ARSENIC IN DRINKING WATER AND GOVERNANCE ISSUES: A CASE STUDY FROM ITALY

by

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List of abbreviations

ARPA. Regional Environmental protection agency
Art. Article (in laws and regulations)
As. Arsenic
ASL. Local Health Authority
ATO. Optimal Water District
CODACONS. Coordination of Associations for the Protection of the Environment and the Rights of Users and Consumers
COMVIRI. Committee for the Surveillance on the Use of Water Sources
EC. European Commission
EPA. United States Environmental Protection Agency
EU. European Union
GDP. Gross Domestic Product
WHO. World Health Organisation
IARC. International Agency for Research on Cancer
MoH. Ministry of Health
O&M. Operation and Maintenance
PPP. Public-Private Partnerships
ROCE. Return on Capital Employed
SCHER. Scientific Committee on Health and Environmental Risks
SIAN. Hygiene, Food and Nutrition Service
SII. Integrated Water Services
SMS. Short Message Service
STO. Technical and Management Secretariat
TAR. Regional Administrative Court
UNPD. United Nations Development Programme
WEDC. Water, Engineering and Development Centre – Loughborough University
WHO. World Health Organisation

Chapter 1. INTRODUCTION

1.2 Background and Context

Arsenic is “one of the chemicals of greatest health concern” (WHO, 2011b, p.315). Chronic high exposure to arsenic through drinking water is a major factor of health hazard, including carcinogenic effects.

The health hazards associated with the presence of arsenic in drinking water, though, did not start receiving due attention before the 1990s, when in large parts of Bangladesh high morbidity and mortality rates were recorded and put in relation with elevated arsenic concentrations in drinking water. The WHO lowered the guideline value for arsenic in drinking water from 50µg/l to 10µg/l in 1993.

In 1998 the European Commission issued the Directive 98/83 on “the quality of water intended for human consumption”. The Directive updated the drinking-water standards to be applied in the EU countries, by establishing 48 health-related water quality parameters, divided into microbiological, chemical and indicator parameters.

Some of those parameters were made more stringent than in the previous European legislation (Directive 80/778 of 1980). Arsenic – a chemical parameter - was one of those, having the standard value drastically lowered from 50µg/l to 10µg/l, reflecting the WHO guidelines.

Directive 98/83 accorded a degree of flexibility to Member States as regards the timescale for compliance with those quality standards, by setting a system of derogation that gave Member States the time to plan and to implement any infrastructural upgrades needed.

1.3 Problem Statement

The Directive had overall a good level of enforcement in the European Union (KWR, 2011, p.7). In Italy, though, compliance with the arsenic standard was not so prompt. Still in 2010 – twelve years after the issue of Directive 98/83 – one million people were supplied with water having arsenic concentrations above 10µg/l, most of them in Lazio region. Emergency measures such as water trucking and public standposts were implemented in some localities in the last years as a “last minute” response to the arsenic issue.

The number of years elapsed from Directive 98/83, the magnitude of the issue still in 2009, and the emergency measures recently put in place, indicate a degree of failure in the implementation of the regulations on arsenic concentration in drinking water in Italy. Emergency reactive interventions seem to be implemented instead of systematic planning and good practice. This study therefore seeks to understand the reasons why this failure in implementation of Directive 98/83 occurred.

As mentioned above, one million Italians in 2009 still lived in areas with arsenic concentrations above the EU set limit. Bracciano (18,889 inhabitants, in Lazio region) is one of the towns that

in 2010 still exceeded the allowed arsenic concentrations and that more recently implemented water trucking and public standposts as “last minute” measures. It is a classic example of the problem in Lazio region, and it will be used in this research as a case study to investigate the reasons of the failure in implementing the European regulation.

1.4 Research Aim

The research aims at understanding the factors that determined the delays in the remedial actions for the issue of high arsenic concentrations in drinking water in Bracciano. The research seeks to understand and to clarify to what extent the different stakeholders involved can be retained accountable for the events, and to what extent the responsibilities lay at local level and to what extent at higher level (regional and/or national).

1.5 Research Objectives and Questions

Given the research aim, this study has the following objectives:

Objective 1	Identify how and why the municipality - as both service provider and local government – has failed to live up to its obligations towards the customers.
Objective 2	Identify the reasons why customers lack “voice” in requiring accountability: in demanding their right to a safe water supply and in requiring prompt responses.
Objective 3	Understand the regulatory regime during the years elapsed, and to what extent it had an impact on the service provider’s performances.

For each research objective, the following research questions need to be answered:

Objective 1	**Objective 2**	**Objective 3**
a) Is water service structure adequate to ensure service level? b) What is the rationale behind the choices the municipality has made? c) How do political level and service provision level interact within the municipality? d) Are there any relations between water provision and electoral consensus? e) How does the municipality perceive its own role in the course of the events?	a) What instruments do customers have to require accountability? b) Have customers received adequate information about the arsenic issue? c) Did customers use the public standposts? Why? d) Do customers perceive the issue as important? e) How do customers perceive the actions undertaken by the municipality?	a) Are regulatory tasks clearly defined and divided among the different authorities? b) What powers has the regulator vis-à-vis the municipality (as service provider and as local government)? c) What were the actions undertaken by the regulator? d) How does the regulator perceive its own role in the course of the events?

1.6 Scope of the Research

As stated above, the research focuses on the town of Bracciano (Italy) as a case study. An overview on the case study is given in Chapter two.

In addition to the points directly related to the management of the arsenic issue locally, certain contextual factors are also taken into account in the research.

These are represented essentially by the water sector governance model existing in Italy. Galli Law (1994) defined a sector wide reform according a New Public Management and principal-agent approach. The reform delineated the possibility of partnerships between the public and the private sector, as well as the separation between service provider, regulator, and political power. Customers were empowered with the right to adequate information and with participatory tools. The reform key points and their implementation are background elements that help contextualising the case study, and help understanding how water services function in Bracciano.

Moreover, some aspects of water service management and of response to the arsenic issue nationwide and in Lazio region are essential to contextualise the case study.

The research focuses on water service management and governance, rather than on technical aspects of the reduction of arsenic concentrations in drinking water. The rationale – as emerging in the following chapters – is that the main issues at stake in the case study were not of technical kind but related to management models and to the relationships between stakeholders. Therefore, clarifying key management and governance points can be potentially more explicative than a strictly technical approach in such a research context.

1.7 Key Concepts and Definition of Terms

Client power: The relationship of accountability that connects customers to the service provider. Customers express their demand for services and monitor service levels, often based on service charters. It has strength especially when services are not provided by the government itself.

Compact: The relationship of accountability that connects government and service providers at sector-wide level.

Contract: The relationship of accountability that connects government and service provider at local level. Also “contract-based” accountability.

Customers: The entities that receive services. This research focuses on domestic customers (households) and not on the industrial and agricultural sector.

Decentralisation: The transfer of powers from the central level to the local level. It can take the form of deconcentration, delegation or devolution depending on how to what extent powers are decentralised.

Galli Law. Sector-wide reform of water sector governance in Italy, promulgated in 1994.

Government: The entity that represents the political power at local or at national level.

In-house water service management. Water services operated directly by central or local governments.

Municipality. The smallest administrative division in Italy. This term often defines the institution governing the municipal territory.

New Public Management (NPM): A public governance approach originating in the 1980s. NPM prescribes that service provision, financing and regulation roles are kept separated and allocated to different stakeholders, primarily through contractual processes. NPM borrows approaches typical of the private sector and fosters the outsourcing of services.

Presidente del Consiglio. Prime Minister in Italy.

Presidente della Repubblica. President of the Republic in Italy.

Principal-agent theory: It defines the relationship between the principal (e.g. an employer) and the agent (e.g. an employee), where the principal designs a compensation system (e.g. a contract) that motivates the agent to act in the principal's interests. It is a key feature of New Public Management.

Public-Private Partnerships (PPPs): Cooperation between public sector and private sector in financing, construction and management of infrastructures or in service provision. PPPs can take several forms depending on the degree of involvement of the private sector, on the sources of financing, and on the allocation of risks.

Region. Administrative division in Italy, comprehending Provinces and municipalities. This term often defines the institution governing the regional territory.

Regulatory regime: The system of the authorities that ensure the adherence of the stakeholders to their duties and responsibilities.

Service provider: The entity in charge of providing services. It can be a governmental department, a public enterprise or a mixed company.

Stakeholders: The parties involved in service provision. They have different roles and degrees of importance and influence. In general, main stakeholders in water sector are the service provider, the customers, the government and the regulator.

Voice: The relationship of accountability that connects customers (as citizens) to the government. It follows formal routes such as elections as well as informal routes such as campaigns, advocacy and lobbying.

1.8 Research Originality

The issue of arsenic in drinking water has been extensively treated from the epidemiological and toxicological point of view on one side, and from the water sources point of view on the other (hydrogeology, geochemistry). The arsenic concentration limit of 10µg/l set by WHO, European Commission end EPA (United States Environmental Protection Agency) in the past decades has triggered further research on exposure to drinking water with relatively low arsenic concentrations.

