



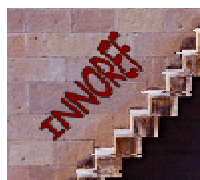
EFFICIENT  
WATER  
RESOURCE  
USE

**E.W.A.R.U.**  
**Efficient Water Resource Use**

**ANNEX N.6**

**CONTEXT ANALYSIS REPORT**

**JANUARY 2007**



# CONTEXT ANALYSIS

In order to execute a complete study of management of the water resource, many and detailed geologic, hydrogeologic and hydrologic information of the examined area are necessary. This approach demands a remarkable cost of time and resources. In our analysis we will limit ourselves to estimate and to analyze some data that have been collected from the partners of the EWARU plan.

## 1. Physical characteristics

The four areas which participate at the EWARU plan have very different geomorphologic and basic characteristics:

- The city of Terni is situated in an alluvial plain in the centre of the Italian peninsula; with a surface of 1953 km<sup>2</sup> and about 220.837 inhabitants it is the larger and more populated surface between the considered areas.
- The Mountain Community of Gemonese, Val Canale and Canal del Ferro represents an alpine area in the North-East of Italy; this surface extends for 875 km<sup>2</sup> but it is barely populated with only a population of about 12.361 inhabitants.
- Etoliko, which is a town placed in the West of Greece, is surrounded by two lagoons and some grasslands and swamps; it has got a surface of 129.305 km<sup>2</sup> and about 7.279 inhabitants.
- Potštát is a village in Olomouc Region, Czech Republic, placed in a hilly area; this area has the smaller surface and population between those examined with 49 km<sup>2</sup> and about 1792 inhabitants.

The number of inhabitants of a zone influences the water amount used for civil and domestic purpose. Instead the type and the degree of development of the economy, influences the water amount necessary for the agricultural and industrial activities. From this point of view it is reasonable to suppose that Terni needs a great quantity of water because the 44% of its land is cropped (about 866 km<sup>2</sup>) and there also many factories of different kind. The economy of the other partner's zones seems less developed and with a prevalence of the agricultural activity.

## 2. Economic analysis of water uses

In all the four areas, almost the totality of the population is connected to public supply system with only a very small part of population with self-supply. The daily consumption of water per person varies from 0,12 m<sup>3</sup> in Potštát to 0,2 m<sup>3</sup> in Terni and Mountain Community. This value is comparable to the values that are found in technical literature as regards the civil water consumption. It's important to emphasize that this value stretches to grow with the largeness of the city population.

Except in the Mountain Community, where not all the population has got a water meter, in the other partner's areas every user has got its own meter and has to pay what it consumes.

The situation that emerges from the analysis of data regarding wastewater treatment is quite acceptable for Terni and Mountain Community but quite problematic for Potštát and Etoliko.

In particular the greater part of the population of Terni is connected to sewerage system and to one of the 257 wastewater treatment plants present inside of its area. Even if 35 of these 257 plants are malfunctioning, data demonstrate that in general there is a good efficiency in pulling down the polluting cargo.

In the Mountain Community the situation is lightly worse but quite acceptable because 60% of the population is connected to sewerage system and 40% is connected with one of the 8 wastewater treatment plants present. In Potštát only 25% of the population is connected to sewerage system and moreover there isn't any wastewater treatment plant. It's possible that also due to this situation water quality isn't good but there aren't further information in purpose.

The population of Etoliko is connected to sewerage system and to one wastewater treatment plant but some of its water bodies show various types of pollution. In particular Lysimachia lake has got high concentrations of nitrogen oxides and phosphates and the water of Acheloos river and lagoons are polluted from Pb and agrochemicals.

### 3. Trends and baseline scenario

Concerning trends in macro-economic policies, Mountain Community and Potštát are entrusted to existing studies and report on trends in agricultural, industrial and energy policy present at a regional level. Terni and Etoliko haven't acquired these data yet.

For what regards planned policies and investments, Municipality of Terni has allocated a large sum of money finalised to investments, for the next three years, on water supply (23,7 million €), sewerage (7,8 million €) and depuration plants (12 million €). These investments will allow to improve a situation of water management which seems already quite good. Furthermore 15 million € have been foreseen as proposed investment in improved technology which could be of particular importance because could solve some problems of water system related to service organization, functionality improvement trough new technologies or mitigation of management cost.

In the area of Mountain Community there aren't any proposed investments in water supply and wastewater treatment but there are proposed investments in flood protection from Region FVG. These investments are very important in order to safeguard the area from disastrous events such as that of the summer 2003. Besides the Civil Defense Department of RFGV has proposed an investment for monitoring hydrologic variables.

