Landscaping
	Industry	Non-process water
	Aquifer Management	Artificial Recharge
TUNISIA		
	Agriculture	The treated wastewater is used in fodder, industrial, tree planting, flower-crop, forest, irrigation of golf courses and hotel gardens, irrigation of green spaces, environment boulevards, recharge of acquifer, and to maintain the biodiversity in protected wetlands. The areas irrigated by treated wastewater represent 2% of total irrigated areas and use 31% of the treated water quantities.
	Environment	
	Touristique area	
	Industry	
	Recharge of acquifer	

2.12 Legal standards

All the aspects related to legislations and administrative issues related to water management are already contained in the Reports WP 2.1.1, so this paragraph is limited to a simple listing of the needed information for further deepenings.

Country / Region	Water quality for different use/reuse	Environmental quality of water bodies	Wastewater discharge in different final bodies (freshwater, groundwater, soil, sea water).
Palestine	Guideline for water quality, 2004, PSI	Palestinian Standard Institution PSI 2003, 742 (*)	Palestinian Standard Institution PSI 2003, 742
Italy	WW reuse: Annex 1 to Decree Environmental Ministry 185/2003.	Legislative Decree 152/06 Part III Annex I-II	Legislative Decree 152/06 Part III Annex V
Malta	Water Framework Directive transposed as LN194 of 2004	Quality of groundwater and surface/coastal water bodies	Discharge to coastal waters Urban Waste Water Treatment Directive transposed as LN340 of 2001 LN213 of 2001 – Pollution caused by certain dangerous substances discharged into the aquatic environment regulations.
Tunisia	Tunisian Norms NT 106.003 Treated Wastewater Reuse Standards NT 09.14 (1983) which defined the physicochemical characteristic and microbiological parameters for potable water	The Water Code (Law 75-16 of 31 March 1975) preserves and prevents the pollution of water resources.	Tunisian Norms NT 106.002 Discharged Effluent standards

(*) Palestinian Standard Institution PSI 2003, 742 for the reuse wastewater guidelines. & industrial effluent discharge Standard PS-227–June 1998 which have been prepared by a special committee & accredited by the Palestinian Standards Institute

2.13 Quality of natural water bodies

Country / Region		% of water bodies in good quality status	% of water bodies in bad quality status
Palestine		Northeastern Aquifer, Eastern Aquifer, Western Aquifer	Some indicators in part of Eastern Aquifer
ITALY	*rivers*	*46%*	*19%*
	lakes	*37%*	*30%*
	groundwater	*51%*	*20%*
Lazio	*rivers*	20%	30%
	lakes	60%	20%
	groundwater	70%	15%
ATO RAGUSA		The lake Dirillo (artificial reservoir) is in a "sufficient state".	The three main rivers of the Province of Ragusa (Acate, Ippari and Irminio) are in a "bad state".
		The groundwater of the aquifers "Ragusano" are in a "good state".	Data on the lake S. Rosalia (artificial reservoir) are not available.
			The groundwater of the aquifers "Piana di Vittoria" are in a "poor state".
Malta	*groundwater*	15	85

In Palestine the most critical situation about the water quality is in Gaza, where the groundwater are seriously compromised by over-pumping (Gaza's population presently extracts almost three times the aquifer's sustainable yearly recharge) and poor sanitation. Massive over-pumping has led to increased saline intrusion as seawater from the adjacent Mediterranean enters and contaminates the aquifer, while the infiltration of raw sewage from sewage collection ponds on the surface further adds to the aquifer's rapid deterioration. At its present rate of deterioration, the United Nations estimates that the underlying portion of the coastal aquifer on which the Gaza Strip relies for all its water needs will be unusable by 2016, and irreversibly damaged by 2020.

In Lazio the groundwater quality is overall good, thanks also to the large number of natural springs. Surface water are instead in a rather critical status, considering that only 20% are in a good status and 30% are in a bad status, despite the national water law (152/06 Decree) and the EC directives requires the achievement of good status for all water bodies before 2015.

In Malta the main objective of the Water Framework Directive (WFD) is the achievement of good status for all water bodies by 2015; and if this is not possible, aim to achieve good status by 2021 or 2027. 'Good status' means good ecological status for surface waters up to one nautical mile from the coast; good chemical status for all territorial waters, good chemical and good quantitative status for groundwaters; and good ecological potential for heavily modified water bodies. The coastal waters show a good quality, except the South-west region of the main island that is compromised by harbours and industrial activities.