Despite such trends in research, the impact of the EC Directive on drinking water quality (European Commission, 1998) in specific situations does not seem to have been extensively researched. In other terms, not much research is available on how the Directive has been implemented in different local contexts in the European Union. In particular, not much research is available on the practical measures put in place in different water supply areas to ensure the transition from the previous limit of 50µg/l to the new limit of 10µg/l. This dissertation seeks to contribute to fill such gap in research. This can be viewed as an element of originality.

In addition, choice was made in this research to privilege a governance/policy approach over a technical approach to the issue. The rationale behind such choice was that appropriate technical/technological resources are available in developed countries to cope with the issue,

whilst delays and deficiencies in implementation of the EC Directive are most likely due to governance factors. In this sense, this research pursues an original approach in analysing the arsenic issue by making use of a conceptual framework based on local water management system and stakeholders (Section 4.3). Such conceptual framework is partially challenged in the final part of the research and modifications to it are proposed (Sections 6.4 and 7.3).

1.9 Limitations

The following factors were found as limits to this research (see Denscombe, 2002, p.80-83):

- First of all, extending the research to several locations in the region, in Italy and in other European countries would be beneficial in order to obtain a comprehensive picture of the issue and to compare the strategies (or lack of strategies) adopted in different locations. Nevertheless, since the research is done in partial fulfilment of the Master of Science in Water and Environmental Management, the established timeframe does not allow extensive multi-site research on the topic.

- Additionally, the operational responses to elevated arsenic levels in drinking water in European countries does not seem to have been extensively researched. This makes comparative study through literature review difficult.

Despite these intrinsic limitations, it was estimated that the topic had potential for research.

Chapter 2. OVERVIEW ON THE CASE STUDY

2.1 Background

Chapter one presented the main features of the research: its rationale, scope, aim and objectives, key concepts and limitations.

This chapter aims at briefly introducing the case study. Firstly, it provides the reader with a preliminary overview on the research setting, including political, demographical, geographical and water resource baseline data. Secondly, the chapter presents a quick overview on the issue of arsenic in drinking water in Italy. Chapter five expands on the data critical to the research aim.

2.1.1 Italy

Italy is a founding member of the European Community, and one of the twenty-seven countries forming the European Union (EU). With a population of 61,261,254 Italy is the fourth country in the EU as number of inhabitants, following Germany, France and the United Kingdom. Italy is an industrialised country. Its GDP (Gross domestic Product) is the fourth in the EU, following Germany, the United Kingdom and France. Italy is a peninsula situated in southern Europe, extending into the central Mediterranean Sea (CIA, undated).

Figure 2.1 Map of the European Union
(Source: https://www.cia.gov/library/publications/the-world-factbook/geos/ee.html)

Figure 2.2 Map of Italy
(Source: https://www.cia.gov/library/publications/the-world-factbook/geos/it.html)

Italy is a democratic republic, with Rome (3.7 million inhabitants in the city area) as the capital city. Italy is administratively divided into twenty Regions endowed with significant autonomy, particularly as regards the Health Care System. Each Region is subdivided into Provinces (110 in total) (Comuni Italiani, undated(a)). The basic administrative unit is the municipality ("Comune"). The overall number of municipalities is 8,092 (ISTAT, 2012), each municipality headed by a mayor assisted by a Municipal Cabinet and by a Municipal Council.

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Italy has become one of the first victims of the global financial crisis started in 2008, partially due to its extremely high public debt. As a consequence, Italy is presently undergoing a series of austerity measures, including tax increases and cuts in public expenditure. The decline of the Italian industry - due to the challenges of globalisation as well as to structural factors - together with the lowest birth rates in Europe, represents a reason of concern for Italy's economy in the medium and long term (BBC, 2012). Italy is ranked 24th in the UNDP Human Development Index – 12th among the EU countries (UNDP, 2011).

Despite the high degree of development in the country, public life in Italy has been affected for decades by "political paralysis, massive government debt, extensive corruption, and organized crime's considerable influence" (U.S. department of State, 2012), with relevant differences between northern and southern regions (CIA, undated). Italy is ranked 69th in Transparency International's Corruption Perception Index – only 27th among the EU and Western Europe countries (Transparency International, 2012). According to Transparency International Italia (2012, p.6), in recent years "the tension and the conflict between (and among) state powers and parts of civil society has reached remarkable levels".

As regards the water sector, water resources management was subdivided into ninety-one "Optimal Water Districts" (ATOs, "Ambito Territoriale Ottimale") by a sector-wide reform dating 1994 (Galli Law) (Euromarket, 2004, p.219). For full details about Galli Law and about recent developments in water sector, see Section 3.4. Nearly 80% of potable water in Italy is supplied by groundwater sources, one of the highest percentages in Europe (KWR, 2011, p.6-7).

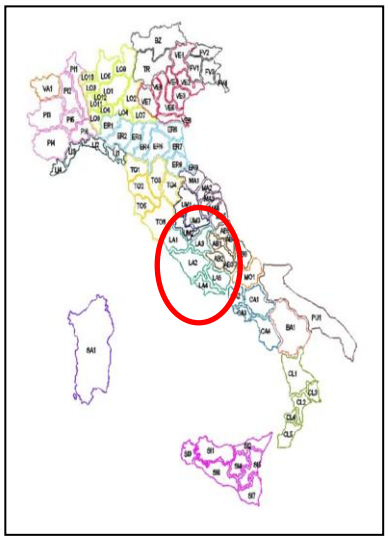

Figure 2.4 Map of ATOs
(Source: Euromarket, 2004, p.219)

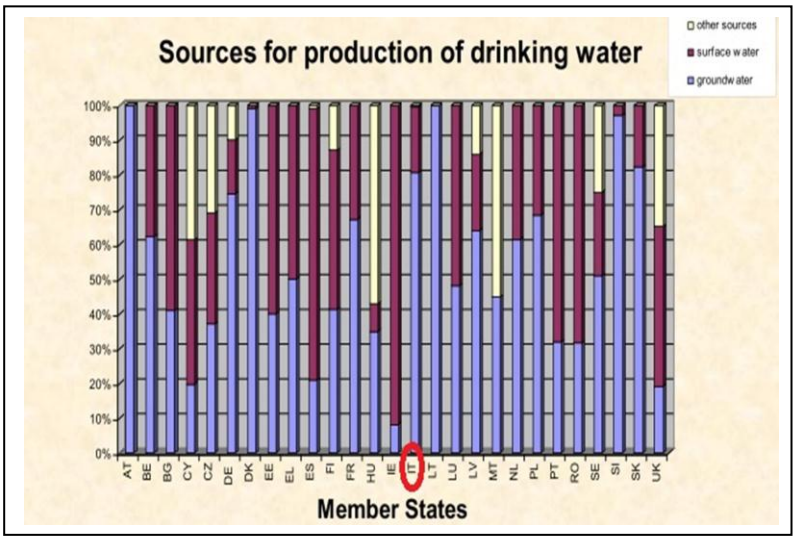

Figure 2.3 Water resources in Italy
(Source: KWR, 2011, p.7)

2.1.2 Bracciano

Bracciano is the setting of the case study conducted in this research. Bracciano is a town (municipality) in Lazio.

Lazio is the second Region in Italy in terms of population, with 5.728.688 inhabitants mostly concentrated in the regional capital Rome. Lazio is divided into five Provinces (Viterbo, Rieti, Rome, Frosinone and Latina) and 378 municipalities (Comuni Italiani, undated(b)). Water

management in Lazio is subdivided into five ATOs – as shown by Figure 2.4 – whose territories mainly corresponded to the five Provinces mentioned above.

Bracciano is situated at about 40 km north-west of Rome. Administratively, it belongs to the Province of Rome.

Figure 2.5 Map of Lazio
(Source: http://www.italymap.it/italy-map-regioni-italia/map-pages-regioni-italia/7-lazio-mappa-regione.html)

Bracciano has 18,889 inhabitants, surface 142.52 km^2. It is situated in a hilly area, in proximity of a volcanic lake (Bracciano Lake, surface 55 km^2). Two neighbouring towns are situated on the lakeside, Anguillara Sabazia and Trevignano Romano, with 18,882 and 5,949 inhabitants respectively (Comuni Italiani, undated(c)).

As shown in Annex two (full map of Bracciano Municipality territory), Bracciano is made up of a central urban area surrounded by semi-rural and rural areas, extending towards the lake to the east and in the countryside to the north, west and south. Population figures recorded the significant increase of 38.9% in the years 2001-2010, not dissimilarly from neighbour towns. Such trend is likely due to the increasing cost of living in Rome pushing part of the population to move from the capital. For the same kind of reason, the percentage of foreigners living in Bracciano is relatively high (12.5%) (Comuni Italiani, undated(d)).