The Municipality of Potštát has allocated 1.400.000 € as proposed investments in water supply and wastewater treatment, 300.000 € as proposed investments in flood protection and 1.250.000 € as proposed investments in water supply enhancement. What we can say is that investments in water supply and wastewater seem to be desirable due to the insufficient quality of water presented in the previous paragraph.

Concerning Etoliko situation we haven't received data yet.

#### 4. Assessing cost-recovery

Water price is defined in different ways in the partners areas:

- In the city of Terni, the Ambit Authority is the subject who has in charge the role of defining this price.
- Each municipality of the Mountain Community has flexibility to choose its own price.
- In Potštát water price is regulated by Ministry of finance of The Czech republic.
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In particular water price level in Terni depends on the category of the user (domestic social, resident, not resident, hotels, craftsmen, commerce, industrial, etc.) and on the amount of the consumption.

In the area of Mountain Community some municipalities apply one annual rate because users haven't got water meters, the other municipalities fix their rates based on water consumption. It's important to notice that in general rates at m<sup>3</sup> of water are much lower than that of Terni and Potštát.

In Potštát water price is in same level for all users (inhabitants, factories, landfarmers etc.) and depends on the use that is made (drinkable water, industrial water, etc.). Furthermore government and regional authorities give grants for building public water supplies, water preparing plants, sewer systems and sewage treatment plants.

Concerning financial costs of water services, as one expects, Terni has got much larger costs of operation, maintenance and administration than the others partners.

Concerning environmental cost we haven't acquired data yet.

# CONTEXT ANALYSIS

## 1. Physical characteristics

Basic characteristics	MUNICIPALITY OF TERNI	MUNICIPALITY OF ETOLIKO	MUNICIPALITY OF POTSTAT	MOUNTAIN COMMUNITY GEMONESE
Surface km2	1.953	129.305	49,47	875,33
Population	220.837	7.279	1.792	12.361
Population density	113 inhab/km <sup>2</sup>	56.83	36,22	14,12
Working age population	≅ 146.000	18	1.167	8.279
The administrative structure				
N° of municipalities	32 Municipalities	1	3 municipalities + 5 smaller municipalized villages	8
Economic characteristics of key water uses				
a) Agriculture				
Total cropped area	86.611,42 ha	50.50km <sup>2</sup>	2990,45 ha of agricultural land, therefrom 1931,06 ha of ploughland	9,51 km2
Livestock	13.873 bovins 27.223 pigs 35.895 ovins 2.035 goats 2.002 equines		1300(estimation)	3.876
Gross production	Not found		1 720 000 Euro /year	Non available
Income	Not found		Gross production in agriculture/worker in agriculture/year 16180 Euro Average income in agriculture sector/person/year 4855 Euro	Non available
Total farm population	19.000		individual private farmers – 127	758
b) Industry				
Turn over for sectors	Mineral extraction factories n. 8  Manufacturing		Data only for whole Czech republic, not for our region	Non available

	activities factories n. 2.085  Production and distribution of electric power water and gas n. 8  Building companies n. 2.648			
Employment for sectors	n. 20.300		Data only for whole Czech republica, not for our region	5.352
c) Hydropower			No hydropower in region	
Installed power capacity	412 MW deriving from 5 hydroelectric plants	Referring to Hydropower there are three technical lakes in the prefecture of Aetoloakarnania, close to the area of intervention and they are the following: Lake of Kremasto with 4 units of power capacity, Kastraki Lake with 4 Units of power capacity and Strato Lake with 4 units of power capacity.	--	Non available
Electricity production	≅ 280 MW (about 70% of power capacity)	The electricity produced by the above units respectively are 437MW, 320 MW and 156,2 MW	--	Non available

## 2. Economic analysis of water uses

Drinking water supply	MUNICIPALITY OF TERNI	MUNICIPALITY OF ETOLIKO	MUNICIPALITY OF POTSTAT	MOUNTAIN COMMUNITY GEMONESE
Population connected to public water supply system	96%	143 enterprices 2.157 houses	1.691	100%
Population with self-supply	≅ 4%		Minimally 100 (but it is inexactitude, many people are connected to public water supply system, but they use their own self-supply)	0%
Number of water supply companies	1- S.I.I. (Water Integrated Services) – Mixed Public – Private Company	1	2	8
Consumption per person/day m3	0,20	39758 (total)	0,12	51
Water meters available on apartments, blocks level	There is no a fixed limit. According to the decree concerning the application of the Galli Law, however every user has to install his own meter and he pays a higher price for the biggest use.		Water meters for cold water by the whole of the property. In flat-building in each flat.	Non available
<b>Wastewater treatment</b>				
Population connected to sewerage system	190.798. They represent the 86% of total population. All municipalities of the Ambit count on a sewerage system and the length of pipeline for each inhabitant is about 1,09 km/inh. The mean age of the pipelines is about 21 years.	143 enterprices 2157 houses	475	60%
Population connected with wastewater	182.170 they represent the 82,49% of total population,	143 enterprices 2157 houses	0	40%

