APENNINE WATER CISTERN

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Spring Semester 2010

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APENNINE WATER CISTERN
LANDSCAPE, WATER AND POWER

WATER WEALTH IN RIETI
Omnipresence of the fluid element

RECLAIMED LANDSCAPE
The reatina valley kept up by a dense drainage meshwork
Settlement foundations creep towards the valley
A process of agriculture cultivation and preservation
Water as central theme in the struggle for regional tourism

HYDROELECTRIC NETWORK
Using the province's resources to energize an industrial center
Revaluation of Lazio

DRINKING WATER DEPENDENCIES
Two autonomous systems
Aqueduct Peschiera-Capore - Delivering 85% for Rome's water consumption

A SUPPLYING REGION – LOOKING FOR IDENTITY

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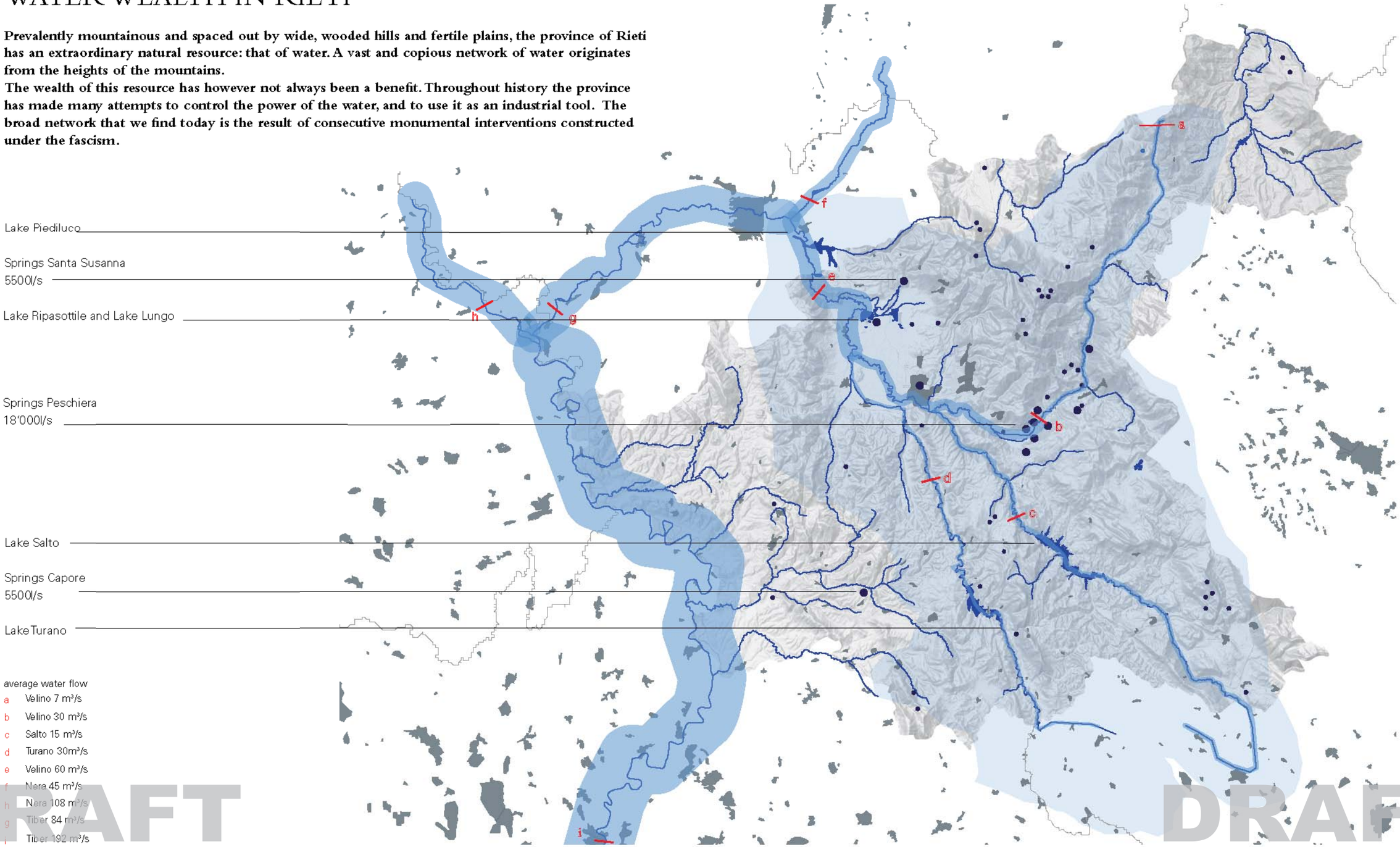
WATER WEALTH IN RIETI

Prevalently mountainous and spaced out by wide, wooded hills and fertile plains, the province of Rieti has an extraordinary natural resource: that of water. A vast and copious network of water originates from the heights of the mountains.
The wealth of this resource has however not always been a benefit. Throughout history the province has made many attempts to control the power of the water, and to use it as an industrial tool. The broad network that we find today is the result of consecutive monumental interventions constructed under the fascism.



average water flow

a Velino 7 m³/s
b Velino 30 m³/s
c Salto 15 m³/s
d Turano 30m³/s
e Velino 60 m³/s
f Nera 45 m³/s
h Nera 108 m³/s
g Tiber 84 m³/s
i Tiber 192 m³/s

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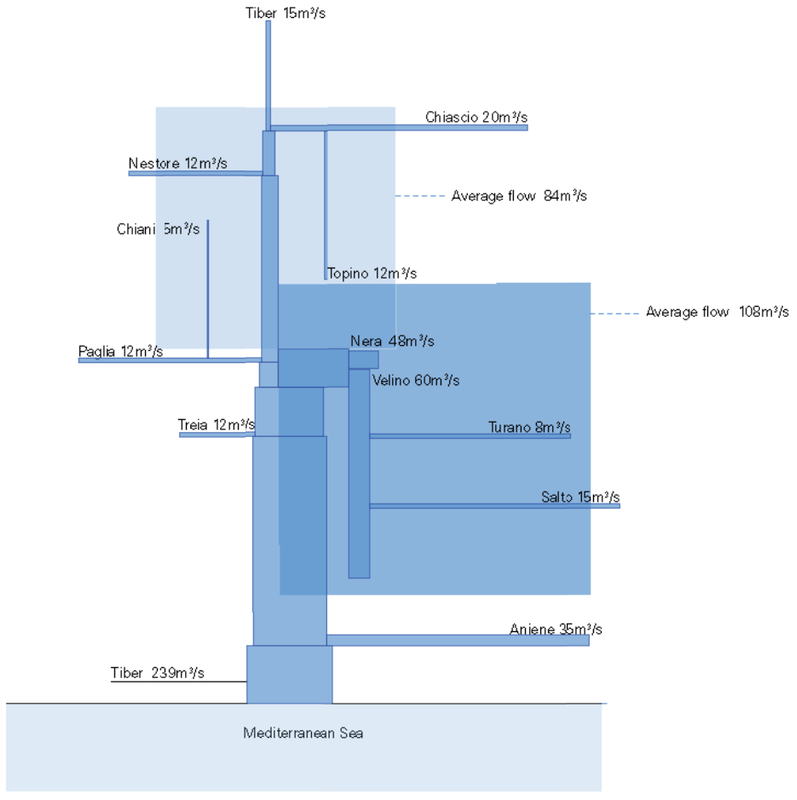
Omnipresence of the fluid element

1 Santa Susanna Springs
2 Lake Ventina
3 Lake Piediluco

84m³/s

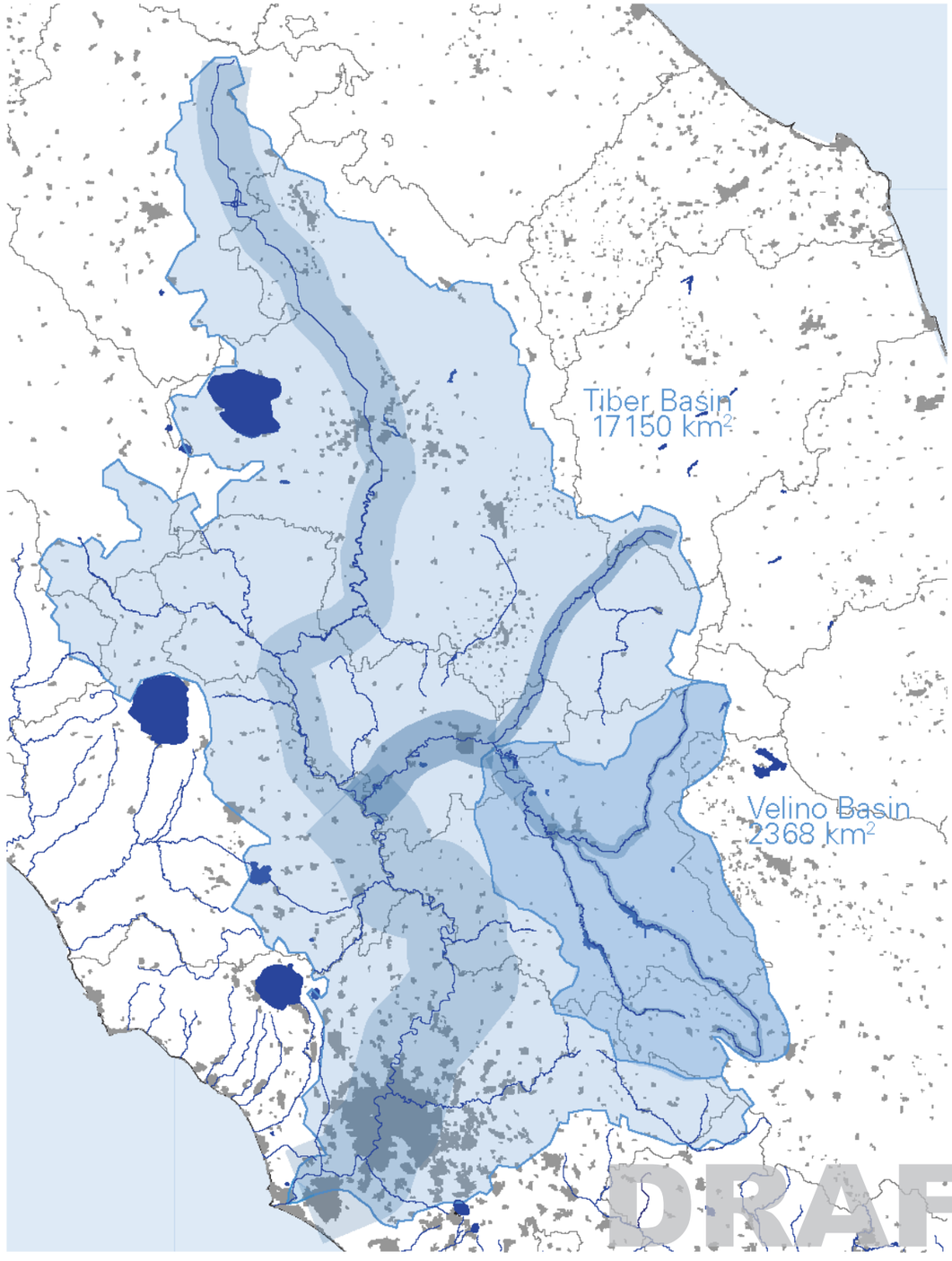
Velino river - Backbone of the province

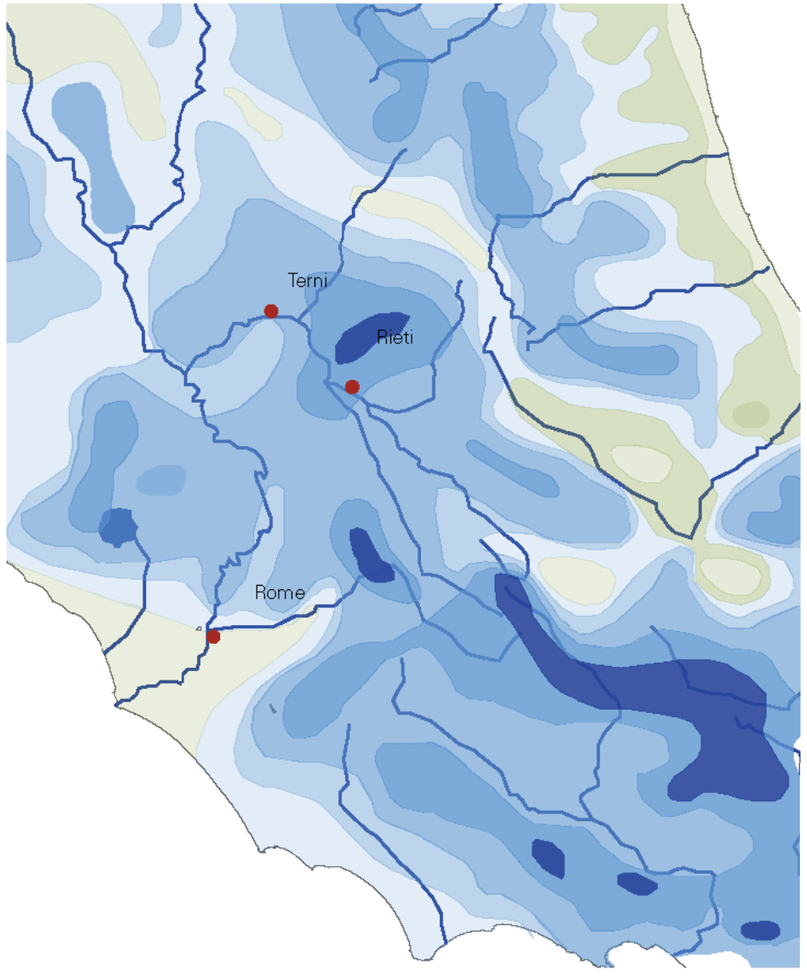
The Velino river flows through the province of Rieti, coming down a narrow valley next to the Monte Terminillo, crossing the City of Rieti, where the rivers Salto and Turano flow into it before entering the plain of Rieti and falling into the Nera, forming the famous Marmore Falls.