Bracciano, as all municipalities, is administratively autonomous. A mayor sits at the head of the municipality, assisted by a Municipal Council and by a Municipal Cabinet. The Council has legislative powers, while the Cabinet assists the mayor in his/her executive powers. The Council is made up of representatives of the political parties, divided into majority and minority. According to the existing system, municipal elections take place every five years. Voters can choose between different mayor candidates, supported by different parties or coalitions. Members of the Cabinet are designated personally by the mayor, each one of them in charge of one or more departments, such as Public Works, Environment, Culture and Tourism. In exceptional cases, such as unlawful behaviours by the institution, resignation of the mayor, financial insolvability or complicity with organised crime, a system of compulsory

administration takes place: mayor, Cabinet and Council are divested of their powers and a technocrat interim commissioner is externally appointed to administer the municipality until the next elections take place.

Bracciano has enjoyed a high degree of political continuity in the last decades, as shown in Table 2.1:

Table 2.1 Political continuity in Bracciano

From	To	Mayor	Comments
1994	1998	Same mayor	Terms of 4 years
1998	2002		
2002	2006	Different mayor	Deceased during term
2006	2007	Commissioner	Interim
2007	2012	Same mayor as 1994-2002	Terms of 5 years
2012	2017 (expected)		

Beside the political level, municipalities have a number of employees (civil servants), varying according to the size of the territory administered. Annex four represents the organisation tree of Bracciano Municipality.

As regards water management division, Bracciano geographically belongs to ATO Lazio 2, which broadly corresponds to the Province of Rome. Nevertheless, as explained in Chapter five, Bracciano still manages water services autonomously through in-house service provision by the municipality.

Bracciano, as all towns in the area, is supplied by groundwater sources, in line with the general Italian trends. Geologically, the area is characterised by volcanic rock, which explains the arsenic concentrations found in water (see Sections 3.1.1 and 3.1.3). Figure 2.6 displays the geological features of the area.

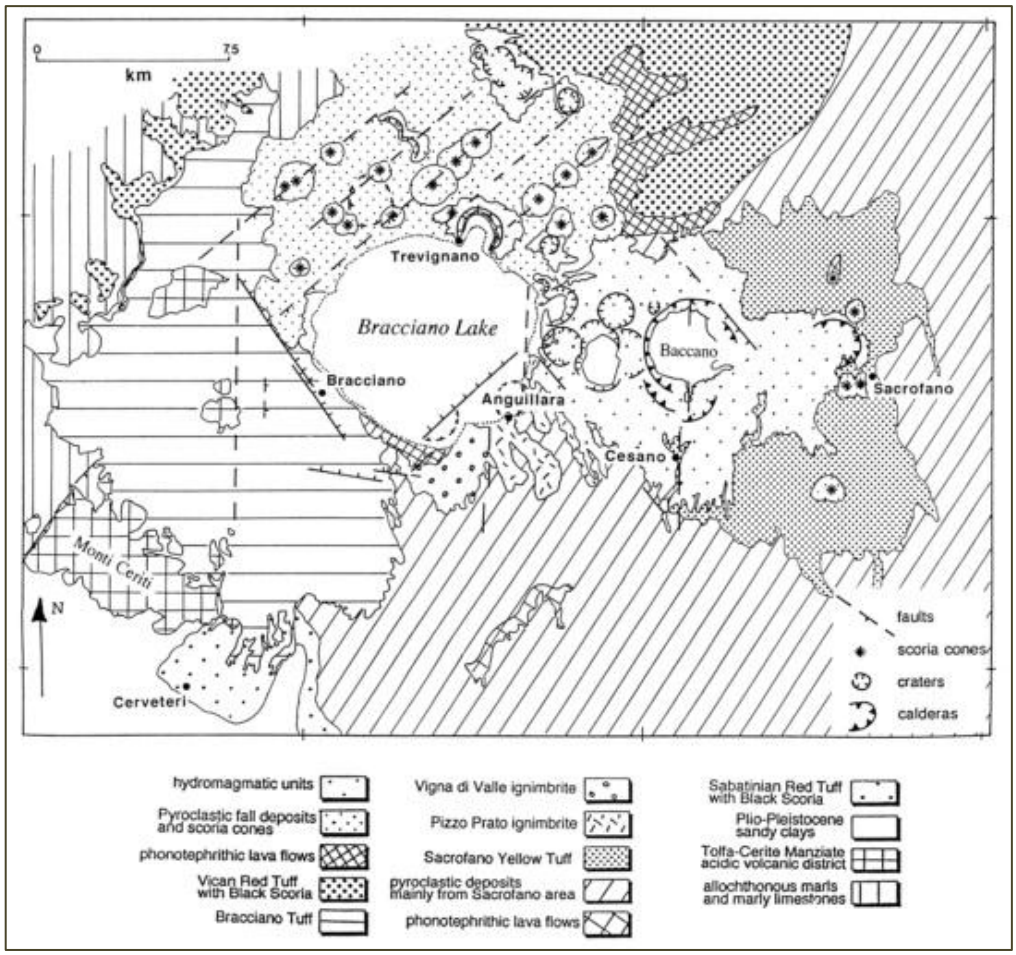

Figure 2.6 Geological map of Bracciano Lake area
(Source: Filippo & Ruspandini, 1998, p.30)

2.2 Arsenic in Drinking Water in Italy

2.2.1 Chronological framework

The Directive EU 98/83 on drinking water quality, lowering the arsenic limit from 50 to 10µg/l, was incorporated in the Italian national law in 2001. As an EU Member State, Italy initially had five years to comply with the stated water quality standards (1998-2003).

After that date Italy retained to benefit from derogation as outlined by EU 98/83: the derogation covered the years 2004, 2005 and 2006. Then Italy applied a second derogation, which covered 2007, 2008 and 2009.

When the end of the second derogation was approaching, Italy requested the European Commission for a third derogation, which was not accorded by the Commission. The official decision was communicated by the Commission in October 2010. At that point a number of measures were taken in Italy, at national and local levels. The objective was on one side to speed up the implementation of remedial measures to decrease arsenic concentration in the concerned areas; on the other side to renegotiate a third and last derogation with the EC.

On March 2011 the European Commission eventually accorded the third derogation to Italy, even though not for all the parameters and not at the concentration levels initially requested. Such derogation covers the years 2010 (retroactive), 2011 and 2012.

2.2.2 Magnitude of the issue

The problem of high arsenic concentrations in drinking water in Italy concerns specific locations in different regions of Italy.

The magnitude of the issue is well represented by the number of water supply zones for which Italy requested the third derogation:

Table 2.2 Magnitude of the arsenic issue in Italy in 2009

Region	No. of water supply zones concerned	Population concerned
Trentino Alto Adige	10	29,221
Lombardia	8	25,962
Tuscany	19	102,743
Lazio	95	862,748
Bracciano	n/a	15,500
Total Italy	132	1,020,674

(Adapted from: European Commission, 2010)

The population corresponding to Bracciano is 15,500 and not 18,889 probably based on population figures dating a precedent population census. The figures clearly show that in 2010 the issue concerned mainly Lazio region, as number of water supply zones and as amount of population.

It can be said that the numbers are significant enough to make the issue relevant for research.

Chapter 3. LITERATURE REVIEW

Chapter two gave a brief overview on the case study, providing the background for the data described and analysed in Chapters five and six. Chapter three examines the available literature relevant to the main aspects of the research.

The research involves public health aspects as well as water sector governance aspects, so this literature review necessarily covers those different aspects. Section 3.1 covers arsenic in drinking water at global level, and includes WHO guidelines as well as EU and Italian legislation on the topic. Section 3.2 examines the principles of water sector governance. Section 3.3 examines the stakeholders involved in water services. Section 3.4 analyses water sector governance in Italy. In fact, all those elements contribute to the development of the research as a whole.

As mentioned in Section 1.8, the implementation in EU countries of the Directive on water quality by the European Commission seems to be a rather under-researched topic, and literature does not seem to offer many data for a comparative study of the implementation strategies of the Directive across different European countries. As a result, this chapter aims at providing a wider background to the research and at locating the case study within a well-defined conceptual and regulatory framework.

Most of the literature review was based on documents available online. The research took place mainly in Loughborough through the following instruments:

- WEDC Centre Knowledge Base
- Loughborough University Catalogue Plus
- Google Scholar search engine
- Google search engine

During fieldwork in Italy, additional resources were kindly provided in printed and electronic format by Dr Carlo Cremisini, director of UTPRA (Environmental Characterisation and Remediation – Natural Disaster Preparedness Unit) at Enea (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), research centre La Casaccia. Many of those resources were used to integrate this chapter.

3.1 Arsenic in Drinking Water

3.1.1 The case of Bangladesh

The most recent developments as regards research on arsenic in drinking water are found in WHO (2011a and 2011b). Rich information is also provided by IARC (2004) though, and many journal articles cast light on specific aspects and help to delineate the recent evolution of literature on the issue.

Arsenic is a metalloid and it is the 20th most common element in the earth's crust. It is associated with igneous and sedimentary rocks. Natural occurrence of high arsenic levels in water supplies can be found in environments including organic black shales, certain types of alluvial sediments, mineralised zones, volcanogenic sources and thermal springs (IARC, 2004, pp.53-55). Products containing arsenic can be used in different industry sectors, including

manufacture of conductors and semiconductors, in the processing of several products (like glass and textiles), in tanning processes and in pesticides (WHO, 2011a, p.1).