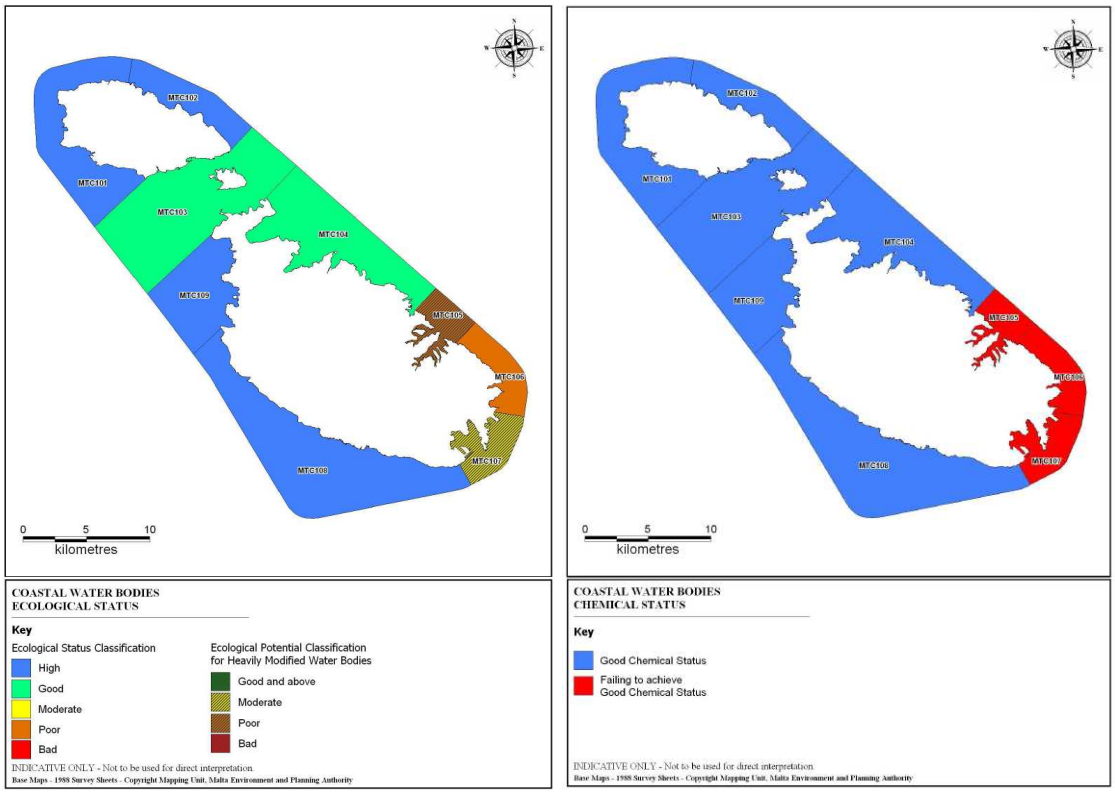


Figure 7 – Classification of ecological status of coastal water bodies in Malta

The groundwater body status presented indicate contamination by Nitrates as the single most important issue, as Nitrate contamination has been identified in thirteen out of fifteen groundwater bodies; other important issue which should also be considered is saline intrusion. 85% of Malta's groundwater bodies present both quantitative and qualitative poor status.

In Tunisia, as reported by Metap (Mediterranean Environmental Technical Assistance Program), 72% of all surface water has an acceptable salinity level of 1.5 g/l or less. About groundwater, shallow aquifers are located in the north and center, deep aquifers in the south: water from only 8% of shallow and 20% of deep aquifers have acceptable salinity levels of 1.5 g/l or less. Data indicate that most water resources are polluted and major pollution sources are municipal wastewater discharge, industrial effluents and agricultural activities. Despite major efforts during the last decade to build wastewater facilities, the overall quality of water remains at risk; salinity is also a major constraint: though 50 percent of all water resources have salinity levels of less than 1.5 g/l, 95 percent of resources in the south have salinity levels above 2 g/l. Uncontrolled and unmonitored leaching practices and agricultural drainage are polluting water and water contains high nitrate levels. Solid waste and sludge from wastewater treatment plants are polluting water. Several waste dumpsites are located near water bodies.