Tiber Basin - Fed by Rieti waters

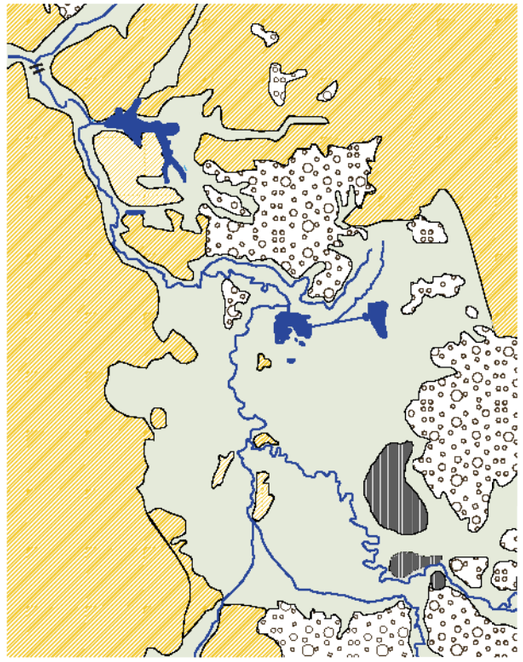
Despite its much smaller surface, in summertime the water from the Velino basin makes half the volume of the water, the Tiber brings into the Sea.





Precipitation jam over Rieti lowlands

Rainfall accumulates along the Appenines and comes down in a very high concentration in the area of the Rieti plain.

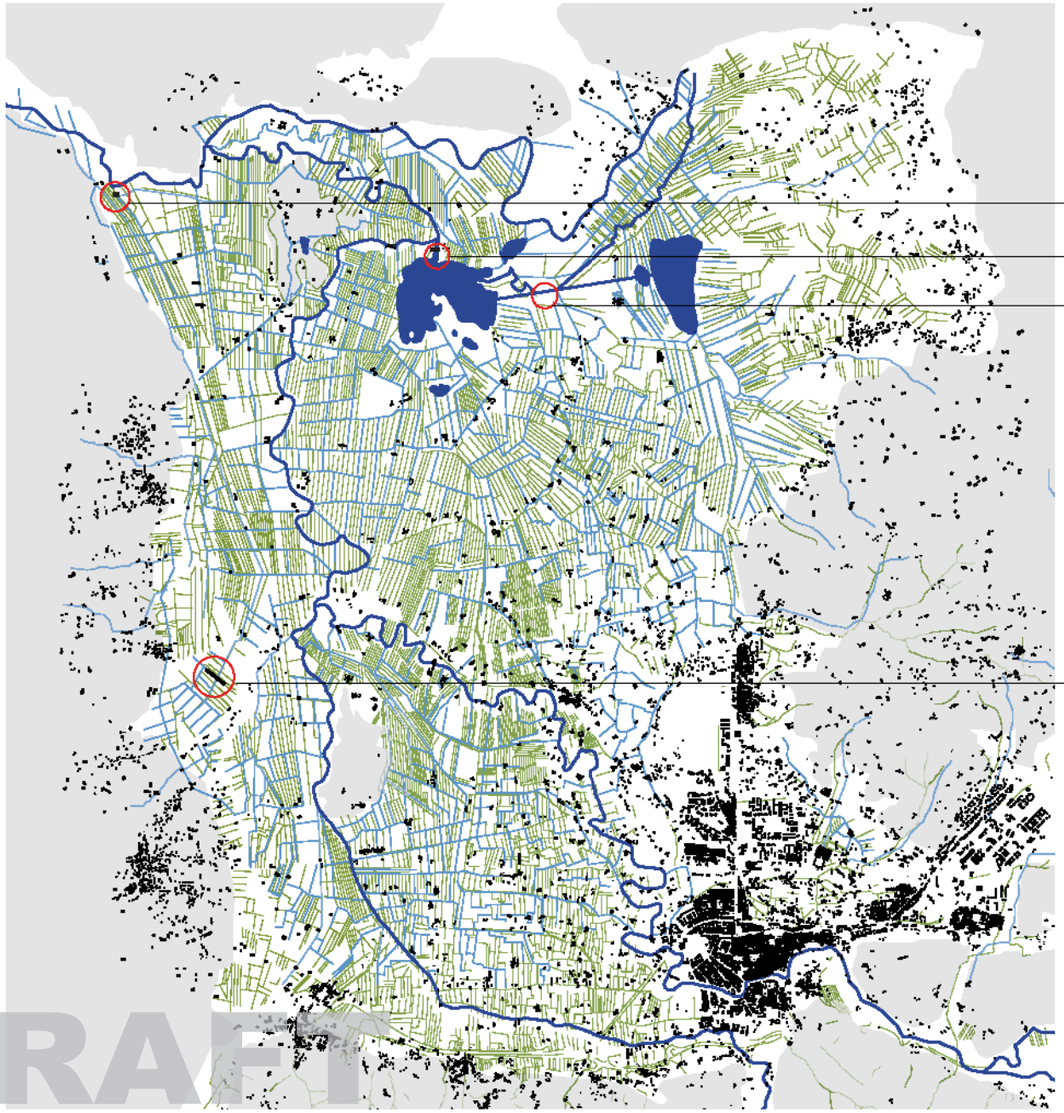


Impervious plain and porous hills

The poriferous, calcaerous soil of the hills surrounding the valley allow for a high level of conductivity. The water coming down from those hills ends up on the plain where, due to the loamy soil, it has to be removed by an artificial drainage systems.

RECLAIMED LANDSCAPE

The Piana Reatina has a very long history of reclamation. In 271 BC the consul Curio Manilo Dentato made the first attempt to drain the plain by digging a channel leading from the lowest point of the valley to the Marmore Falls. During the following centuries there where many more efforts to turn the barren marshes into a fertile area and to free it from Malaria. None of these were successful until the territorial restructuring of the landscape during the course of the Bonifica Integrale in the early 20th century.

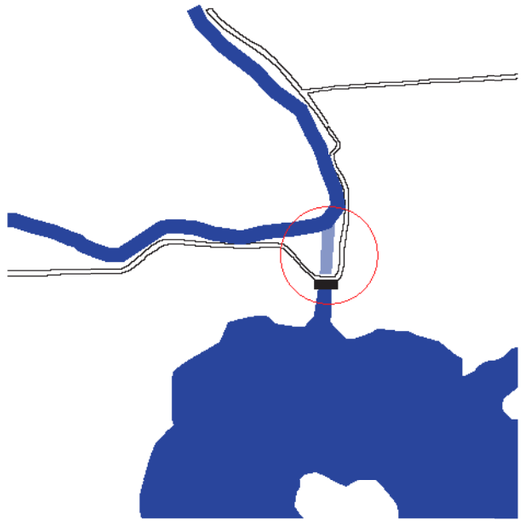


The Reatina valley kept up by a dense drainage meshwork

The agricultural soil of the piana Reatina needs drainage to improve production and to prevent the fields from flooding. The dense network of ditches, fosses and concrete channels is spread all over the plain, bringing the water either to the lakes and rivers.

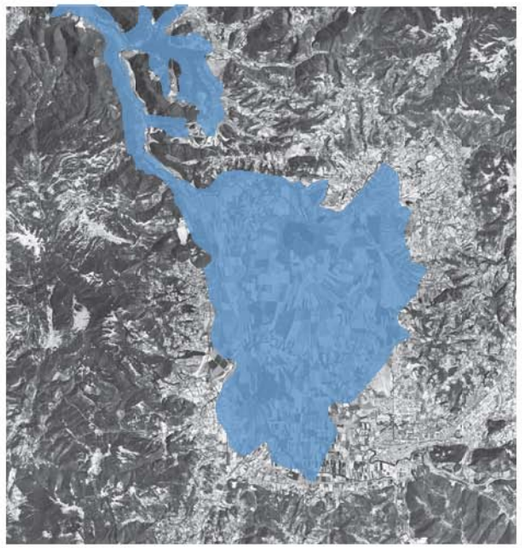
**Pump station Ripasottile -
Engine of an artificial habitat**

Without the pumps running, the water level would rise up to 1.5 meters, which would cause the flooding of 3'000 to 4'000 hectares of the land surrounding the lakes.



Engineering structures prevent the landscape from flooding

The two pumps inside the building are activated as soon as the water in the lakes starts to rise. Through a small channel, crossing underneath the building, the water is pumped out of the lake directly into the Velino river.



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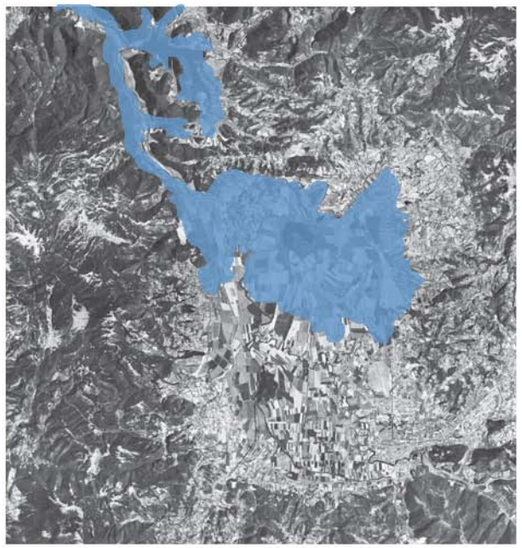

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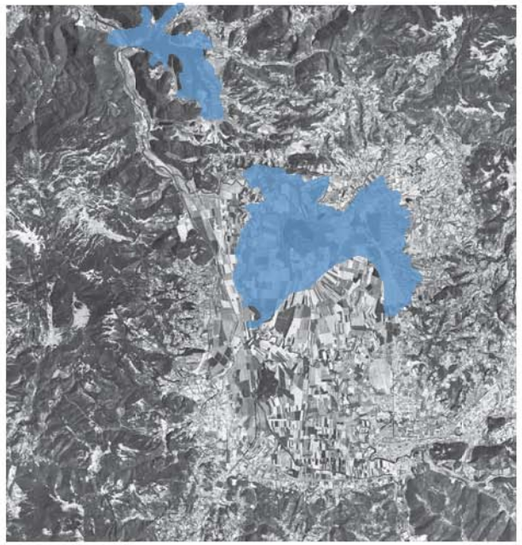

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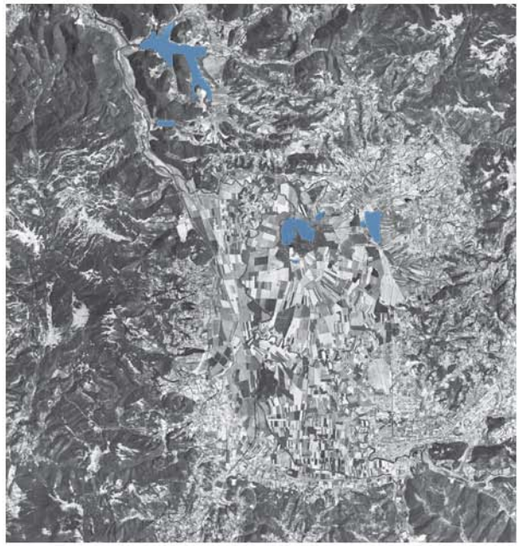