As stated by WHO *Guideline for Drinking-water Quality – 4th Edition*, arsenic is "one of the chemicals of greatest health concern" (WHO, 2011b, p.315). Nonetheless, only in the past two or three decades the presence of arsenic in drinking water has been gradually recognized as a major public health issue in various regions of the world (IARC, 2004, p.60).

In fact, Bangladesh was the case that brought the health risks related to arsenic in drinking water at the centre of the attention in the scientific community and in the eyes of policy-makers.

Historically, Bangladesh was characterised by high rates of water-borne diseases caused by the common use of surface water for drinking purposes. In the 1970s UNICEF promoted with the Bangladeshi government a countrywide programme of borehole drilling in order to tackle the issue. At that time arsenic wasn't recognised yet as a problem in water supplies, so no arsenic testing was conducted before launching and developing the borehole programme.

The programme was successful and the population responsive (Mclellan, 2002; Caldwell et al., 2003), so that in the 1980s UNICEF withdrew from the programme since Bangladeshi private sector was adequately developed to carry on with the borehole implementation. The objective of providing 80% of Bangladeshis with "safe" water by year 2000 was achieved and surpassed.

It was not before the mid-1990s that elevated arsenic concentrations in boreholes in Bangladesh was recognised as an issue and its effects on health specifically studied (this historical reconstruction is mainly based on Smith, Lingas & Rahman, 2000, pp.1093-1094, and on Adeel, 2001).

The Bangladeshi population exposed to high arsenic concentrations in drinking water is estimated to be between 25 and 77 million. Such wide range depends mainly on the arsenic concentration considered as "high": estimates on the upper side are based on the WHO indication of 10µg/l, while others are based on the Bangladeshi standard of 50µg/l (Adeel, 2001; Smith, Lingas & Rahman, 2000; Arogos et al., 2010; IARC, 2004, p.66; Ahmad, 2001). The magnitude of the issue appears clearly through the observation that in 1998 4,196 wells out of 9,024 in Bangladesh contained arsenic concentrations above 50µg/l, and 884 above 500µg/l (IARC, 2004, p.61).

To present, Bangladesh represents one of the most relevant cases of large scale exposure to arsenic through drinking water. As such, it has been the object of several epidemiology and toxicology studies investigating the relation between exposure to elevated arsenic concentrations in drinking water and morbidity/mortality rates (e.g. Smith, Lingas & Rahman, 2000; Chen & Ahsan, 2004; Argos et al., 2010).

In particular, a recently published piece of research (Argos et al., 2010) reported the results of a comprehensive epidemiological study conducted in Bangladesh in the years 2000-2009, covering a population of over 11,000. A point of strength of this study is the use of "blinded" investigators, i.e. unaware of arsenic exposure of individual patients (Argos et al., 2010, p.253). The use of "non-blinded" investigators was a methodological flaw highlighted by WHO (2011a, p.6) in some of the literature on the health risks related to exposure to arsenic through

drinking water. Another point of strength of the research is that patients were individually followed up for an average period of 6.5 years.

Figure 3.1 clearly shows an overall correlation between exposure to arsenic through drinking water in time and health hazard. On the other hand, it also shows how difficult it can be to exactly define such correlation, particularly at relatively low concentrations. In fact, the comparison of the line relative to 10.1–50µg/l with the line relative to 50.1–150µg/l seems to suggest some sort of inverse association between arsenic concentration and health hazard. These aspects are treated in Section 3.1.4.

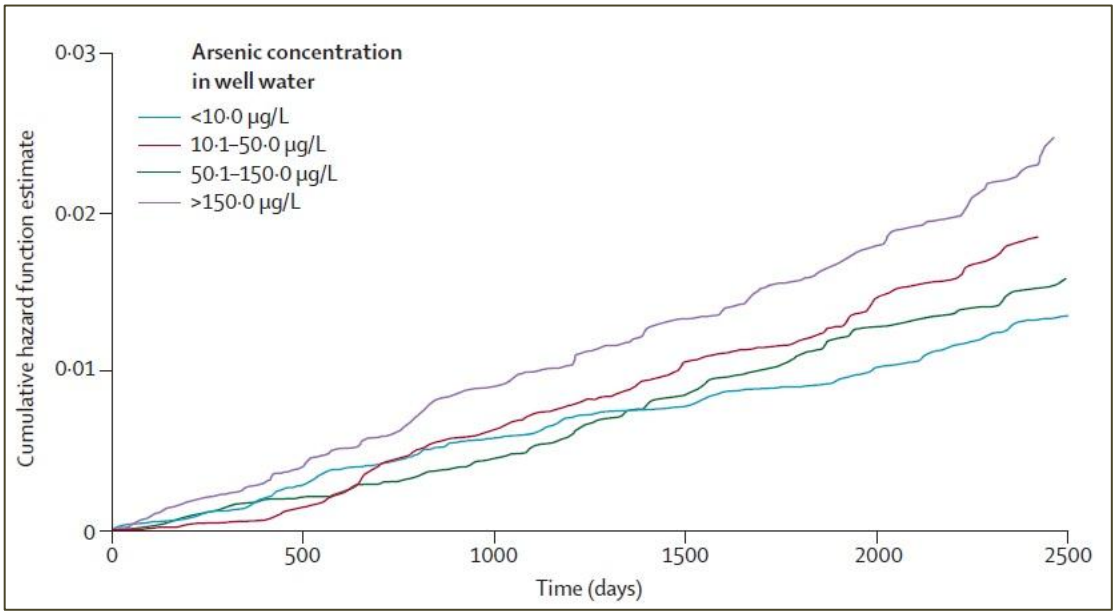

Figure 3.1 Correlation between arsenic concentration and health hazard
(Source: Argos et al., 2010, p.255)

Despite such points of uncertainty, the research main outcomes can be summarised as follows:

- Mortality rates increased with increasing arsenic exposure.
- Long-term exposure to arsenic "was a more important predictor of mortality than were subsequent short-term changes of exposure" (Argos et al., 2010, pp.255-257).

3.1.2 Occurrence in other regions of the world

Though Bangladesh is probably the most significant case of arsenic-related public health issues in the world (IARC, 2004, p.61), many other countries and regions have naturally elevated arsenic concentrations in groundwater (Steiner-Asiedu et al., 2010, p.2), with great differences of levels, ranges and population concerned. IARC (2004, p.60-95), provides comprehensive data, the most relevant of which are summarised below.

In India, region of West Bengal, 6 millions of people were reported to be drinking water with arsenic concentration above 50µg/l (IARC, 2004, p.68).

In Central and South America, Chile, Bolivia, Peru, Argentina and Mexico are affected by the same issue, with 400,000 and 630,000 people in Chile and Argentina respectively exposed to arsenic concentrations ranging from 50 to 500µg/l. The issue, though, is gradually being tackled (IARC, 2004, p.74-75).

As regards South-East Asia, populations of China (including Taiwan), Thailand, Japan and Vietnam are exposed to a range of elevated arsenic concentrations, with peaks of 4,440µg/l in Shanxi province, China (IARC, 2004, p.85). See also Chen et al. (1992).

In Africa and in the Middle-East, exposure to high arsenic concentrations was reported from Egypt, Ghana and Iran. Australia has high concentrations in the state of Victoria (IARC, 2004, p.89).

Localised cases occur also in North America (Canada and USA): in USA in the late 1990s 5% of water supply systems were reported to have arsenic concentrations above 20µg/l (IARC, 2004, p.95).

In Europe, localised cases were reported from Finland, from Spain (up to 2% of population in Madrid exposed to concentrations above 10µg/l), from Switzerland and from old mining areas in South-West England (IARC 2004, p.93-94), as well as from regions of Hungary, Romania and Slovakia (Hough et al., 2010). See also van Halem et al. (2009).

3.1.3 Occurrence in Italy

Localised occurrences of elevated arsenic concentrations in drinking water were found In Italy, though none of those data are reported in IARC (2004).

Very high concentrations of arsenic in groundwater were observed close to Pesariis, a village on the Carnic Alps (northern Italy), reaching above 900µg/l. It should be noted that such concentrations were found in aquifers not directly used for drinking purposes. A certain level of public health hazard is present though, since such waters partly blend with waters from other aquifers that are commonly exploited for drinking purposes (Petrini et al., 2010). Research was also conducted in the area of Mount Amiata, in Tuscany (central Italy). Water was sampled from various drinking water networks, recording a peak value of 14.4µg/l of arsenic (Tamasi & Cini, 2004).

However, the area of Italy where the arsenic concentrations in groundwater tend to be greater is Lazio Region, central Italy, particularly in volcanic aquifers. See Ghirga, Litta & Mocci (2010). The presence of certain toxic elements including arsenic in various water sources – especially groundwater – in Lazio has been recognised since the 1970s (Vivona et al., 2007, p.1183; Angelone et al., 2009, p.902).