3. Information concerning water and sanitation service in the project area

3.1 Typology of settlements

Country / Region	Urban	Rural	Other
Palestine	Urban Central 53.5 % (PWA, 2005).	Rural village and Refugee camps 46.5 %	/
Italy			
Lazio	· **Borgata Romana**. One of the isolated neighborhoods near Rome (borgate romane)too far from the existing sewage network to be easily connected (e.g. Tragliatella, Monte Migliore, Sacrofanese-S.Cornelia) · **Castelli Romani**. An urban sprawl location in the area of Castelli Romani, where high water abstraction is lowering groundwater table and Albano and Nemi lakes level. · **Latina**. A village of Province of Latina where water of artificial drainage canals is severely polluted		
ATO RAGUSA	12 Municipalities	All the municipalities (except for Monterosso Almo, Giarratana and Chiaramonte Gulfi that are in a mountain zone) have small villages in the coastal zone (e.g., Marina di Ragusa, Marina di Modica, Sampieri, Marina di Acate, Scoglitti, etc.), often far from the central urban areas. During summer these villages increase significantly their population due to the touristic activities. This often implies severe problems concerning water shortage and/or WWTPs exploitation over their size.	In the municipality of Ragusa (the main of the ATO) there are several isolated settlements, illegally built, that are not connected with the municipal water systems (water supply, sewage, WWTP). In particular, there are about 8 settlements in the "Altopiano ragusano" zone and 22 settlements along the road connecting Ragusa with Marina di Ragusa.* Data on isolated settlements in the other municipalities are not available.
Malta			
		GOZO island	
Tunisia			
	1-Rural settlement with in-house water distribution systems but no sewage system (individual sanitation), Chorfech 24 (North-West of Tunisi, about 24 Km on the National Road GB8 between Tunisi and Bizert). This settlement is identified as a isolated rural village (around 350 inhabitants)		
	2-Rural village with in-house water distribution systems with partially sewage system and without treatment plant: **Zaouiet El-Magaiez.** This settlement is located at Cap Bon (Nabeul) and count 2500 - 4000 inhabitants (978 houses).		
	3-Urban areas with prevalence of multi-floor buildings: in house water distribution systems and sewage systems and treatment plant, **Bordo Centre** (68 976 inhabitants). This area is characterized by 10 Buildings (5 floors), Small stores, Supermarket, Offices (doctor, lawer,..) Inside commercial area. This centre is connected to supply and sewage networks.		

3.2 Water use and service existing in the settlements

Palestine

Kind of settlement	Question	Comments and water appliance	
Yes, 38 Palestinian communities with 20.000 still not have water network (PWA report, 2011). Some of the Palestinian use local springs, cistern with capacity of 90-120 m3, some purchase water from tanks with unidentified or uncontrolled sources. There wastewater treatment as gray water for garden level.		Potable and cooking	5 L
		Toilet	20 L
		Washing machine	9 L
		Shower	20 L
		Kitchen sink	30 L
	Is there a public water distribution network?	Yes	
	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	yes	
	What percentage of the population is served by the public network?	85%	
	Do households use other source of water than the public network (e.g. rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	Yes (rain Water harvesting)	

Data from (PWA, water fun / SMART project, 2011) and Lahalia Master Thesis, 2006.

ITALY-ATO Ragusa

Kind of settlement	Question	Comments
Urban central areas	Is there a public water distribution network?	Yes
Coastal villages		Yes
Rural villages and isolated settlements		No
Urban central areas	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	Yes
Coastal villages		Yes
Rural villages and isolated settlements		Yes
Urban central areas	What percentage of the population is served by the public network?	95%
Coastal villages		*n.a.*
Rural villages and isolated settlements		0%
Urban central areas	Do households use other source of water than the public network (e,g, rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	*n.a.* (some buildings can have systems to store rainwater)
Coastal villages		*n.a.* (some buildings can have systems to store rainwater)
Rural villages and isolated settlements		Private wells, rainwater, water purchased

Malta-Gozo

Kind of settlement	Question	Comments
Rural, little villages	Is there a public water distribution network?	Yes
	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	Yes
	What percentage of the population is served by the public network?	100%
	Do households use other source of water than the public network (e.g. rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	Yes (not quantified)