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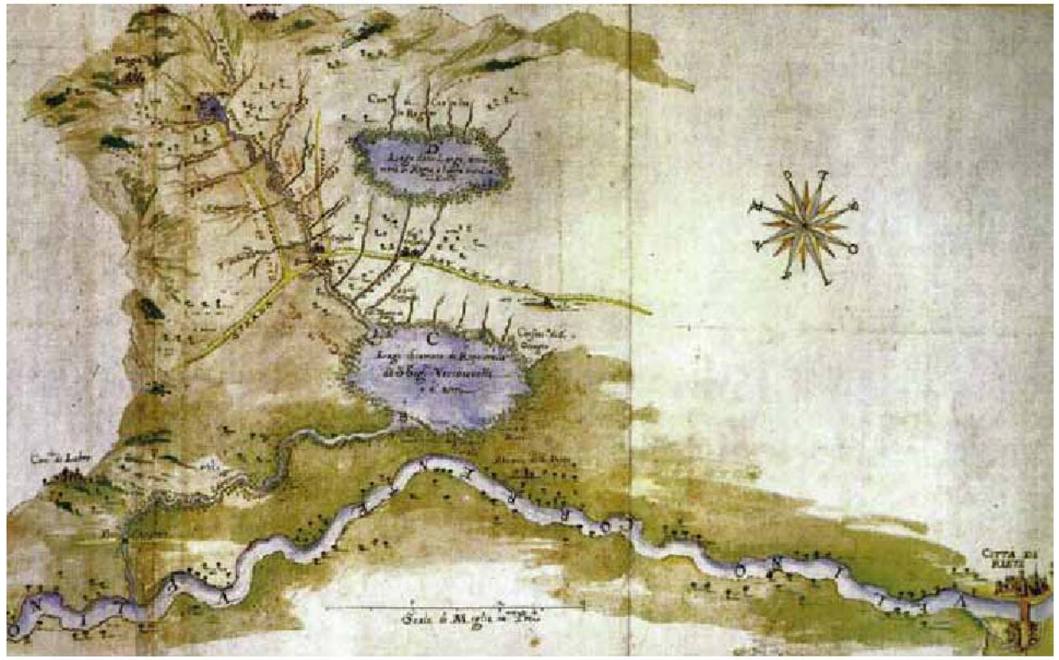
The lake becomes a fertile plain

1 Prehistoric
2 290 BC
3 1590 AC
4 today



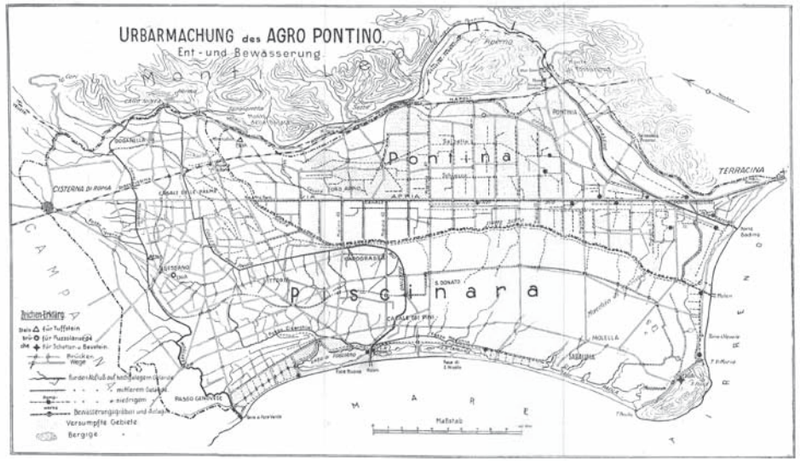
The drainage of the marshes - a millenium project

Map of the Rieti plain with the lakes Ripasottile and Lungo, 18th Century

Bonifica Integrale - Teritorial changes during fascism

Bonifica integrale means 'complete reclamation'. The movement was started in the late 1930s and included all works that are likely to increase the yield of arable land in any sense. The main tasks were: reforestation of the mountains, irrigation in dry areas, combating malaria, inner colonisation, ruralisation and modernisation of agriculture.

In this time there were made many new constructions, such as streets, bridges, dams, channels or artificial lakes all over the country.



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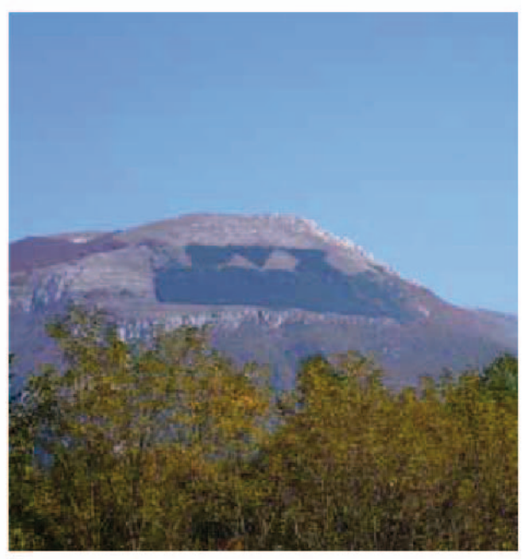

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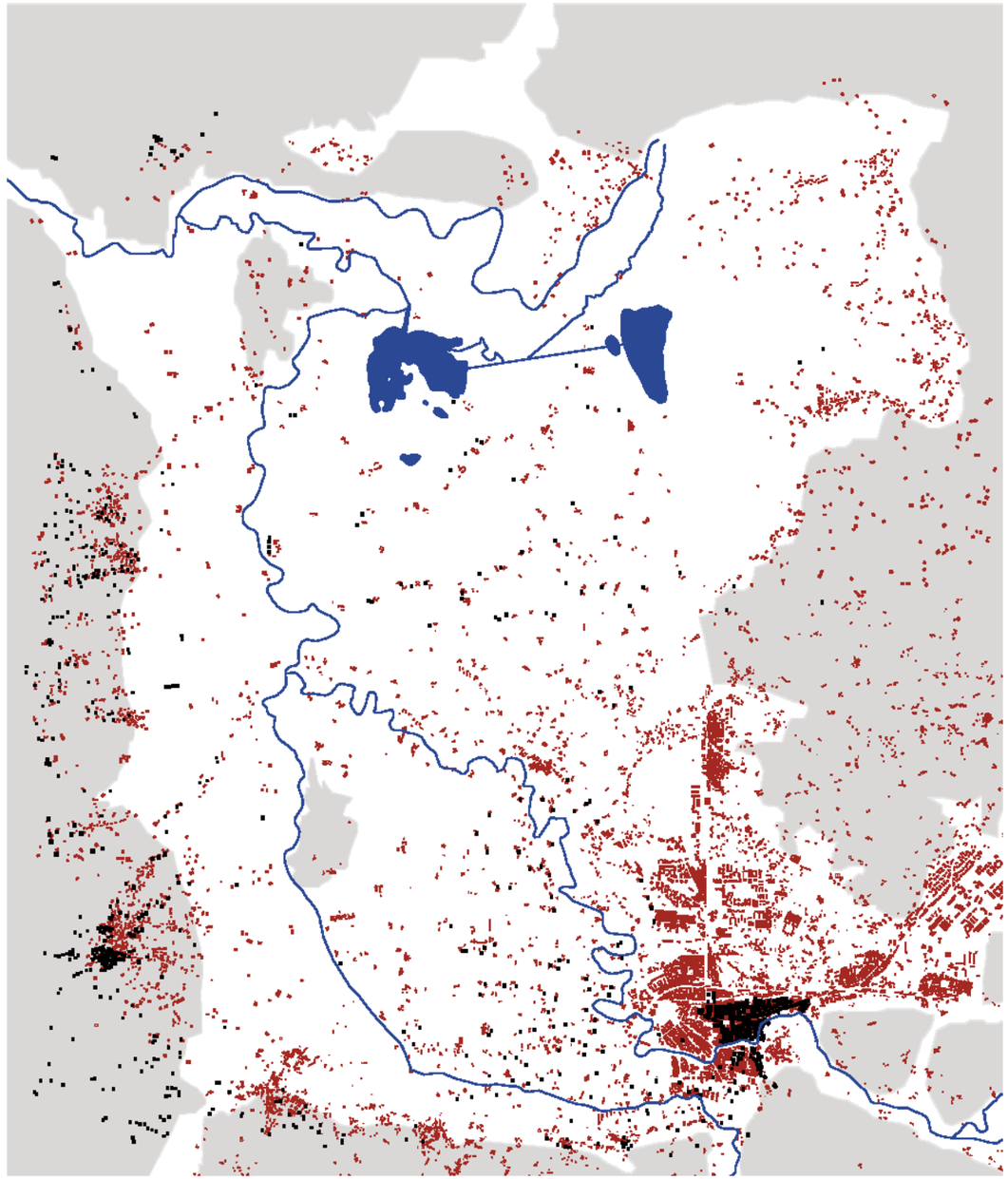
National forces reclaim the country

1 Plan of the reclamation of the Pontine marshes, 1934
2 Cover for the journal 'l'Agro Pontino', 1936
3 Monument on the Monte Giano, Antrodoco, 1939

Settlement foundations creep towards the valley

Regarding the evolution of the settlement structure, there is, next to the phenomena of expansion of urban settlements in the direction of the plain, a development characterized in three basic types of dynamics:

- Development of the settlement crown along the edges of the wood moving towards the bottom. In some cases these villages have a historical background and in some cases they are completely new settlements.
- Development of linear settlements along the main roads, especially along the road to board the plane and along the connections between the centres of hill and plain or in direction of Rieti.
- Dissemination of houses scattered along the plain. Often this residences with outbuildings and large gardens are related to farmland.



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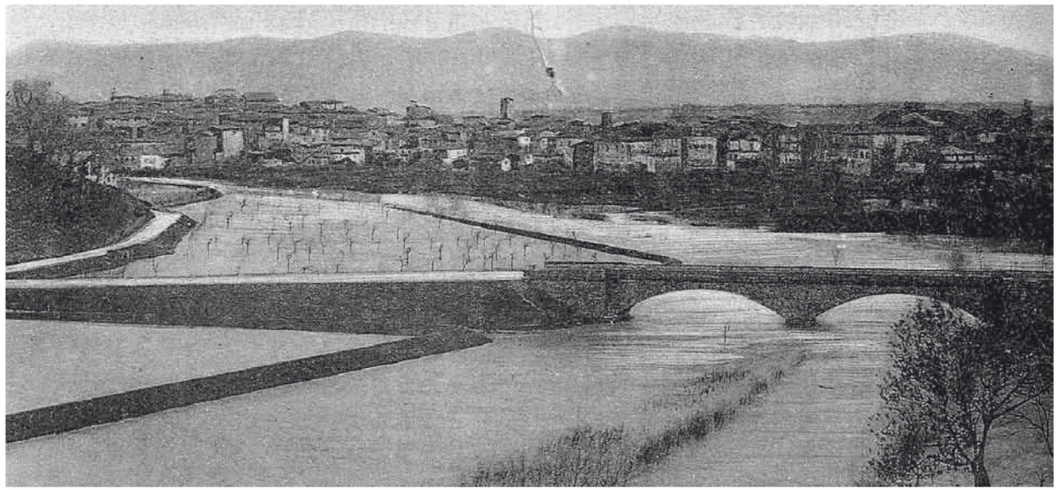
Abandoned farm houses - Growing city

1 Poggio Bustone, medieval village in the Rieti hills
2 Buildings under construction, along the street leading towards the city
3 Abandoned houses on the plain

Rieti - Shaped by surrounding water

Map from 1565 showing the city as an island half enclosed by the river.

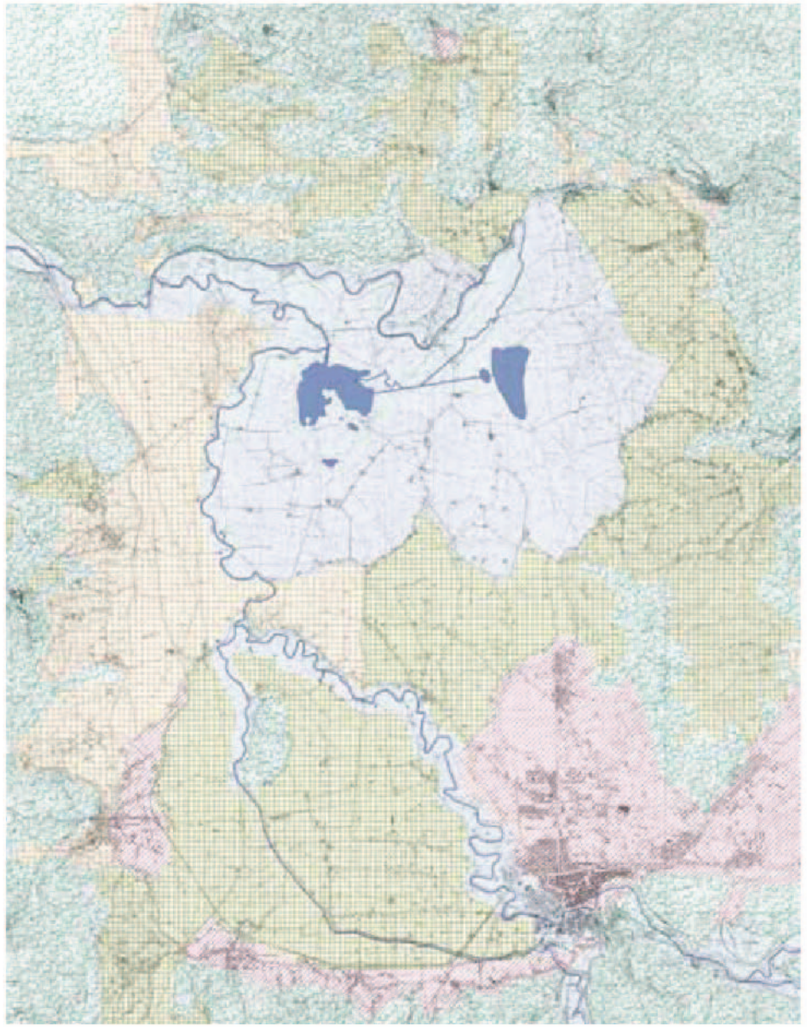


Flooding - Water as a threat

The history of Rieti includes several floods that caused extensive destruction to the city. In the 1930s there was a big renovation of the Velino channel in order to control its course and to prevent the city from another disaster.