In recent years, Vivona et al. (2007) conducted research on rivers, wells and springs in an area of 100km^2 in Lazio, finding arsenic concentrations ranging from 2 to 45µg/l, with most values between 10 and 25µg/l. Angelone et al. (2009) sampled 65 wells and springs in an area of 900km^2, including thermal water sources. They found a mean of 305µg/l arsenic concentration in thermal waters, and of 23µg/l in cold waters. Achene et al. (2010) sampled 100 springs and boreholes currently supplying drinking water to 17 towns and villages in

northern Lazio. The results highlighted that 37% of the sources had arsenic concentrations above 10µg/l, and 12% of the sources had concentrations above 30µg/l. See Figure 3.2.

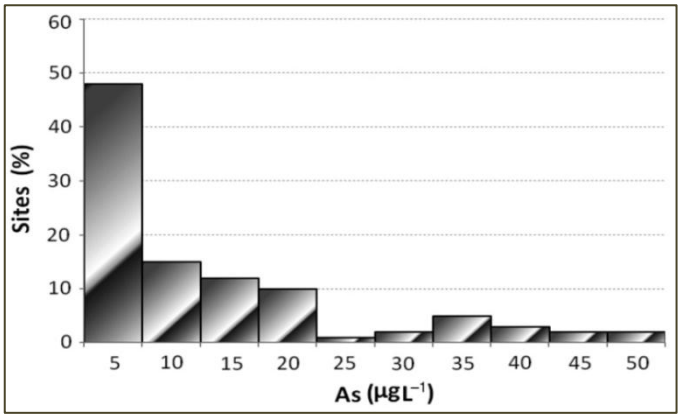

Figure 3.2 Arsenic concentrations in northern Lazio
(Source: Achene et al., 2010, p.516)

Sposito (2006) and Di Pofi (2008) conducted sampling on various water sources in Lazio, obtaining similar overall results.

It should be noticed that, while research was conducted on the presence of arsenic in drinking water networks in Italy, systematic epidemiological research does not seem to be available on the incidence of arsenic related diseases in the areas where arsenic concentrations in water are elevated. That may be due to the difficulties in investigating the toxicology mechanisms regulating chronic arsenic exposure, particularly at relatively low concentrations (Section 3.1.4).

3.1.4 Effects on human health

The effects of arsenic in drinking water on human health have been largely studied in the last two or three decades, with various results. Many studies focus on the carcinogenicity of arsenic (for instance Chen et al. (1992); Smith, Lingas & Rahman (2000); Chen & Ahsan (2004)). At any rate, research does not seem to have reached unequivocal conclusions on some of the strictly toxicological and epidemiological aspects. IARC (2004) and WHO (2011a and 2011b) summarise agreed-upon results and draw conclusions from them, as follows.

Acute exposure occurs when very high doses of arsenic are ingested, in a range between 1.2 and 21 mg/l. Symptoms are severe and vary from vomiting and diarrhoea to progressive deterioration in motor and sensory responses (WHO, 2011a, p.5).

Chronic exposure occurs when relatively low doses of arsenic are ingested through water for prolonged periods of time. Severe skin diseases of various types are the most commonly observed symptoms, including skin cancer. They are observed after a period of exposure of around five years (WHO, 2011a, p.5; IARC, 2004, p.177-180). Smith, Lingas & Rahman (2000, p.1095), mention latency of ten years. Cardiovascular diseases also are observed, particularly in children, as well as the “black foot disease” (WHO, 2011a, p.5-6). Smith & Steinmaus (2011) emphasises the mortality risk associated with cardiovascular diseases deriving from arsenic chronic exposure. In addition, also the respiratory, gastrointestinal and

nervous systems, liver and spleen can be affected by severe arsenic-related diseases (IARC, 2004, p.177-186).

As an overall conclusion on the health risks associated with arsenic in drinking water, IARC (2004, p.228) defined arsenic in drinking water as carcinogenic to humans. WHO also explicitly recognised the causal relationship between consumption of arsenic-contaminated water and development of cancer, especially skin, bladder and lung cancer (WHO, 2011a, p.6).

It is though necessary to mention that the correlation between increased arsenic exposure and increased health hazard is not straightforward at relatively low arsenic concentrations. SCHER (the Scientific Committee on Health and Environmental Risks of the European Commission) expressed the opinion that "information on a potential increase of cancer incidence in humans exposed to drinking water with arsenic concentrations <100µg/l is inconsistent due to difficulties in estimating past exposures and possible confounders" (SCHER, 2010, p.8). Similar positions were expressed by Cantor & Lubin (2007), Meliker et al. (2010), and Mink et al. (2008).

Some studies suggest indeed an inverse association, at low arsenic concentrations, between arsenic intake and certain diseases. Baastrup et al. (2008) conducted a study in Denmark, suggesting that "arsenic might have a protective effect at low concentrations" for certain kinds of diseases (Baastrup et al., 2008, p.237). At the same time they recognise the difficulty of drawing unequivocal conclusions. Analogous conclusions were obtained by Kayajanian (2003), who suggested a "J-shaped curve" for arsenic, in which cancer mortality increases below certain arsenic intakes. Therefore such study advised that both an upper and lower limit be set for arsenic, spanning across 50µg/l (Kayajanian, 2003, p.142).

3.1.5 WHO guideline value

WHO defines acceptable values for arsenic concentration in drinking water between 1 and 10µg/l, and sets 10µg/l as a value not to be exceeded (WHO, 2011b, p.78). On account of the uncertainty still existing about some of the toxicology mechanisms of arsenic exposure, WHO invites to consider the guideline limit of 10µg/l as a provisional value (WHO, 2011b, p. 317).

In practice, the compliance with the 10µg/l limit can be relatively simple to achieve in large water supplies, where waters from different sources can be treated and blended in order to decrease the arsenic concentration. On the contrary, the operation can be problematic in small and rural supplies, where the availability of alternative sources in less likely, household level supply is widespread, and the financial and technical resources at hand may be limited (WHO, 2011a, p.9).

Thus, WHO recognises the difficulties that many countries may encounter in attaining the indicated guideline value, at the same time stating that "every effort should be made to keep concentrations as low as reasonably possible" (WHO, 2011a, p.11).

It is interesting to notice that the limit of arsenic in drinking water was lowered from 50 to 10µg/l by WHO for the first time in 1993 (Ahmad, 2001; Mclellan, 2002; Euromarket, 2003, p.33), possibly as a consequence of the growing attention and increasing scientific knowledge on the arsenic issue in that decade. The fact that still in 2011 the same "provisional" value was

confirmed by WHO despite the uncertainty at low concentrations, seems to point out a precautionary attitude by WHO. In fact the debate is still open in the scientific community: while some studies suggest that the limit of 10µg/l should be raised (Section 3.1.4), others suggest that it should be lowered, and that even countries where arsenic-related diseases have not reached epidemiological concern should treat the issue carefully (Steiner-Asiedu et al., 2010, p.4; Van Halem et al., 2009, p.56-59).

3.1.6 European legislation

After WHO set the limit of 10µg/l in 1993, such guideline value was incorporated as a prescriptive standard by the European Union and by the USA Environmental Protection Agency respectively in 1998 and in 2001, as well as by several countries in the world. See IARC (2004, p.96), European Commission (1998) and EPA (2009).

It is important now to examine closely the regulations on drinking water quality set in 1998 by the European Commission and incorporated in the Italian legislation in 2001 (Presidente della Repubblica, 2001), because they represent an essential part in the framework of the case study object of research. Annexes and articles cited in this section are part of EC 98/83 (European Commission, 1998).

As mentioned above, the maximum arsenic concentration in “water intended for human consumption” was set By the European Commission at 10µg/l, based on the WHO guidelines and on the Commission’s Scientific Committee (European Commission, 1998, Preamble and Annex I).

Some key principles and mechanisms defined the obligations of each member state:

- The concern for human health,
- The prohibition to supply water that can put human health at risk,
- Water quality monitoring,
- Remedial actions in case of non-compliance with the standard values,
- Derogations to the norm,
- Information to the population.

Water provided to the populations should be “wholesome and clean” according to the microbiological and chemical parameters displayed in Annex I. Water quality is regularly monitored by the organisations in charge, which are defined by each member state. Specifications on the analytical methods are given in Annex III.

Annex II provided details about the monitoring programme. “Check monitoring” control certain basic physical, chemical and microbiological parameters, while “audit monitoring” control the full list of parameters indicated in Annex I.

Remedial actions and restrictions in use were described in Article 8.

First of all, in case of failure to comply with the given quality standards, the problem should be immediately investigated and the causes detected.

Once that is done, remedial actions should be considered as a high priority and consequently implemented as soon as possible in order to restore the quality standards. In doing so, the extent to which the parameters are exceeded should be taken into account, as well as the degree of health risks associated with it. At the same time, in deciding the appropriate remedial actions, the competent authorities should also take into account the potential risk and distress for the population represented by the interruption or restriction of the existing water supplies.