treatment plant	but the existing plants are able to satisfy an increased request of about 48%			
Number of wastewater treatment plant	257, but 35 of these are malfunctioning.	1	0	14
Water quality	<p>The following data are taken by a study of ARPA (Regional Agency for Environmental Protection). The study has examined the efficiency of 5 depuration plants in Terni. The data show the decrement (in %) of polluting power of treated waters:</p> <p>BOD5 = 87%  COD = 91%  SS=95%  Ntot=62%  Ptot=93%</p> <p>Where  BOD5=Biochemical Oxygen Demand  COD = Chemical Oxygen Demand:  they represents a measure of polluting power of water and represent the oxygen amount necessary to decompose organic substances in water.</p> <p>SS= Is the amount of solid particles</p> <p>Ntot=Total amount of nitrates</p> <p>Ptot= Total amount of phosphates</p> <p>It may be concluded that there is a good efficiency of the examined depuration plants but the study revealed too that this efficiency is lower for smaller plants, that so are defined not convenient.</p>	<p>There is not a systematic monitoring of the water quality in the pilot area. The water from the artificial Lake Kastrakiou (one of the 4 Acheloos (dams) seems that is of a good quality, appropriate for irrigation, aquaculture and water supply. The concentrations of PO<sup>-</sup>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup> in Lysimachia lake is high. Some chemical indicators show also the wash out of agrochemicals and Pb into the water of Acheloos river and laggons. High concentrations of nitrate the periode April - August is an evidence of the intensive use of agrochemical. The concentration of phosphate are higher in the water of lagoons than the water of rivers. The PH of the whole area is between 6.5-8.5. Lower PH is measured in the less salted water of Aitoliko Lagoon. There is a lack of BOD measures. In the Kleisova lagoon (part of the Mesologgi lagoon) is used as a dumping site for the solid waste of Mesologgi and other urban areas.</p>	<p>Not good. Regional hygienic station of Olomouc Region (NUTS III) permitted exception from standard specifications in manganese limit 0,5 mg/l (specification is 0,05 mg/l) to the 30.4.2007. In March 2007 must be requested for next exception. There was period, when water in public water supply wasnt drinkable due to high quantity of ferrum. Thesedays it is allright.</p>	<p>Corresponding to italian standard</p>
Economic characteristics of key water uses				
a) Agriculture				
Total cropped area		50.50km <sup>2</sup>	2990,45 ha of	9,51 km <sup>2</sup>



			agricultural land, therefrom 1931,06 ha of ploughland	
Livestock			1300(estimation)	3.876
Gross production			1 720 000 Euro /year	Non available
Income			Gross production in agriculture/worker in agriculture/year 16180 Euro Average income in agriculture sector/person/year 4855 Euro	Non available
Total farm population			individual private farmers – 127	758
b) Industry				
Turn over for sectors			Data only for whole Czech republic, not for our region	Non available
Employment for sectors			Data only for whole Czech republica, not for our region	5.352
c) Hydropower			No hydropower in region	
Installed power capacity			--	Non available
Electricity production			--	Non available

## 2. Trends and baseline scenario

Trends in macro-economic policies	MUNICIPALITY OF TERNI	MUNICIPALITY OF ETOLIKO	MUNICIPALITY OF POTSTAT	COMUNITA' MONTANA GEMONESE
Existing studies and reports on trends in agricultural policy			Concept of agricultural policy and countryside development of the Olomouc Region (NUTS III), Development strategy of Hranicko Region (District of Administration 3)	yes, at regional level
Existing studies and reports on trends in industrial policy			Concept of development of business activities in Olomouc Region, Development policy of territorial area Olomouc Region	yes, at regional level
Existing studies and reports on trends in energy policy			Territorial energetic concept of of the Olomouc Region (NUTS III), National programme for the support of energy savings and usage of renewable and secondary source energy 2006	yes, at regional level
<b>Trends in exogenous variables</b>				
Population growth				Variation 1993-2003: -5,1%
Change in economic development				Economic reconversion from the commerce (related to borders) to the tourism
Technological changes				
a) household water use				No one
b) agriculture and irrigation				No one
c) climate change				No one