Channels became streets

The bridge is a relict of the Roman ages, when the Velino formed a harbour in front of the city and the streets were navigable by ship.



unspoilt landscape

agriculture zone with high yield

agriculture zone with average yield

protected zone

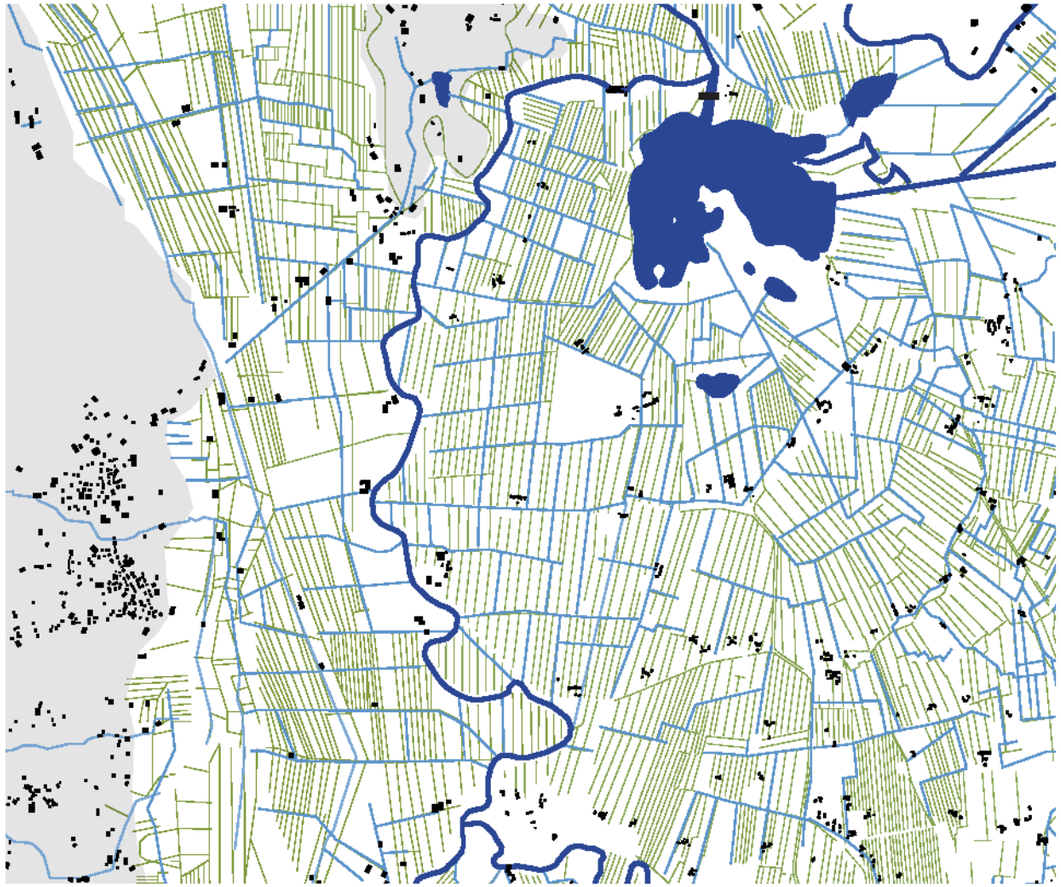
urban area

A process of agriculture cultivation and preservation

There are mainly two types of farmers on the Rieti lowlands:
1 Large landowners who usually live outside the province (in Rome, Perugia, etc..) and let their land to local people.
2 Small farming land owners who have another job in the city.
This causes heavily fragmented allotments and hardly any investments because the part-time farmers prefer to have small parcels with which they can enhance their income.

More self use then intensive production

There is a range of things, that are cultivated on the fields. While vegetables, grapes, barley and alfalfa are mostly produced in small amounts, there are bigger amounts of wheat and corn produced for the open market. In the past the area had been famous for the cultivation of sugar beet, supplying the Rieti sugar factory that closed in 1973.

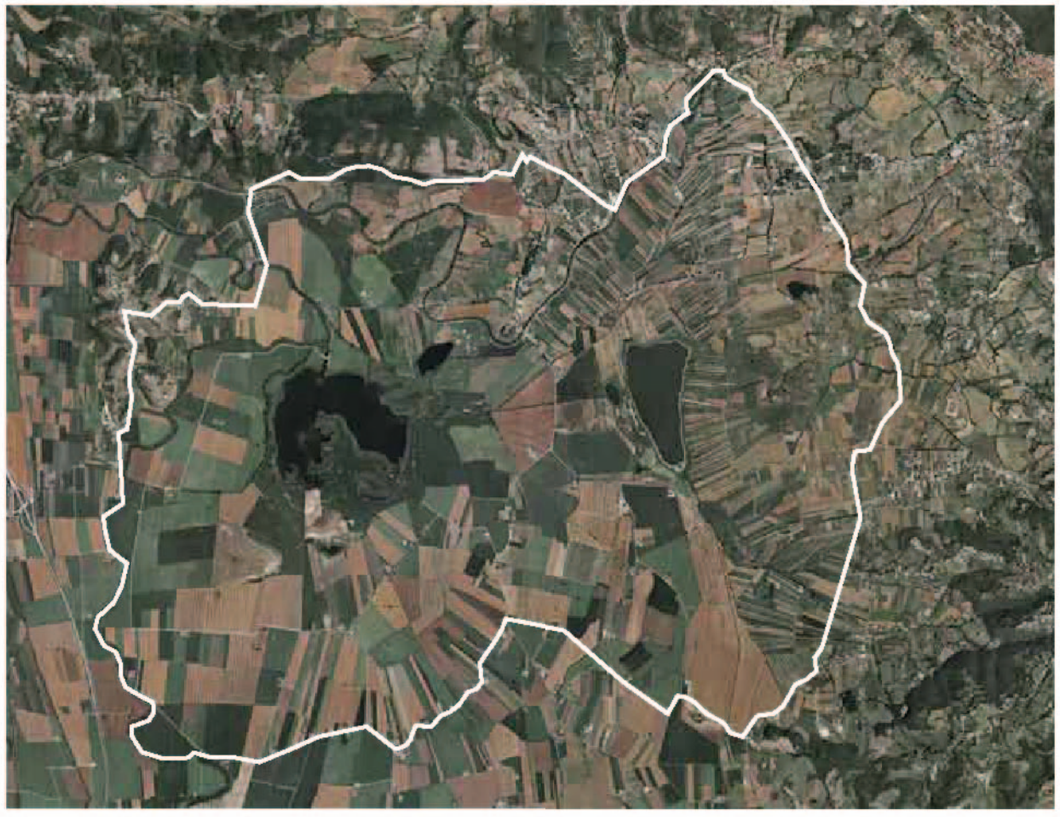


drainage

field structure

Drainage mesh and field structure - Two corresponding systems

The interaction between agriculture and water is an organization of limited fields and drainages.

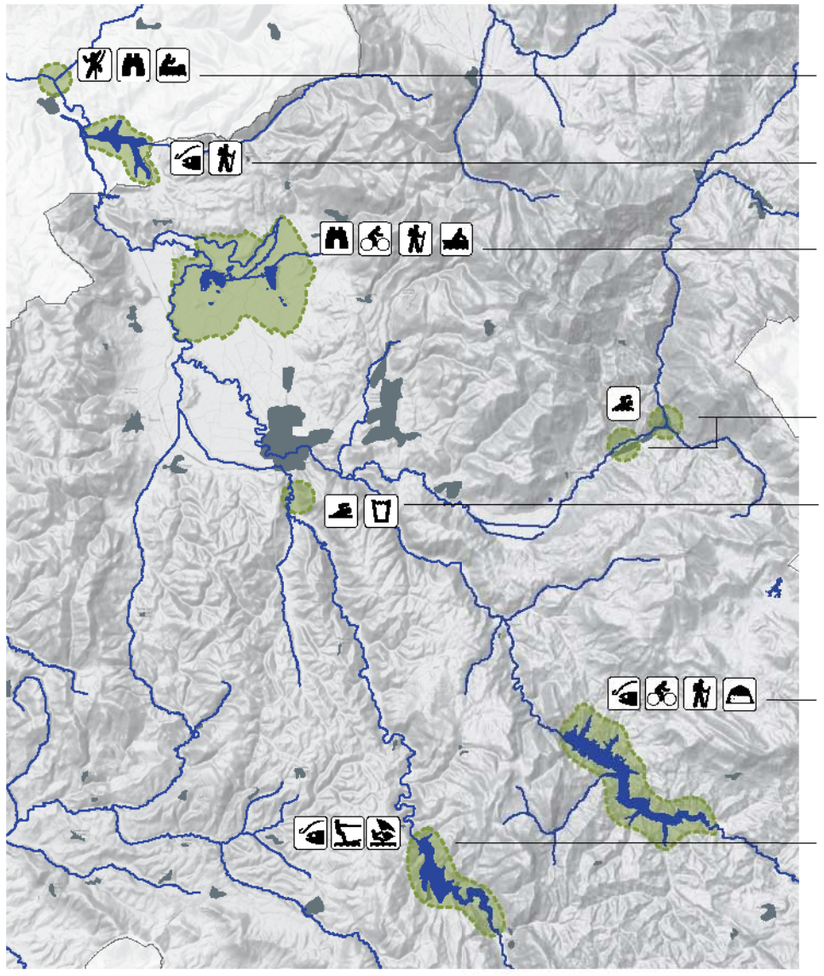


The nature reserve - Protecting the landscape from industrial use

The nature reserve was established in 1985 as a result of a group of environmentalist who opposed the exploitation of the lakes for hydroelectricity.
There are several restrictions in the reserve, such as the prohibition to build new houses or to cut trees. Apart from that there are some European regulations concerning the flora and fauna.

Lake Lungo and lake Ripasottile - Leftovers of the Lacus Velinus

A special condition around the two lakes determines an environment of great wildlife interest. Especially the fish and bird fauna includes numerous rare species. Apart from that, the area is a popular recreation area.



Water as central theme in the struggle for regional tourism

Water is a very important element for the, however fairly low, touristic activities in the province Rieti. There are several kinds of tourism. The Marmore falls are well maintained and commercially organized. The nature reserve in comparison provides the visitors with a natural landscape for free. The area around the lakes Salto and Turano seems, despite of its beauty, to be mostly abandoned and mainly used by local people, using the lakes for fishing or water sport.

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The Rieti plain - a recreation landscape

1 Pilgrims on the Saint Francis Walk
2 Paragliders over the plain
3 Cyclist on the cycle track
4 Bird watching

Marmore Falls -
A staged spectacle for tourism

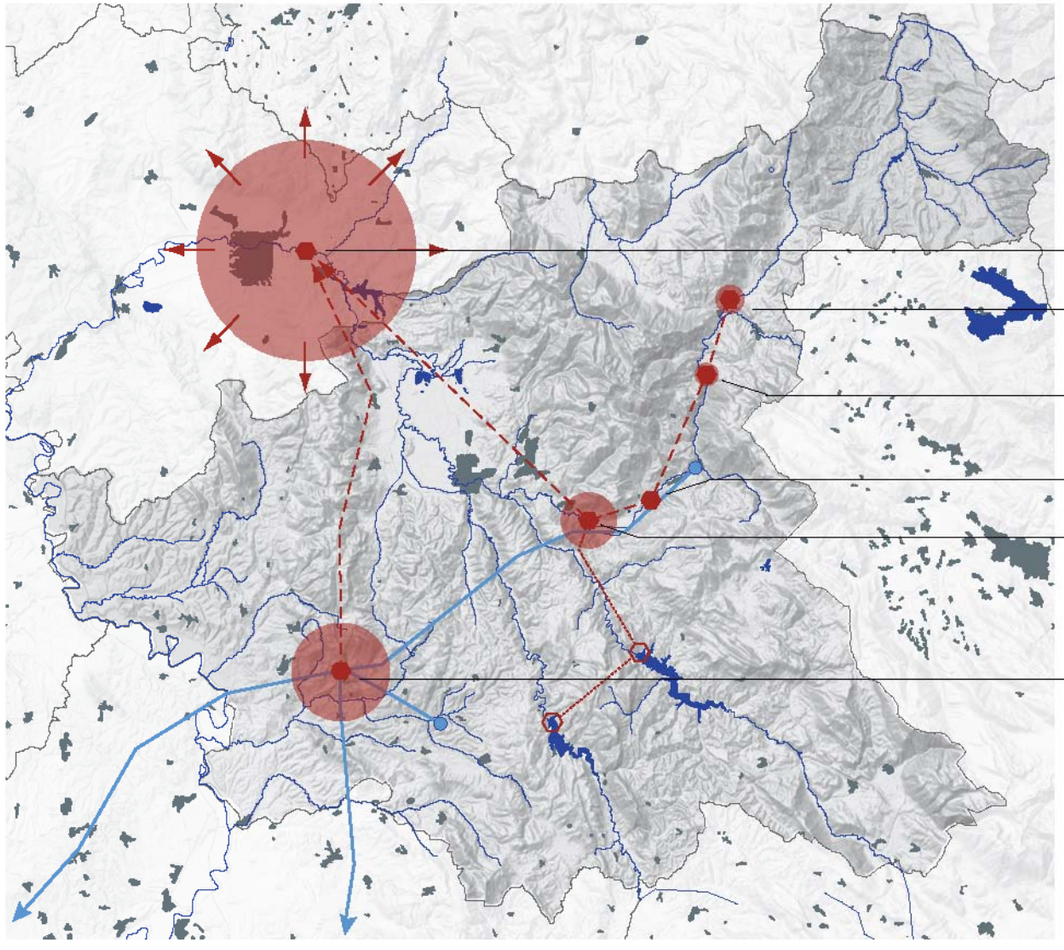
Most of the time the water in the channels above the 165 m high falls is diverted to a hydroelectric power plant. In order to satisfy tourists, the falls are turned on according to a set schedule, achieving a spectacular effect at full flow.