Member States had the right to apply derogations to the Directive 98/83 by their own initiative, within the limits stated in Art.9. The maximum parameter values for the time covered by the derogations were set by the member state on condition that they do not jeopardise consumers' health and on condition that no alternative water provision is available in the areas concerned.

The derogation should be as short as possible, and in any case not longer than three years. Towards the end of such period a thorough review was done in order to assess the situation. After that, the Member State could apply a second derogation. Only in "exceptional circumstances" a Member State could apply a third and last derogation. Approval by the EC was a precondition to apply the third derogation, but not the first and second one. Once the Member State submitted the request for a third derogation, the EC had three months to establish if to grant it or not.

Any derogation, beside the duration, needed to specify: the reasons of the derogation; the parameters and the geographical areas concerned; the monitoring programme including extra monitoring where necessary; an action plan for the remedial action including a timetable of the works and cost estimates. All those data needed to be sent to the EC.

Member states had five year time from 1998 to ensure that water quality complies with the standard indicated in the Directive (Art.14). Only in exceptional cases and for limited geographical areas (Art.15) they were allowed to ask the EC for a longer time. The additional period of time was of three years maximum and renewable once. The mechanism of such requests is similar to the one regarding derogations.

Beside specifying water quality standards and setting procedures for the compliance to the regulations by the member states, the EC emphasised the right of the populations (or consumers) to be adequately informed.

In case any derogations and remedial actions were implemented by any of the member states, the consumers had the right to be "promptly" informed about the reasons of the derogation and about the conditions governing it. Special advice needed to be given to particularly vulnerable groups. The only exception to these obligations was when the competent authorities judged the non-compliance to be "trivial", in which case the exceeded standard(s) should be restored within thirty days (European Commission, 1998, Art. 8-9).

Moreover, each Member State had to publish a report on the quality of water intended for human consumption every three years, aimed at providing adequate information to the population. Such reports had to be sent to the EC, that every three years had the task of publishing a comprehensive report on water quality in the European Union.

3.1.7 Italian legislation

The Directive EC 98/83 was transposed into the Italian law in 2001 (Decreto Legislativo 2 febbraio 2001, n.31, modified by Decreto Legislativo 2 febbraio 2002, n. 27). See Presidente della Repubblica (2001).

Firstly, Decreto Legislativo 2001 n.31 reproduced the key points stated by European Commission (1998). In addition, it specified the ways in which those points were implemented in Italy: the institutions in charge and the main mechanisms. In this sense it is of interest for this research. All Articles (Art.) mentioned in this section refer to Presidente della Repubblica (2001).

First of all, the Decreto Legislativo 2001 n.31 detailed the mechanisms of monitoring and control (Art.6-9). The technical procedures of analysis were to be set by the Ministry of Health (MoH) in collaboration with the Istituto Superiore della Sanità, the technical and scientific body of the Italian National Health Service. Locally, the ASLs (local health authorities) were in charge of evaluating and judging the conformity to the quality standards of the water supplied by the service provider.

Water quality undergoes internal and external controls: the service providers were in charge of internal controls, the frequency and location of which needed to be agreed upon with the local ASLs. External controls were run by the local ASLs according to programmes established by the Region. The ASLs relied on the ARPAs (Regional Agency for Environmental Protection) for laboratory testing. The results of the tests needed to be sent to the MoH on a monthly basis.

In case the results indicated that water did not comply with one or more of the set quality standards, the ASL had to inform immediately the service provider and to suggest to the local mayor appropriate measures to safeguard public health. The service provider, after consulting with the ASL and with the ATO (for a definition of ATO see Section 3.4) had to put immediately in place remedial measures in order to re-establish adequate water quality.

At the same time, the mayor, the service provider and the ASL, each of them according to its own attributions, had the duty of informing the consumers about the measures adopted.

The mechanism of derogations was essentially the same as the one delineated in European Commission (1998), with the important specification that the requests for derogations originated from the Regions (Art.13): each Region established the derogation within the maximum values allowed by the MoH and by the Ministry of Environment. After that, if a second derogation was judged necessary the Region needed to ask the MoH, communicating the results achieved as well as all the information required (following European Commission, 1998, Art.9). The MoH was in charge of taking a decision in cooperation with the Ministry of Environment.

As regards the exceptional cases in which a third derogation could be accorded, the procedure was essentially the same, with the difference that the MoH consolidated the requests by the different Regions and forwarded them to the EC: only if the EC gives its approval the derogation was accorded to the applicants.

Despite several institutional bodies were entrusted with different aspects of Decreto Legislativo 2001 n.31, it seems that the Region in particular played a central role. The attributions of the Region covered a range of aspects, especially in case of non-compliance with one or more water quality parameters. In fact the Region - beside the role played in the derogation procedures – had the option of putting in place emergency water supply as a temporary measure, and of taking over for the local authorities if they did not perform adequately. In addition the Region was in charge of adopting action plans for the improvement of drinking water quality, and of delineating the attributions of the local ASL (Art.12). Finally, if a derogation is set, the Region was in charge of informing the population about it and of providing specifically vulnerable groups with appropriate recommendations whenever necessary (Art.13).

Art.19 set administrative sanctions for the service provider that fails to comply with some of the points of Decreto Legislativo 2001 n.31. Though the author is not a specialist in administrative law, it seems that the amount of the sanctions for the different faults was rather low. They range from 500,000 to 120,000,000 Lire (i.e. from 258 to 62,000€ at the official exchange rate of 1€ = 1,936.27 Lire).

3.2 Some Principles of Water Sector Governance

Section 3.1 of this chapter examined the issue of arsenic in drinking water from the point of view of the magnitude of the issue worldwide and in Italy. It highlighted the effects on human health of exposure to arsenic through drinking water. The position of WHO on the issue was examined, as well as the EU legislation and its transposition in the Italian law.

Looking at the water sector governance in Italy will be needed in order to provide a complete background for the research. Beforehand, though, it is necessary to briefly analyse certain key principles of water sector governance, and examine the roles and responsibilities of the various stakeholders involved. This section aims at defining the principles of water sector governance that are relevant to the research.

3.2.1 Principal-agent theory and New Public Management

The principal-agent theory, or principal-agent problem, originates from the field of economics. It defines the relationship between the principal and the agent, where the principal designs a compensation system that motivates the agent to act in the principal's interests. That is the case of a contract between an employer (principal) and an employee (agent). In this sense the principal-agent problem is not only a matter of economic incentives but also of control (to what extent the principal can control the agent); information (how much information is needed by the principal to assess the agent's performance); and risk taking (how risk is shared between the two parties). The principal and the agent play two separate roles and each party aims at maximising its own utility (Stiglitz, 1998, p.966-972; Lippi et al., 2008, p.622). In other words, the principal-agent problem arises as a tension between the principal that demands a service and the agent that provides it (Batley & Larbi, 2004, p.35).

In a democratic system, citizens can be viewed as the ultimate principals, and the politicians they elect as their agents. In turn, politicians become principals and officials and civil servants are their agents. Thus, the whole structure of a public administration can be seen as a chain of

principal-agent relationships, in which incentives, information and accountability play key roles (Batley & Larbi, 2004, p.35 and p.58).

The principal-agent theory underpins many public governance reforms that took place in the 1980s and in the 1990s under the umbrella definition of New Public Management (NPM) (Batley & Larbi, 2004, p.36; Lane, 2000, p.5).

NPM can be seen as a reaction to classical bureaucratic forms of administration characterised by long hierarchical processes and by monopolistic agents often not motivated by performance oriented contracts and incentives (Batley & Larbi, 2004, p.36). Additionally, in the classical bureaucratic systems the government takes up several roles at a time: in-house production of goods and services; financing through taxation; regulation through dedicated bureaux (Lane, 2000, p.4). NPM, on the contrary, prescribes that those roles are kept separated and allocated to different stakeholders, primarily through contractual processes (Lane, 2000, p.193). This shows the relevance of the principal-agent theory in NPM.

In this sense NPM borrows certain approaches typical of the private sector: the contractual approach, the focus on managerial improvement, and the emphasis on market and competition. Overall, NPM reforms entail rethinking the role of government, reshaping service delivery, empowering human resources and defining systems of performance monitoring and of accountability. Performance is measured – at both organisational and individual level – based on the outputs delivered. This requires establishing clear performance objectives. See Batley & Larbi (2004, p.41-48). In other terms, this means "clarifying what is expected from whom as well as who is responsible for what and […] tying them down to the fulfilment of contractual obligations" (Lane, 2000, p.193).

3.2.2 Public-Private Partnerships and decentralisation

"A common objective of progressive water utilities is to improve service provision to customers while meeting the utility's financial objectives" (Sansom et al., 2004, p.82). In this perspective, the involvement of private actors in the provision of services is generally seen as a promising option, in the water sector as well as in other sectors (European Commission, 2004, p.5-8; World Bank, 2006, p.3-5; Sohail & Maslyukivska, 2009, p.2).

The Public-Private Partnerships (PPPs) phenomenon developed starting from the mid-1990s as a feature of those general public sector reforms defined above as NPM (Batley & Larbi, 2004, p.49; European Commission, 2004, p.3), which tended to shift the role of government from service provision to policy, regulation and possibly financing (Sansom et al., 2004, p.70-74), and to delegate service provision to external contractors.