Tunisia

Settlement	Question	Comments and water appliance
Chorfech 24	Chorfech 24 is connected to supply network managed by SONEDE (individual counter)	
	water consumption	between 129l/d.p (global) and 164 l/d.p (domestic) l/d.p
	Is there a public water distribution network?	YES
	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	YES
	What percentage of the population is served by the public network?	98
	Do households use other source of water than the public network (e.g. rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	1- NO 2- the acquifer is salt (depth 1 to 2 m in winter) 3- some farmers use the Medjerdah irrigation network for irrigation in their fields
Zaouiet El-magaiez	water consumption	
	Is there a public water distribution network?	YES
	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	Yes
	What percentage of the population is served by the public network?	96
	Do households use other source of water than the public network (e.g. rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	1- For the drink, the population use another soft resource distributed by jerrican by a private distribution 2- the population use the aquifer for house activities

Bardo Centre	water consumption	
	Is there a public water distribution network?	YES
	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	YES
	What percentage of the population is served by the public network?	100
	Do households use other source of water than the public network (e.g. rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	NO

ITALY-Lazio Region:

Kind of settlement	Question	Comments
Borgata Romana	Is there a public water distribution network?	Yes
Castelli Romani		Yes
Latina		Yes
Borgata Romana	Is there in-house distribution (in-house taps and showers, only one water distribution point outside the house, public water distribution points)	Yes
Castelli Romani		Yes
Latina		Yes
Borgata Romana	What percentage of the population is served by the public network?	100%
Castelli Romani		*100%.*
Latina		100%
Borgata Romana	Do households use other source of water than the public network (e,g, rainwater, greywater treated or untreated) and for which use and relative specific amount in percentage on the total consumption? which fraction of the population use non conventional resources?	*NO*
Castelli Romani		Generally no. There could be some case of private wells or rainwater harvesting
Latina		NO

Lazio Region	Borgata Romana	Houses are equipped with flushing toilets or dry toilets?	flushing toilets
	Castelli Romani		flushing toilets
	Latina		flushing toilets
	Borgata Romana	Are there public toilet (flushing or dry)?	NO
	Castelli Romani		No significant contribution to wastewater
	Latina		No significant contribution to wastewater
	Borgata Romana	Other kind of sanitation (pit latrines open defecation) are in use?	No
	Castelli Romani		No
	Latina		No
	Borgata Romana	Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	Yes (mainly black, grey and rainwater)
	Castelli Romani		Yes (mainly black, grey and rainwater) with the exception of isolated home served by private septic tanks
	Latina		Yes (mainly black, grey and rainwater)
	Borgata Romana	Is there a wastewater treatment?	Not for all the settlements: some discharge directly into water bodies
	Castelli Romani		Yes but the sewage network is not complete
	Latina		Yes but the sewage network is not complete
	Borgata Romana	Is wastewater discharged or reused? Where is discharged?	Discharged (river or artifical drainage network)
	Castelli Romani		Discharged (river or artifical drainage network)
	Latina		Discharged (river or artifical drainage network)

3.3 Sanitation service existing in the settlements

Country/Region	Kind of settlement	Question	Comments
Palestine	Urban, Rural and Refugee camp.	Houses are equipped with flushing toilets	NA
		Are there public toilet (flushing)	At the main cities
		Other kind of sanitation (pit latrines) are in use?	Cesspits
		Is there a sewage network? What kind of water does it drains (, black and grey water, ,)?	All mixed system the rainwater are mixed with the sewer system.
		Is there a wastewater treatment?	In some area as centralize and decentralize.
		Is wastewater discharged or reused? Where is discharged?	Discharge to nearest Wadis
ATO RAGUSA	Urban central areas	Houses are equipped with flushing toilets or dry toilets?	flushing toilets
	Coastal villages		flushing toilets
	Rural villages and isolated settlements		flushing toilets
	Urban central areas	Are there public toilet (flushing or dry)?	flushing toilets
	Coastal villages		flushing toilets
	Rural villages and isolated settlements		flushing toilets
	Urban central areas	Other kind of sanitation (pit latrines open defecation) are in use?	No
	Coastal villages		No
	Rural villages and isolated settlements		No
	Urban central areas	Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	Yes (mainly black, grey and rainwater)
	Coastal villages		Yes (mainly black, grey and rainwater)