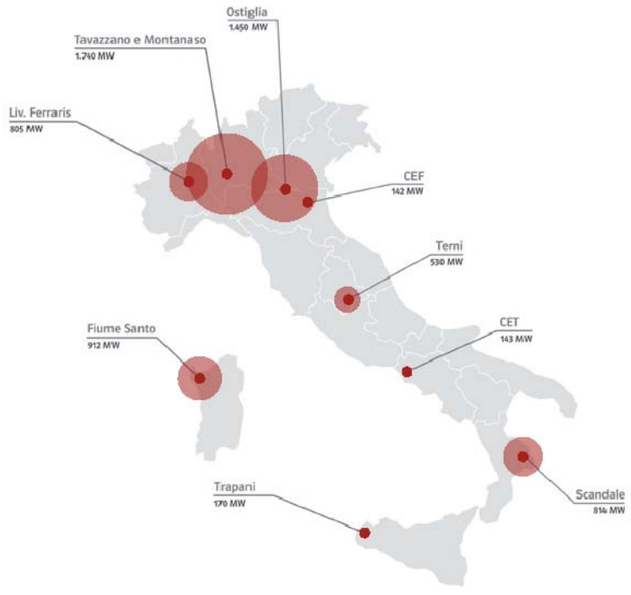
Antrodoco, Cottorella and Cotilia
neglected thermal springs

Although the presence of thermal springs is something that could be used for boost regional tourism, Rieti didn't succeed in taking this opportunity. The therms are bad maintained and don't seem to be an attractive place for tourists.

HYDROELECTRIC NETWORK

The electric network in the province of Rieti was mainly built up in the first half of the 20th Century. The richness of water brought the fascist government to creating the province of Rieti and annexing it to Lazio in 1927. During the following process of industrialisation, the existing natural network was consecutively overlaid by an artificial system. The construction of dams, artificial lakes, channels, pump stations and hydro electric plants created a stable, functioning kind of apparatus that has hardly changed until now.





Using the province's resources to energize an industrial centre

In the 19th century Terni took advantage of the Industrial revolution and of plentiful water sources in the area. New industries included a steelwork, a foundry, as well as weapons, jute and wool factories. In 1927 Terni became capital of the province. In order to enforce Terni's industrial power, Mussolini restructured the existing power production network by introducing new structures and a bunch of hydroelectric power plants.

– Apennine water cistern –

– Hydroelectric network –

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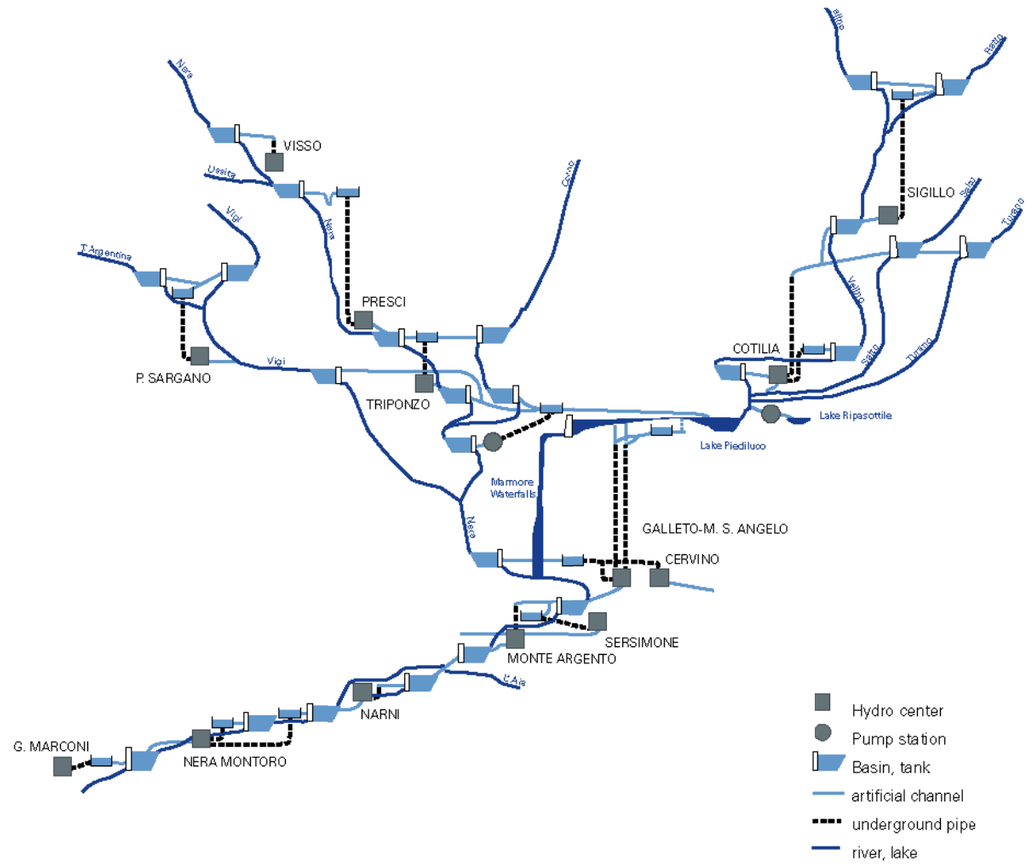
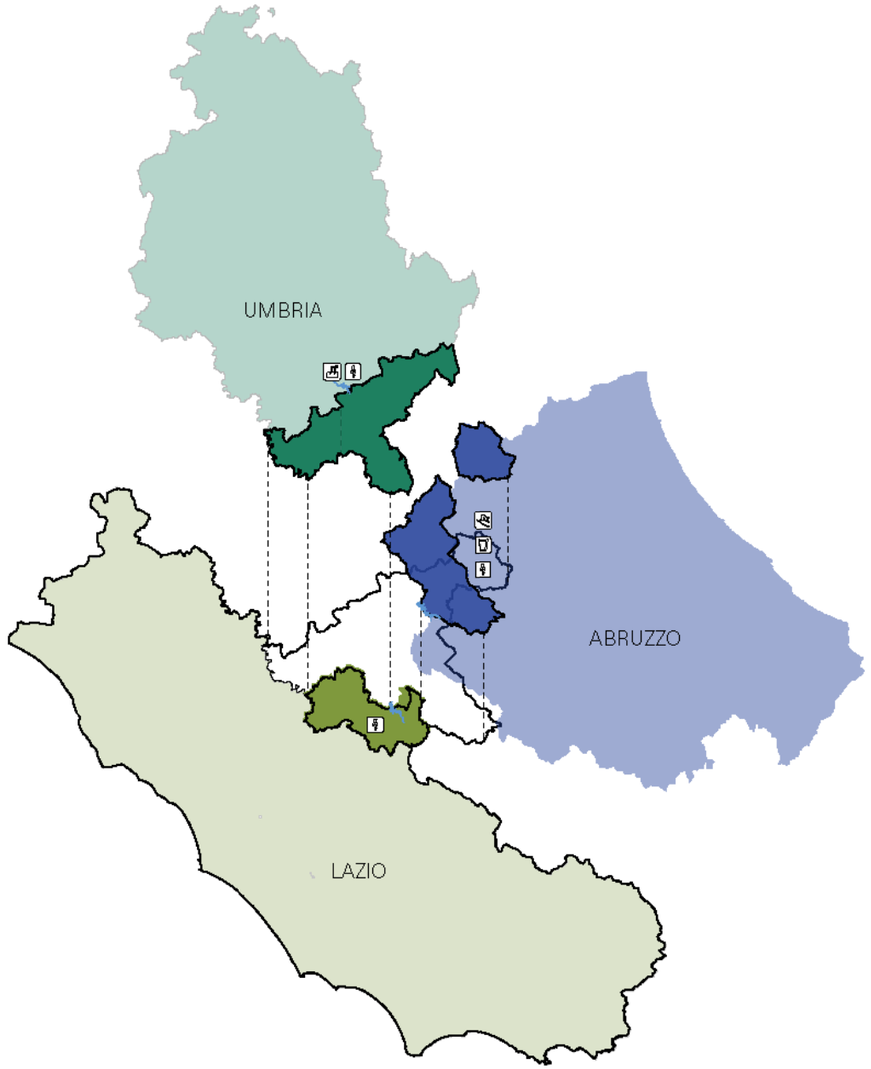
Water - An industrial good

1 Industrial zone in Terni
2 Branching of the channel Pennarossa in Terni



Production chain and water flow

The natural water system is completely overlaid by a constructed industrial network of channels, pipes, tanks and hydroelectric power plants.



Revaluation of Lazio

In 1923, the district of Rieti, which was the southernmost corner of Umbria, was detached from the Province of Perugia and merged to the Province of Rome. In 1927, the district of Cittaducale was detached from the Province of Aquila degli Abruzzi and united with the district of Rieti in order to form the new Province of Rieti, enlarging the Region Lazio. After the revaluation by annexing those parts, the way was clear for the government to make the new province a kind of a supply centre, giving Rome drinking water, electricity and a winter holiday resort.

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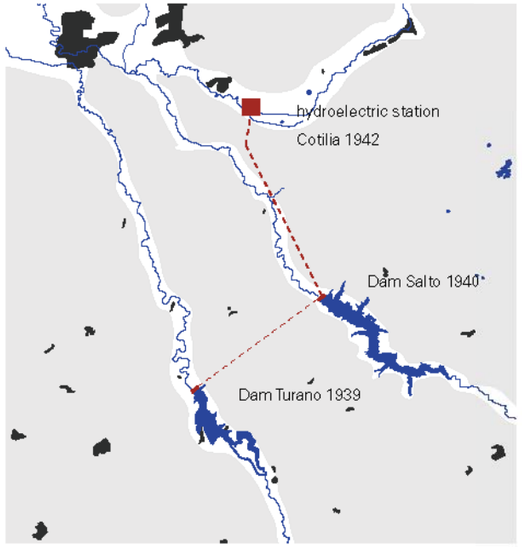
Important objects for the new region

Important objects for the new region
1 Aqueduct Peschiera
2 Dam Salto
3 Monte Terminillo ski resort



Two new basins in the mountains

The lakes Turano and Salto are two large artificial lakes which feed the power plant in Cotilia. Built in 1939 and 1940 the dams have created two basins with a surface of 150 m². The lakes are connected by a gallery, leading down the hill towards Cotilia.