PPPs can take several forms, depending on the type of contract binding the private operator to the government. The contract – or in more general terms the organisational arrangement – stipulates the roles of the public and the private in key areas such as asset ownership, financing, tariffs and system operation. For an overview of the main types of contacts see Batley & Larbi (2004, p.128-132); European Commission (2004, p.8-21); World Bank (2006, p.7-11).

It is generally recognised that successful PPPs require the presence of private firms with adequate capacity, strong regulatory action by independent authorities, clear policies and

legislation, transparency in bidding, autonomy of the service provider from politics, and involvement of all stakeholders and commitment by the service provider to increase service levels (Edwards, Rosensweig & Salt, 1993; Batley & Larbi, 2004; World Bank, 2006; Sohail & Maslyukivska, 2009). It should be pointed out though that in recent years the PPP approach has been criticised, particularly when multinational corporations got involved in water management in low or middle income countries. Public Citizen (2003) and De Marzo (2009) are instances of those criticisms.

The kind of reforms highlighted above takes ideally place in a decentralised system, i.e. in governance systems in which fiscal, political and administrative powers are transferred from central to local level (Edwards, Rosensweig & Salt, 1993, p.20; World Bank, 2000, p.3).

Decentralisation, if correctly designed and implemented, can "move decision making closer to people and improve governance, including the efficiency of service delivery" (World Bank, 2000, p.3. See also World Bank, 2004, p.186-188). Decentralisation reforms can take the following forms (World Bank, 2000, p.3; Edwards, Rosensweig & Salt, 1993, p.5):

- Deconcentration: Central government decentralises certain powers to its local branches. This is the mildest form of decentralisation.
- Delegation: Central government transfers powers to local governments or to agencies that are not wholly controlled by central government. The link of accountability to central government remains.
- Devolution: Central government devolves decision-making, management, and financial powers to local governments. This is the most comprehensive form of decentralisation.

Designing decentralisation reforms is a highly complex task, and the kind of decentralisation greatly depends on context specific factors. Though the "perfect" decentralisation design does not exist, overall it can be said that essential components of successful decentralisation are adequate resource allocation, clear division of responsibilities among stakeholders, and well-defined accountability systems (World Bank, 2000, p.3-4). Accountability to customers is considered as a key feature of successful decentralisation (Batley & Larbi, 2004, p.102).

3.3 Stakeholders in Water Services

The type of approach to governance delineated above requires a clear separation of roles between government and service provider and the presence of a well-functioning regulatory regime, in order to provide adequate services to the customers. Each one of these stakeholders has distinct responsibilities, and the relationships among stakeholders follow defined routes.

This section provides an overview on stakeholders' roles and relationships. It is largely based on World Bank (2004).

3.3.1 The service provider

The service provider is the entity in charge of providing the services. As outlined above, services can be contracted out to private firms in various forms of PPPs. Therefore, service

providers can be “public, private non-profit and private for-profit entities” (World Bank, 2004, p.48). Even when the service provider is a public entity, it is essential that it is operationally autonomous from the political and policy-making levels (World Bank, 2004, p.50).

The relationships between service provider and government are defined as “compact” and “contract”. “Compact” is the overall sector-wide policy that transfers the service provision task from the government to the service providers. It defines the overall accountability of the service providers to the government (World Bank, 2004, p.48 and p.51). A “contract”, on the other hand, is an agreement between government (often local government) and a service provider in a specific location. It stipulates duties and responsibilities of both parties and is legally enforceable. It makes a specific service provider accountable to the governmental body with which the contract is stipulated (World Bank, 2004, p.48).

3.3.2 The customers

Among the stakeholders involved in water service provision systems, customers can be seen as the main right-bearers: “customers should have a clear legal right to service of a specified standard, at a specified price, and […] should have a way to hold the utility accountable if it does not deliver” (World Bank, 2006, p.143).

Consequently, the service provider should make possible for customers to complain and should ensure responses within a defined period; a (regulatory) body should facilitate customers in claiming their rights. At the same time customers should recognise their obligations vis-à-vis the service provider, particularly the obligation to pay for the services they receive. In this sense it is advisable to involve customers in the decision-making processes that determine the way water services are managed (World Bank, 2006, p.143; WISE, 2008; De Stefano, 2010).

Customers are clients and citizens at the same time. As clients, they receive the services supplied by the provider and pay for them. As citizens, they participate individually or collectively in the political processes (World Bank, 2004, p.49). As mentioned above, citizens are the ultimate principals in a principal-agent model (Section 3.2.1).

The relationship of accountability between customers and service provider is defined as “client power”: customers express their demand for services and monitor the service provider’s service levels, often on the basis of service charters. This can be defined as the “short route of accountability” (World Bank, 2004, p.49-51) because it is relatively straightforward and puts customers in direct contact with the provider.

As citizens, customers are endowed with civil rights that define their relationship with the political power. World Bank (2004, p.50) names such relationship “voice”. Customers can express their voice through several channels, in the first place the formal channels of political representation, like voting and elections. In addition, customers can use informal channels such as campaigning, advocacy and lobbying to express their voice (World Bank, 2004, p.50). “Voice” is defined as the “long route of accountability”. It is “long” because is a complex and indirect way customers have to claim their rights to adequate services. It is used when the “client power” route is weak or missing, which is often the case when services are provided by the public sector (World Bank, 2004, p.55).

Barriers to customers' "voice"

Information is a prerequisite for building up customers' "client power" and "voice", and is the first step towards customers' participation (World Bank, 2006, p.144-145; WISE, 2008; De Stefano, 2010). As stated by World Bank (2004, p.56), "information is power". Information increases customers' awareness on key issues and motivates them to exert pressure on politicians (World Bank, 2004, p.86-89). When customers receive specific information on government's choices, on their impact on the customers and on the available alternatives, they are potentially able to "raise their voice" and influence governments and/or service providers.

For exactly the same reason, though, information about outcomes and performances is not always promptly shared with customers, so their basic awareness of the service level they receive does not necessarily turn into "voice" or "client power" (World Bank, 2004, p.56). As mentioned above, that occurs especially when the public sector provides services in-house, i.e. where "client power" is weak, and "voice" is the only accountability route available to customers – however long and complex it might be.

In addition to poor information, several other barriers can weaken customers' "voice". First of all, customers represent a composite stakeholder group: they can have different interests and sensitivity, which may not be represented in a cohesive view (World Bank, 2004, p.56; World Bank, 2006, p.40). In addition, social conflict levels can be high and the political scene polarised: in such cases customers may focus on other issues they perceive as more urgent or stringent (World Bank, 2004, p.88). Finally, service provision at very low tariffs can be used by politicians as an instrument of political consensus, even when those tariffs do not ensure financial sustainability and require subsidising. This can generate a vicious circle between politicians' low "willingness to charge" and customers' low "willingness to pay" (Sansom et al., 2004, p.86).

The risk at stake is that customers end up being "silent stakeholders" (Batley & Larbi, 2004, p.65).

3.3.3 The regulator

"Good regulation is a means of impartially improving accountability and transparency to enable more effective service provision" (Sansom et al., 2004, p.74). This means that the presence of an adequate regulatory regime is essential in any service provision setting.

The regulator keeps political power and service provision separate, and ensures its own independence (World Bank, 2004, p.168). It makes sure that stakeholders comply with their respective duties and that the relationships of accountability among stakeholders follow the appropriate routes (World Bank, 2004, p.167).

Establishing an adequate regulatory regime is indeed a major role played by the government. In some cases governments assign regulatory roles to already existing institutions; in other cases ad-hoc independent authorities are created (World Bank, 2006, p.125), particularly in countries without a tradition of separation between government and service providers. The presence of a regulatory regime is important both when services are provided by the public sector and when they are provided by private or mixed firms (World Bank, 2004, p.168-169).

The main regulating tasks can be summarised as follows (based on World Bank, 2006, p.126; Sansom et al., 2004, p.74-75; Batley & Larbi, 2004, p.187):

- Monitor performances and stakeholders' adherence to their responsibilities
- Take action (including sanction) to address poor performances and irregularities
- Adjust tariffs according to existing regulation
- Adjudicate disputes between stakeholders
- License providers having adequate capacity
- Promote appropriate asset management and serviceability

Such variety of tasks indicates that the regulatory regime needs to be structured appropriately, and a number of basic conditions are needed to allow the regulatory regime to perform its functions.

In the first place, the regulator must be independent. Independence means distance from political power, service provider and customers (World Bank, 2006, p.140; Batley & Larbi, 2004, p.194). To be actually independent, the regulator needs an adequate and dedicated budget, transparent and publicly accountable recruitment policies, and public reporting systems (Sansom et al., 2004, p.75). Secondly, the regulator needs moral and legal legitimacy, i.e. it needs to be sustained by an adequate legislative framework and by a clear mandate (World Bank, 2006, p.128; Sansom et al., 2004, p.75; Batley & Larbi, 2004, p.193).