d) ...				
<b>Planned policies and investments</b>				
Proposed investments in water supply and wastewater treatment	<p>The proposed investments for the next 3 years are the following:</p> <ol style="list-style-type: none"> <li>1. Water supply: € 23,7 millions;</li> <li>2. Sewerage: €. 7,8 millions;</li> <li>3. Depuration plants: €. 12,0 millions</li> </ol> <p>Total amount = €. 43,5 millions.</p>		1.400.000,- Euro	No one
Proposed investments in pollution reduction programmes in agriculture			0	No one
Proposed investments in flood protection			300.000,- Euro	yes, from the Region FVG
Proposed investments in wetland restoration			0	No one
Proposed investments in improved technology	<p>In investment plan, A.A.T.O. has pointed out some strategic investments: they are of particular importance because they can solve some problems of water system related to service organization, functionality improvement trough new technologies or mitigation of management cost (for example costs for electric power): the total amount foreseen for this kind of investments is about 15,0 millions of Euros in the next 3 years.</p>			No one
Proposed investments in water supply enhancement			1.250.000,- Euro	No one
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### 3. Assessing cost-recovery (for each water service considered)

Prices water services	MUNICIPALITY OF TERNI	MUNICIPALITY OF ETOLIKO	MUNICIPALITY OF POTSTAT	COMUNITA' MONTANA GEMONESE
a) Current water price	The structure of the price has been clearly defined by a specific Italian Law (D.M. LL.PP. of 1 <sup>st</sup> August 1996). According to this Law, is the Ambit Authority the subject who has in charge the role of defining this price. For our case the structure of this price is clearly identified in the enclose table.		Water rent: Drinkable water 29,50 Kc = cca 1,05 Euro/m <sup>3</sup> , industrial water 19,- Kc= cca 0,68 Euro/m <sup>3</sup> (Sewer rate: 19,- Kc = cca 0,68 Euro/m <sup>3</sup> )	
Price level		0-50 = 0.31 50-100 = 0.36 100 - = 0.41	Annual increase in level of inflation (+ 3% in 2007)	Non confrontable. Municipalities have different calculation modes.
Price structure			Water price is regulated by Ministry of finance of The Czech republic: Water price = true charges + fair profit + VAT (5%). Water price is in same level for all users in region (inhabitants, factories, landfarmers etc.)	- price at m <sup>3</sup> ; - price per person; - flat rate per tap.
b) Subsidies			State grants for water price canceled in 1993	
Government/regional authorities	According to Italian Laws, the above mentioned price must achieve a substantial degree of self sustainability. In the A.A.T.O. financial planned for the next 10 years, there are about € 26,9 millions of Regional Subsidy		Government and regional authorities give grants for building public water supplies, water preparing plants, sewer systems and sewage treatment plants.	None.
Financial costs of water services				
a) Capital costs	According to Italian Law, in financial planned it has been assumed a rate of 7% for capital costs.		308.500,- Euro (y. 2002 – 2006)	647.000 euro a year
b) Operation and maintenance	About €. 8,0 millions for year 2006.		19.100,- Euro (y. 2006 – cost is after deduction of tax	47.000 euro a year

			write-offs)	
c) Administrative costs	About €. 13,4 millions for year 2006.		No data	145.000 euro a year (11,73 euro a per person a year)
<b>Environmental costs</b>			Data only for whole Czech republic	
a) Internalised costs through charges/taxes				Non available
b) Direct assessment				
Charges in environmental quality				Non available
Economic value/willingness to pay				Non available
c) Costs of preventive and mitigation measures				Non available
Implemented				Non available
Required for restoring good water status				Non available

#### 4. Protected areas

Protected areas	MUNICIPALITY OF TERNI	MUNICIPALITY OF ETOLIKO	MUNICIPALITY OF POTSTAT	COMUNITA' MONTANA GEMONESE
Number of protected areas in the watershed				14
Type of protected areas				- Prioratary finding areas; - Natural regional park; - Natural regional reserves; - areas SIC.
Surface (Km2)				17,07
Land use :				
a) agriculture				Non available
b) industry				Non available
c) forest				Non available
d) wetlands				Non available
c) ....				
<b>Pollution</b>				
Source of pollution:				Non available
automotive traffic				Non available
domestic heating				Non available
industry				Non available