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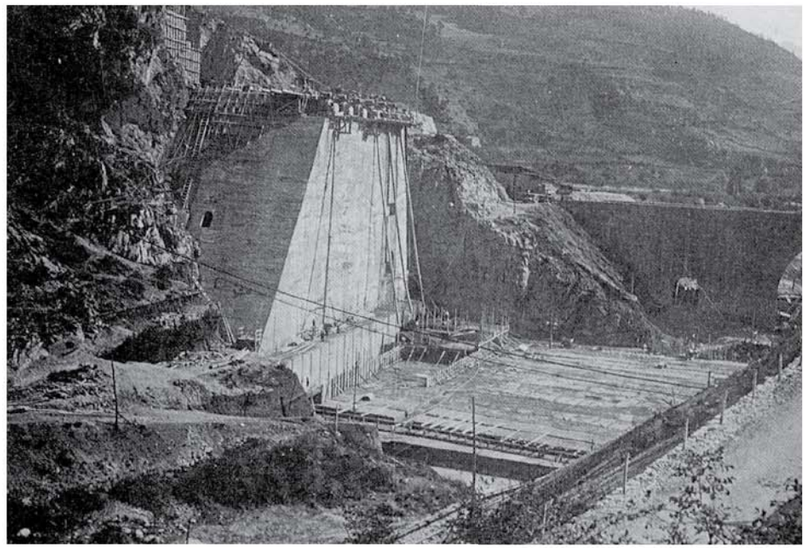

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Controlling the water power

1 Water falling down from the opened Dam Turano
2 Dam Turano under construction, 1939

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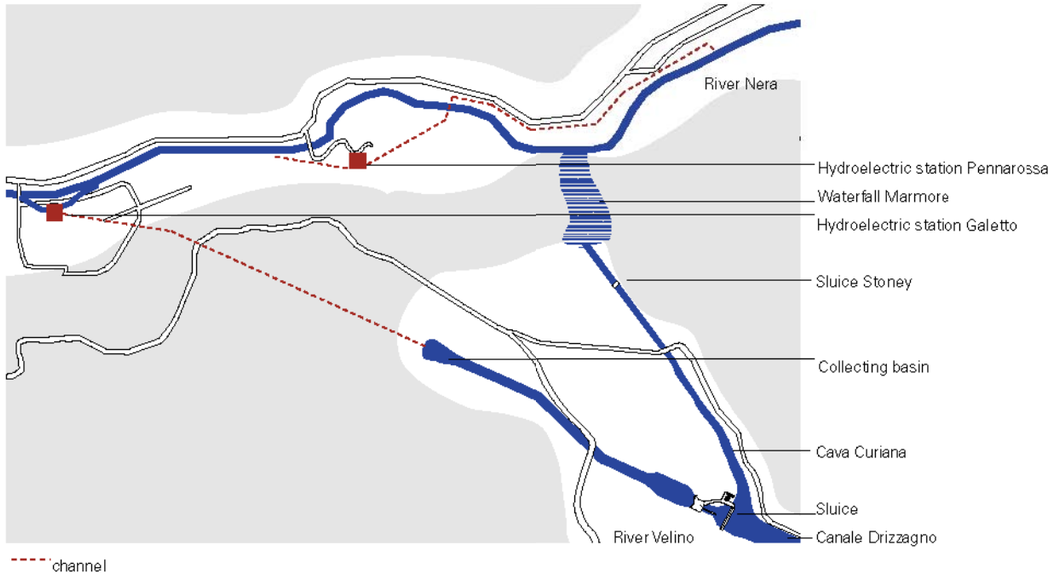

Industrial use vs touristic attraction

1 Sluice at the branching of the two channels
2 Basin, collecting the water and bringing it to the power plant through an underground channel

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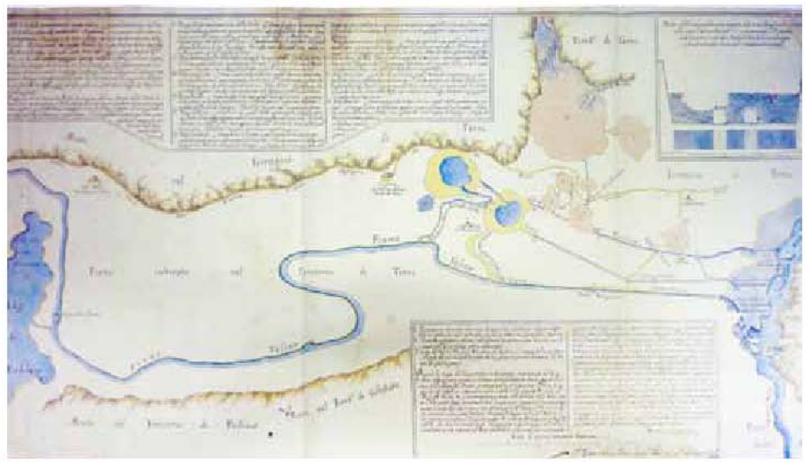

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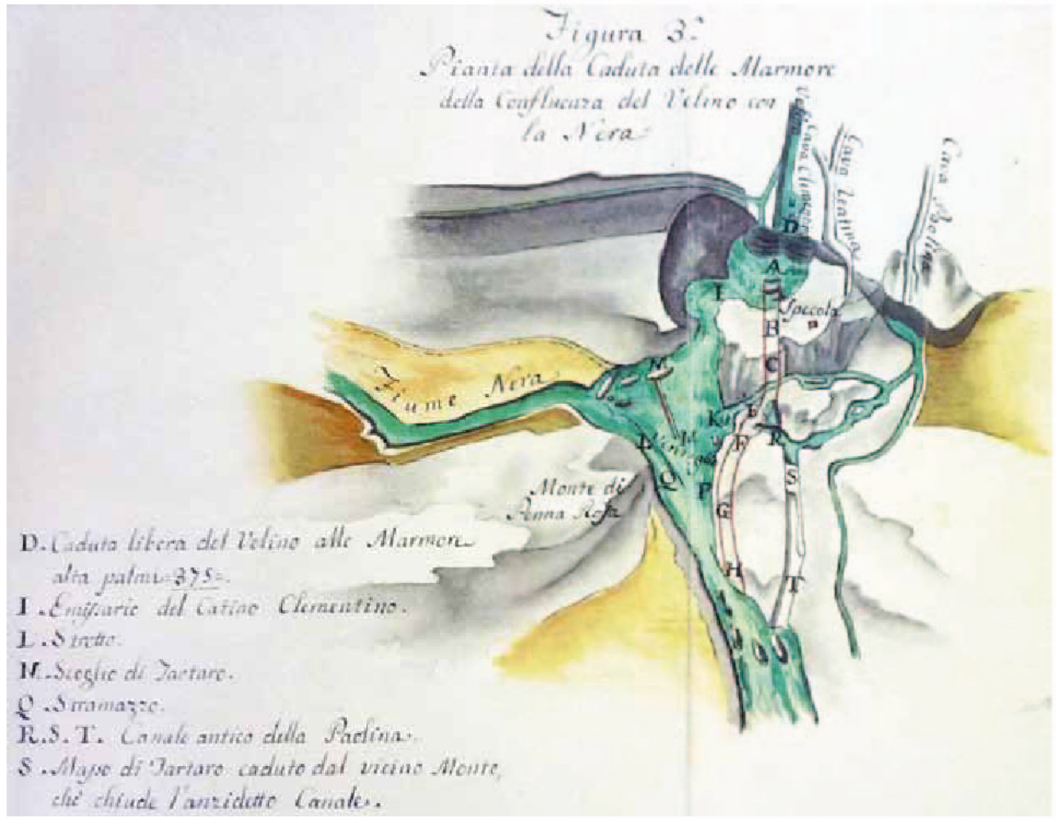
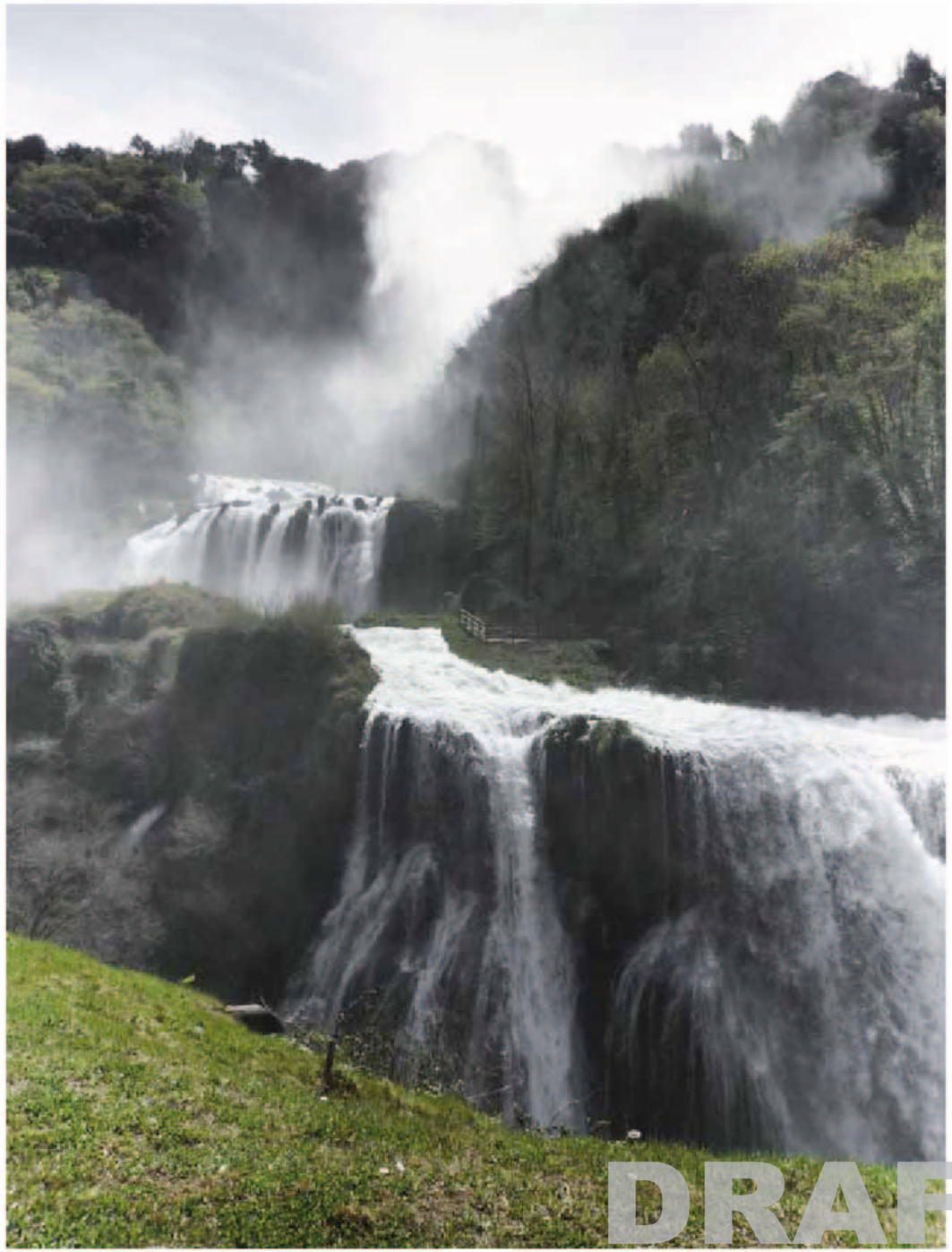
A channel system - Draining the valley

1 Canale Drizzagno on the edge of lake Piediluco
2 Antique map showing Velino river and the Canale Curiana, 1752



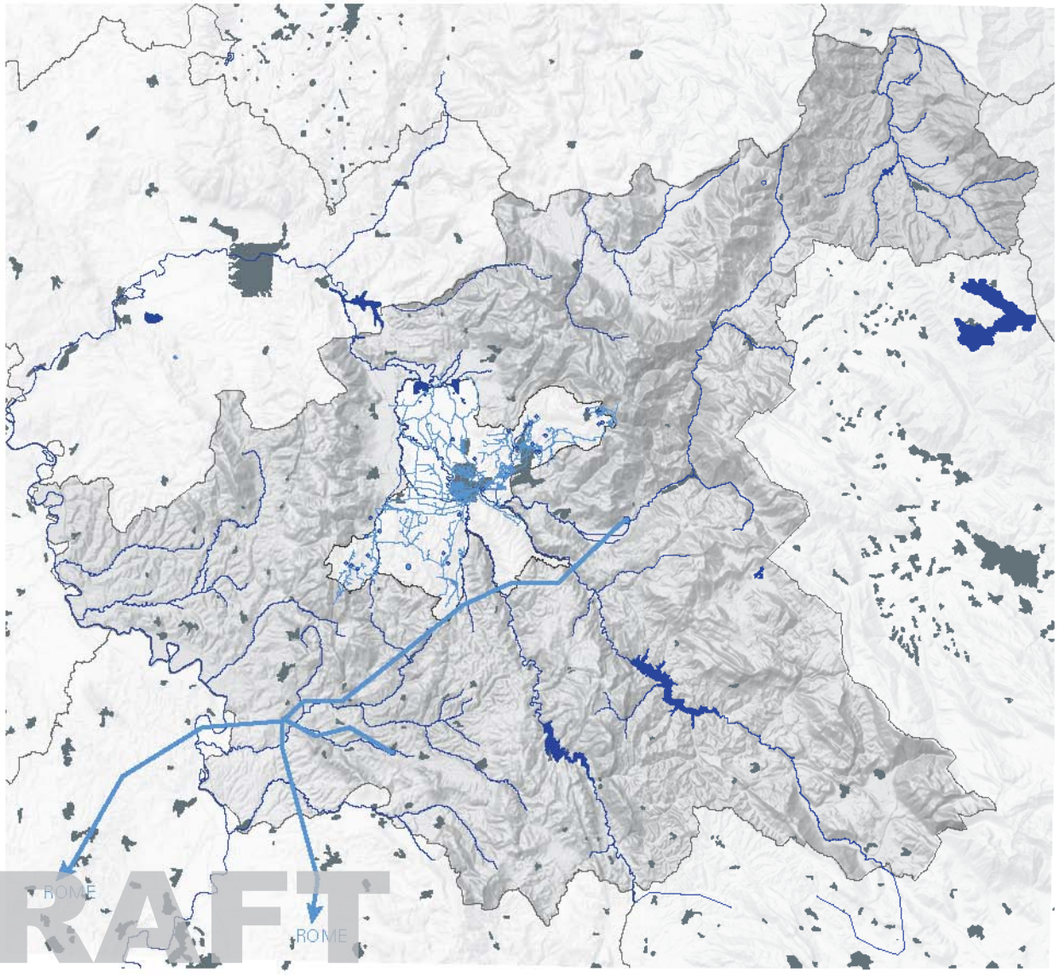
A constructed natural phenomenon

The present appearance of Marmore falls is the result of a row of environmental changes by human hand over the centuries. There have been many studies and numerous interventions before the architect Andrea Vici Terni in 1787-1788 found the current solution that allows a better flow-off of the Nera.