	Rural villages and isolated settlements		No
	Urban central areas	Is there a wastewater treatment?	Yes
	Coastal villages		Yes
	Rural villages and isolated settlements		Not centralized, only Imhoff or septic tanks
	Urban central areas	Is wastewater discharged or reused? Where is discharged?	Discharged (river or sea)
	Coastal villages		Discharged (sea)
	Rural villages and isolated settlements		Discharged (river or subsurface discharge)
Gozo		Houses are equipped with flushing toilets or dry toilets?	Flushing
		Are there public toilet (flushing or dry)?	Flushing
		Other kind of sanitation (pit latrines open defecation) are in use?	No
		Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	Yes – black and greywater. (rainwater from illegal connections)
		Is there a wastewater treatment?	Yes
		Is wastewater discharged or reused? Where is discharged?	Discharged – to the sea. Plans in hand for re-use
Tunisia	Chorfech 24	Houses are equipped with flushing toilets or dry toilets?	flushing toilet
		Are there public toilet (flushing or dry)?	
		Other kind of sanitation (pit latrines open defecation) are in use?	pit latrines
		Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	NO
		Is there a wastewater treatment?	NO
		Is wastewater discharged or reused? Where is discharged?	soil, infiltration
	Zaouiet El-Magaiez	Houses are equipped with flushing toilets or dry toilets?	flushing toilet

		Are there public toilet (flushing or dry)?	
		Other kind of sanitation (pit latrines open defecation) are in use?	pit latrines and sewage network for some houses
		Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	partially
		Is there a wastewater treatment?	NO
		Is wastewater discharged or reused? Where is discharged?	1- soil, infiltration 2- and partially evacuated by network to the natural area out of the village
	Bordo Centre	Houses are equipped with flushing toilets or dry toilets?	flushing toilet
		Are there public toilet (flushing or dry)?	NO
		Other kind of sanitation (pit latrines open defecation) are in use?	NO
		Is there a sewage network? What kind of water does it drains (blackwater only, black and greywater, black only, grey and rainwater)?	YES
		Is there a wastewater treatment?	YES (urban sewage network to WWTP, Tunis oues, El-Attar)
		Is wastewater discharged or reused? Where is discharged?	Municipal sewage network to WWTP, Tunis oues, El-Attar)

3.4 Local sanitary or environmental problems

In Palestine the major problem is groundwater pollution both in West bank and in Gaza strip; in WB there will be direct contact and biological contamination occurs and trace metals as anthropogenic pollutants; in Gaza saline intrusion, high chloride and nitrate beside the biological contamination: nitrate reachs 450 mg/l (below 45 mg/l according to WHO).

In Ato Ragusa region, there are not available data on specific environmental problems due to local wastewater discharge, but the bad status of the rivers implies a bad functioning of the WWTPs that especially during summer the suffer the population increase. In isolated settlements there are not available data on specific environmental problems due to local wastewater discharge, but the wastewater discharge probably occurs without controls. Specific sanitary problems are in all cases absent.

In Gozo no particular problems are underlined.

In Tunisia, in Chorfech 24 area potential contamination of groundwater by the use of pit latrine, grey waters disposal directly by the surface, and smells, mosquitoes and flies are the major environmental issues. .
In Zaouiet El-Magaiez there are some environmental problem for the partially raw wastewater discharged directly without treatment in the river, with associated smell problems and mosquitoes proliferation.
In Bardo center there are some problems with rainwater evacuation.

3.5 Local water and sanitation policy

In Palestine the New water Policy is under development and PWA working for reform for water sector in Palestine in which new water policy, wastewater policy, water supply policy and afterward new strategies will be developed .New water law, regulations, by laws and institutional settings will be considered in the reform process.

In Sicily, the master plan of the integrated water services in the ATO Ragusa foresees investments for the strengthening of the services, above all in the wastewater treatment sector that was put under infringement by EU. The update of the master plan of ATO Ragusa is still pending and the national and regional legislative framework on public water services is under revision. This causes uncertainty and delay in the adoption of effective policies.

Malta has recently launched a new water policy which takes into account Malta's specific needs and international obligations. The key objectives of the policy are:

1. Supply of good quality water to meet the needs of the population.
2. Sustainable use and management of the nation's water resources.
3. Protection of the water resources and the aquatic environment from pollution.
4. Fair and transparent regulation of the water industry.
5. Mitigating against the effects of floods.
6. Adaptation to climate change.

Tunisia is now working on water strategy 2050.