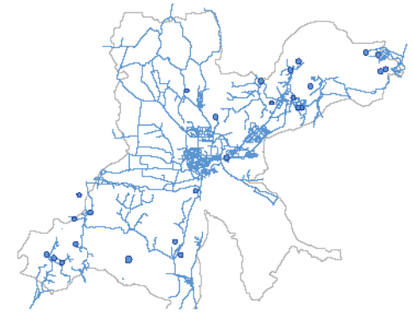


DRINKING WATER DEPENDENCIES

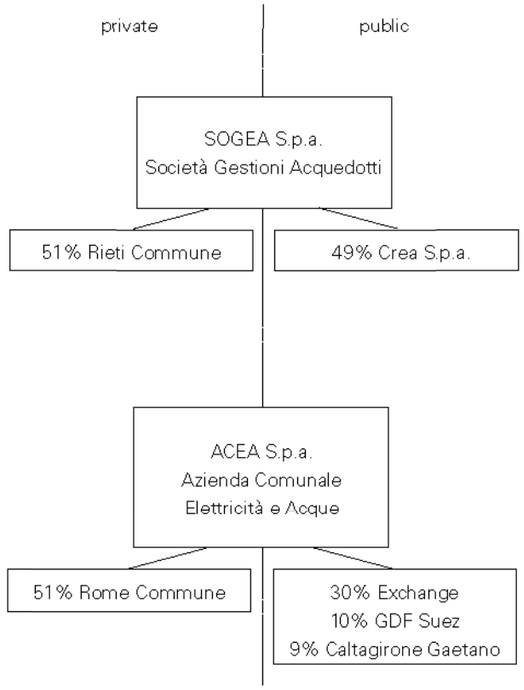
The Peschiera springs, situated in Cittaducale in the province of Rieti, are the largest water springs in Europe. With its incredible outflow of 18'000 l/s they have the capacity to supply 6.8 Millions Italian inhabitants. In order to guarantee a sufficient fresh water feed at any time, the Roman government captured the springs in 1926 and began to build up the 130km long aqueduct Peschiera-Capore, which by now provides 85% of the water used in Rome. Since the original concession, made in 1926, passed off in 1996, there is a complex political discussion about the ownership of the springs and about an appropriate compensation, that hasn't found a solution until now.



Water network for Rieti

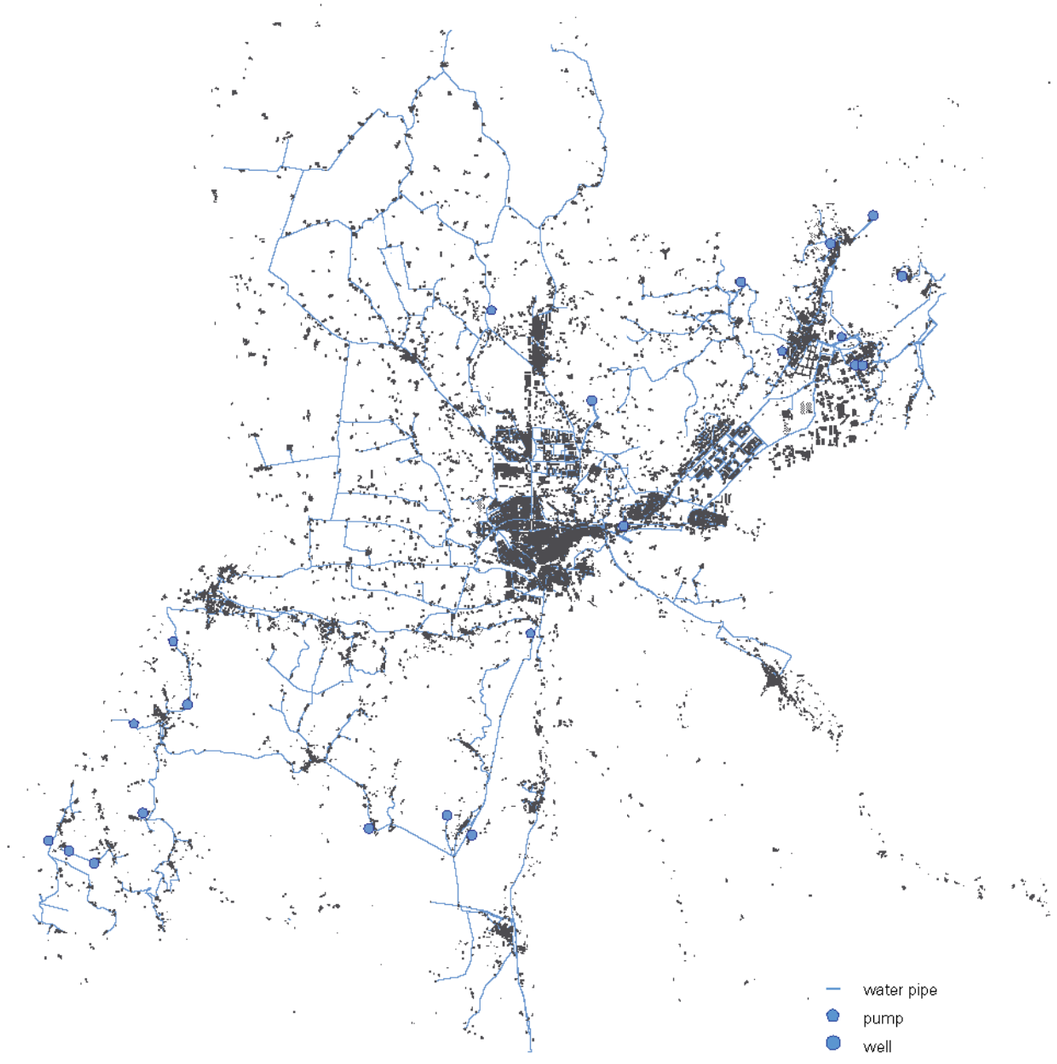


Aqueducts from Rieti to Rome



Two autonomous systems

The water supply network for the commune Rieti is totally independent of the aqueduct supplying Rome. While the water from Rome is taken from the Peschiera Springs, Rieti is supplied by several wells using the groundwater and springs. Both networks are managed by a public-private enterprise.

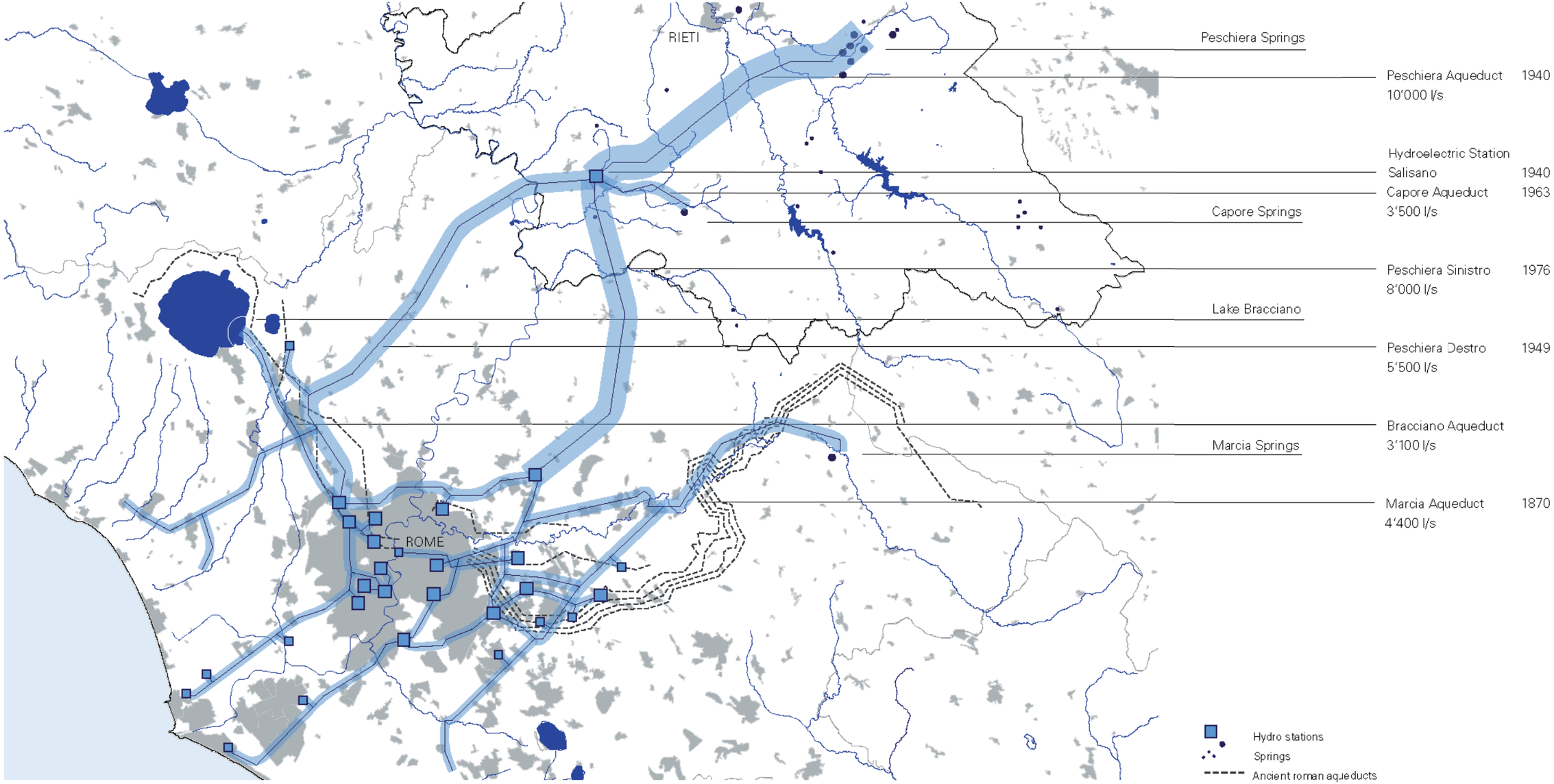


The comune supplied by surounding wells

Rieti's water network was mainly built in the 1950s. The system is fed by several wells and tanks, mostly located in the hilly areas on the edge of the communal border.

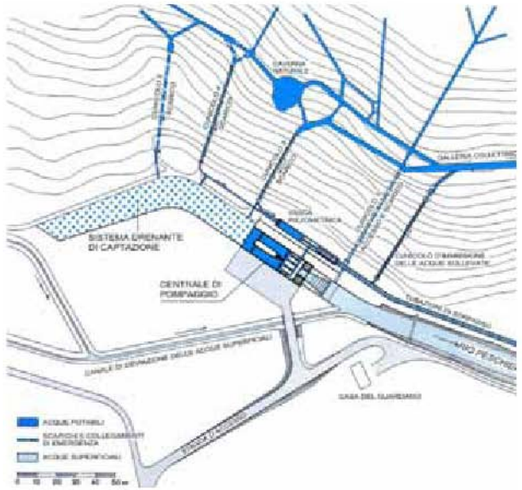
Collecting and distributing Rieti waters

San Mauro, a well between the industrial zone and Rieti



Peschiera-Capore Aqueduct - Delivering 85% for Rome's water consumption

The first project for the aqueduct included the construction of the section between the Peschiera springs and Salisano and a next section between Salisano and Rome, along the right bank of the Tiber. The choice of this route was made with the initial intention to use the jump of 240m for the production of electricity in the hydroelectric power station of Salisano . However, it was clear that the city of Rome would need a larger amount of water, so another branch passing along the left bank of the Tiber was introduced. Nowadays the aqueduct supplies Rome with 13'500 l/s, which means 428 l per inhabitant per day.



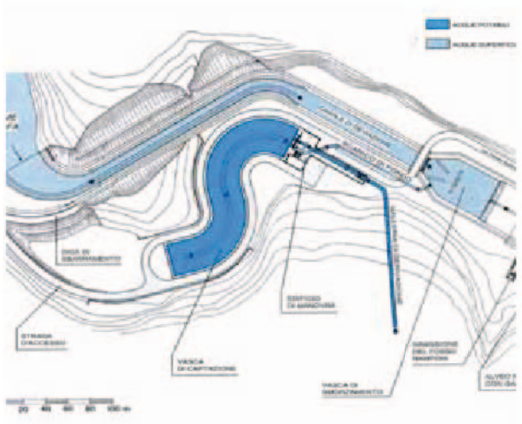
Peschiera Springs -
Highly protected structure

In 2001 the springs became the first 'oggetto sensitivo' in the whole of Italy. Since then the access to the structure is strictly limited to a few people for fear of terroristim.

1926	Province Rieti	consession for 70 years for using the water from the Peschiera springs	City Rome (ACEA)	
1963	Province Rieti	consession till 1996 for using the water from the Capore springs	City Rome (ACEA)	
1995	Province Rieti	ask to renew the consession for the water of the springs Peschiera and Capore	City Rome (ACEA)	no answer
1996	Province Rieti	end of the consession	City Rome (ACEA)	no answer
1998	Province Rieti	ACEA becomes a S.P.A. 51% public, 49% private	City Rome (ACEA)	
1996 - now	Province Rieti	no consession, no payment, Rome is still using the water	City Rome (ACEA)	a lot of discussions but no solution yet

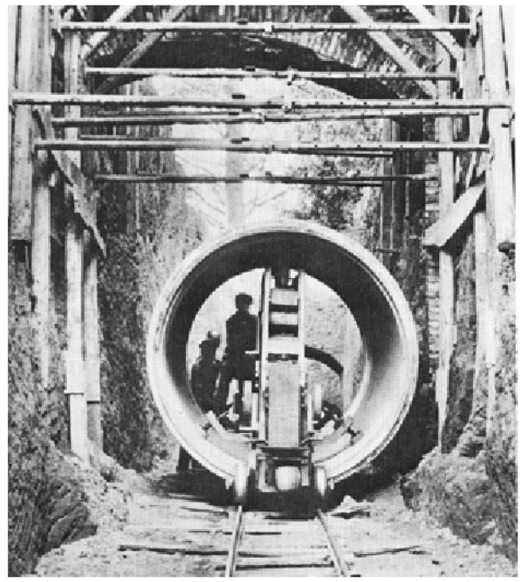
Privatisation of a public good

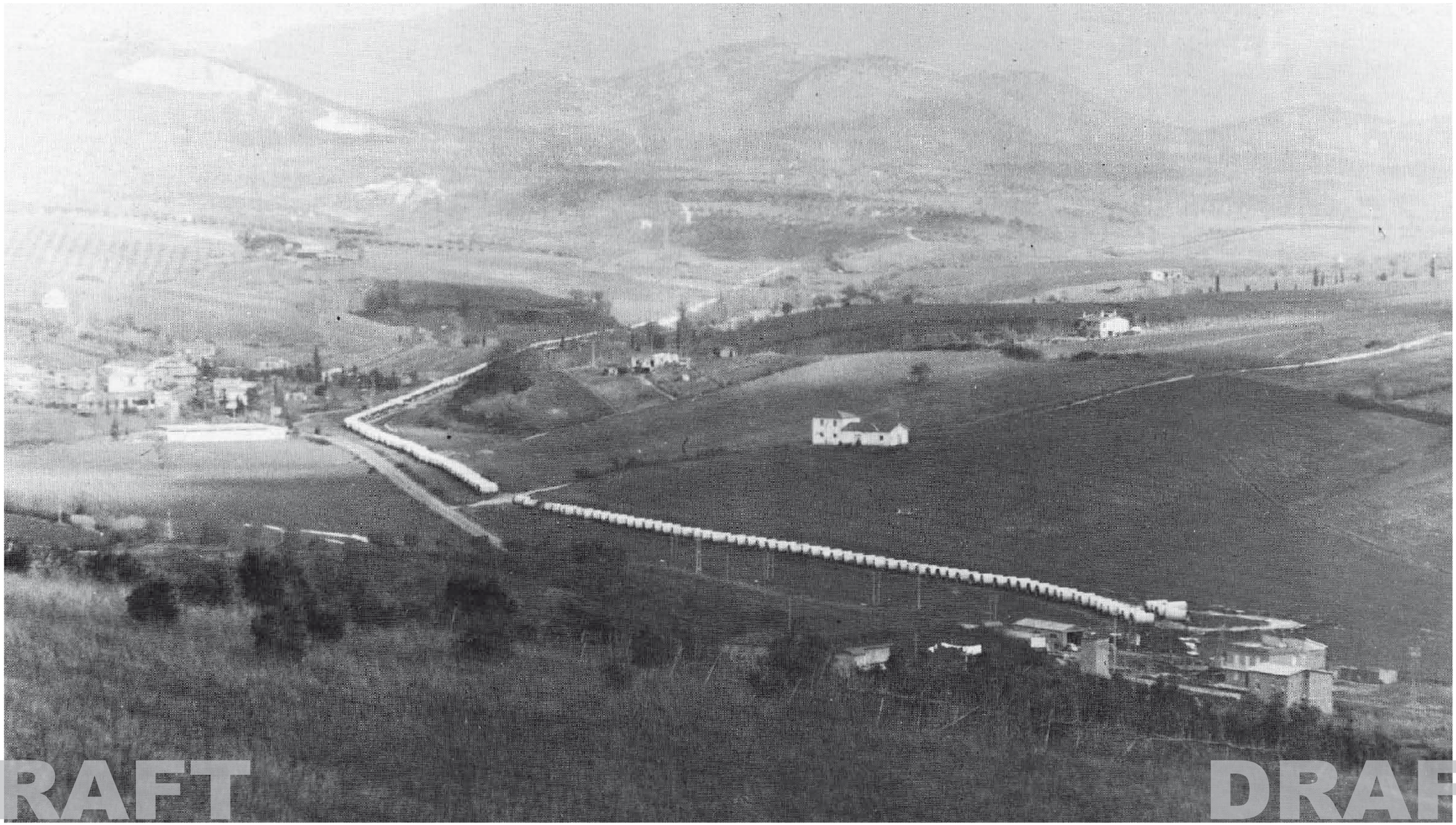
In comparison to other countries, Italy has a very high water consumption. The current tariff on the other hand is below European average. Apart from that, there is a problem about the mostly bad condition of the water infrastructures. Central Italy has an average loss of about 40% of the water fed into the network. In order to solve these problems there is a national discussion about the privatization of the water. By transforming water into an economic good, people hope for a better maintenance of the pipes and, by rising the tariffs, for a more sparing use.

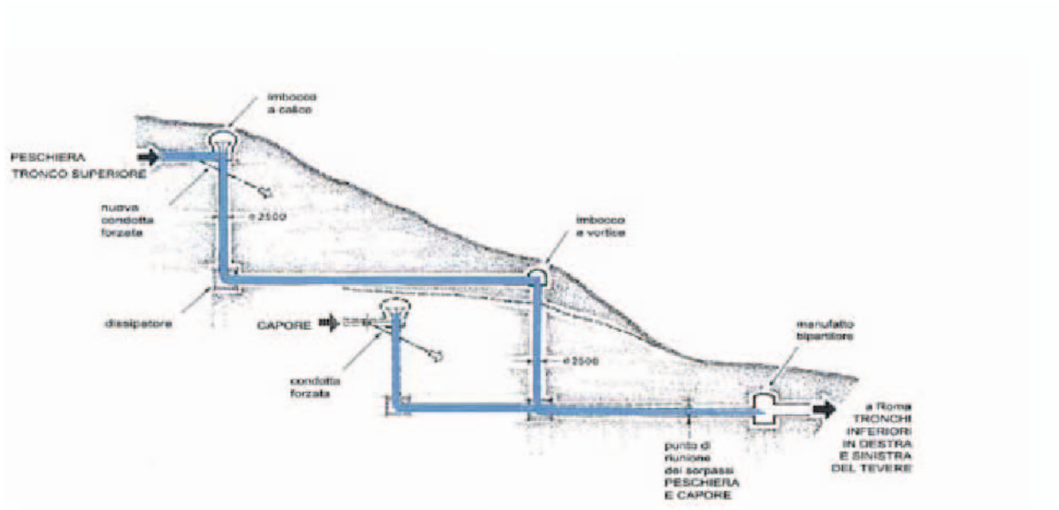


Capore springs -
Fresh water from Bassa Sabina

The springs are located in the valley of the Farfa river. The water flows out from a limestone outcrop bordered by pliocene conglomerates typical of the whole valley.







**Hydroelectric station Salisano -
Power produced by drinking water**

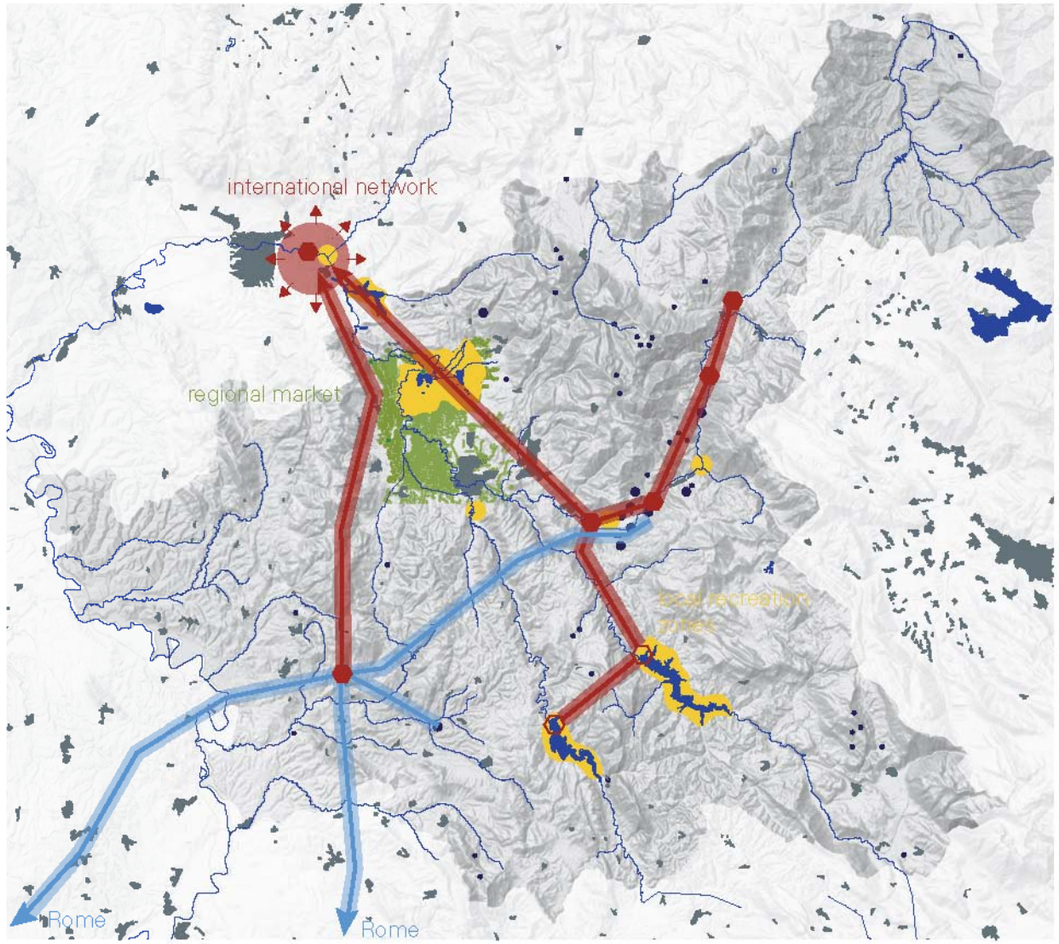
Salisano is situated at the branching of the left and right aqueduct Peschiera – Capore .

Water pipes carving the landscape

The Peschiera-Capore aqueduct is one of the largest pipes in the world that only carries spring water. Its total length is nearly 130 km, 90% of which is underground. The implementation of the whole aqueduct has taken nearly half a century.

A SUPPLYING REGION - LOOKING FOR IDENTITY

In the province of Rieti, water is the main factor of a collective identity and it has a big territorial value. The broad artificial structure that was established in the course of the national reclamation process in the early 20th century turned the natural water system into an industrial framework of total control. This means, on one hand, the physical control of water and on the other hand, the economical control of the province's vital resource by a centralistic government. One can say, that the province of Rieti works as a kind of supplying area, especially in case of the drinking water supply for Rome. Next to certain benefits, the changes had a negative impact on the autonomy of the region. Till this day, Rieti wasn't able to liberate itself from Rome's shadow and to get its own identity.
The beauty and wealth of water should be seen as a gift, that must be protected and maintained, not only economically but rather in a cultural and ecological sense.



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Map sytem map commune di Rieti, digital map

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ACKNOWLEGMENTS

PERSONS

Roberto Lorenzetti, Rieti
Ingeniere Blassetti, SOGEA, Rieti
Ingeniere Bacchi, E-ON, Terni
Ingeniere Fagiani, Consorzio del sviluppo nucleo, Cittaducale
Signore Fabio, SOGEA, Rieti
Franco Fagiuolo, Provincia di Rieti, Rietivd
Rita Giovannelli, Rieti da scoprire, Rieti
Pablo de Paola, Coitato difesa acque, Rieti
Capo de la presa E-ON, Cotilia
Gianni Celestini, Architetto, Rieti

INSTITUTIONS

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Consorzio del sviluppo nucleo, Cittaducale
Gestione Aquedotti, Rieti
Provinicia di Rieti
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Sogea s.p.a., Rieti
E-ON produzione nucleo idrico, Terni
Rieti da scoprire