In operational terms, the regulator needs full access to relevant information about the object of regulation (World Bank, 2006, p.128; Batley & Larbi, 2004, p.193), and to be empowered with adequate capacity, expertise and skills (World Bank, 2006, p.128; Sansom et al., 2004, p.75; Batley & Larbi, 2004, p.193). In this sense different regulation tasks can be allocated to different regulating authorities (Sansom et al., 2004, p.75). Additionally, the regulator should be incentivised to perform its tasks, i.e. to "comply with the rules governing its choices" (World Bank, 2006, p.128).

Ideally, the regulator applies appropriate remedies, is open to public scrutiny, acts fairly and transparently, and has a goal-based approach (Better Regulation Commission, 2000).

3.4 Water Sector Governance in Italy

Having highlighted the key principles of water sector governance (Section 3.2) as well as the roles and relationships of the stakeholders involved (Section 3.3), this section will now focus on Italy. This section aims at providing an overview on the water sector governance in Italy, analysing the existing legal framework and its actual degree of implementation.

3.4.1 Water sector reform: Galli Law

The water sector in Italy traditionally was – and partially is - highly fragmented. Until 1994, water services were managed mostly by the public sector, which involved a number of municipalities, municipal companies and regional public-owned entities, and minimally by private operators. Some studies mention about 23,500 operators in the country before 1994 (Asquer, 2010, p.66). Other studies report 5,500 water service providers, 7,000 entities in charge of wastewater collection, and 2,000 in charge of wastewater treatment and disposal

(Lippi et al., 2008, p.623). See also Danesi, Passarelli & Peruzzi (2007, p.34). Such fragmentation determined high levels of inefficiency (Argento & van Helden, 2010, p.796).

In order to globally reorganise the water sector, a radical reform was issued in 1994 (Law 5 January 1994, n. 36), see Presidente della Repubblica (1994). The reform was named "Galli Law" after Giancarlo Galli, its proponent Member of Parliament. Galli Law incorporated elements of principal-agent theory (Lippi et al., 2008, p.622) and of NPM (Argento & van Helden, 2010, p.792). The main purposes of Galli Law can be summarised as follows:

- Transfer water services from in-house public management to public or private-owned companies (Lippi et al., 2008, p.623). The need for investment required private capital and expertise (Citroni, 2007, p.8; Argento & van Helden, 2010, p.796).
- Reduce fragmentation through horizontal integration of water service management, i.e. by organising water services by territorial units (Lippi et al., 2008, p.623; Citroni, 2007, p.8).
- Simplify planning through vertical integration of water services, i.e. by integrating water services from water abstraction to wastewater disposal. (Lippi et al., 2008, p.623; Citroni, 2007, p.8).
- Introduce a tariff model adequate to ensure full cost recovery from the customers. When Galli Law was issued Italy was going through a severe financial crisis (Lippi et al., 2008, p.623) and public expenditure needed to be kept under control.

Galli Law defined the stakeholders involved in water services, their roles and responsibilities. The Italian administrative system is decentralised, so local institutions were entrusted with major roles in determining water service organisation throughout the country. Therefore, interventions by the central government were limited to setting general directives, methodologies and criteria to implement the reform, particularly as regards water sources mapping, environmental protection, planning, prevention of hydrological emergencies, and minimum service levels (Art.4). All Articles (Art.) mentioned in this section refer to Galli Law (Presidente della Repubblica, 1994).

One of the most innovative aspects of the reform was the establishment of an overall "Integrated Water Service" (SII) incorporating water abstraction, transmission, distribution, treatment and sewerage services (vertical integration). The SII was territorially structured on the basis of local "Optimal Water Districts" (ATOs, "Ambito Territoriale Ottimale") (horizontal integration). ATOs were to be set according to water basin criteria, reduction of fragmentation, and adequate scaling of water services (Art.9).

The Regions were entrusted of establishing ATOs' boundaries, theoretically within six months after the issue of Galli Law (Art.8). Once the ATOs were determined, Provinces and municipalities were in charge of organising the water services according to criteria of efficiency, efficacy and economy (Art.9). The Regions were entrusted of defining the contract model to be implemented between local governments (municipalities) and service providers. Provinces and municipalities were in charge of an initial asset assessment and of ensuring the achievement of the objectives set by the reform (Art.11). Galli Law indicated concession as the general type of contract to be stipulated between local governments and service providers (Art.12).

The reform prescribed tariffs to be set by local governments based on a standard method established by the Ministry of Public Works (called "normalised method"), and applied by the

service providers to the customers. Tariffs were required to cover full costs, including operation, maintenance and upgrading, environmental aspects, and ROCE (return on capital employed) (Art.13).

In addition to the ATOs, other new authorities were established by Galli Law for the enforcement of the reform.

COMVIRI (Committee for the Surveillance on the Use of Water Sources), a political-technical body established within the Ministry of Public Works, was in charge of guaranteeing that water management abided by the principles of efficiency, efficacy and economy, that tariffs were adequate, and customers' rights safeguarded. Whenever Regions or Provinces instituted local regulatory bodies, COMVIRI was required to collaborate with them (Art.21).

COMVIRI functions were based on data coming from the Observatory on Water Services, an ad-hoc bureau created within the Ministry of Public Works. The Observatory had the task of collecting and analysing data concerning service providers and contracts, service quality, tariffs and investment plans. Service providers had the duty of periodically sending those data to the Observatory. COMVIRI had the task of reporting all irregularities by the providers to the appropriate judicial bodies, to find out any responsibilities by the local governments, and to compensate customers where necessary (Art.22).

Galli Law acknowledged customers' right to information, and stated service providers' duty to keep customers informed about service provision, including the technologies used, the functionality of the plants, water quality and quantity. Moreover, in order to foster customers' participation, the reform stated that mixed and private service providers could issue bonds available to their customers (Art.23).

As regards monitoring and control at local level, in addition to the pre-existing bodies in charge service providers were entrusted with the duty of conducting water analysis internally. Service providers could be charged with sanctions if, after being notified any irregularities, they did not promptly implement appropriate measures to restore appropriate water quality or to prevent the use of unsuitable water by the customers (Art.26).

3.4.2 Recent developments in legislation

Several changes were made to Galli Law over the years. This section briefly highlights the major ones.

Modifications to Galli Law were introduced in 2006 by Decreto Legislativo 3 April 2006, n.152 (Presidente della Repubblica, 2006), represented in the first place by the establishment of Autorità d'Ambito Territoriale Ottimale ("ATO Authorities"). ATO Authorities centralised the powers that in origin Galli Law attributed to municipalities and to Provinces. In other words, each ATO had one ATO Authority. All local governments were required to participate in the local ATO Authority. ATO Authorities had functions of general regulation and control. At the same time, ATO Authorities were in charge of asset assessment, infrastructural planning, water service management arrangements, and financial planning including tariffs. In case ATO Authorities did not intervene, the Regions and if necessary the Ministry of Environment were required to take over.

An additional modification dating 2006 prescribed the additional allocation of solid waste sector tasks to COMVIRI and to the Observatory, which resulted in changes in denomination and composition of those bodies (Presidente della repubblica, 2006).

A radical change was then introduced in 2010, when it was stipulated that the ATOs - and thus the ATO Authorities - were to be abolished in one year time in the framework of urgent measures for the containment of public expenditure. All the attributions of ATOs and ATO Authorities were to be reabsorbed by the Regions (Presidente della Repubblica, 2010).

The role of the private sector was modified several times also. Whilst in 2002 the legislator imposed private management of water services through competitive bidding, in 2004 local governments were newly authorised to delegate water services to public or mixed companies without competitive bidding (Argento & van Helden, 2010, p.798-799). See also Asquer (2010, p.74) and Giannelli (2006, p.294-303). More recently, Decreto Legislativo 25 June 2008, n. 112, newly stipulated that in-house water management was allowed only "in exceptional cases", and reiterated that competitive bidding with participation of private or mixed companies (with at least 40% private participation) was the procedure to follow in ordinary cases (Mommo, 2009).

The latest major development took place in June 2011, when Italians voted two referendums about water sector governance. The first referendum concerned private sector participation, and the second the ROCE tariff component. The vast majority of the population voted to abrogate the articles of Decreto-legge 25 June 2008, n. 112 which promoted the participation of private firms in water management, and to remove ROCE from tariff computation (see Ministero dell'Interno, undated).

The legal framework is very complex though, and it seems the referendum results have not yet had any actual consequence. In addition the ATOs do not seem to have been suppressed yet. See Surace (2012) for an overview.

3.4.3 Controversies over Galli Law

Some of the fundamental traits of Galli Law, together with the continuous and not always coherent changes it has gone through, have generated a certain level of controversy.

A key issue is the top-down nature of Galli Law: "the reform introduced compulsory radical changes, and its implementation was top-down" (Argento & van Helden, 2010, p.796). In other terms, the reform was designed by the legislator at central government level without consulting with the various stakeholders involved in water management, and delegated the entire implementation of the Law to local governments - to Regions in the first place. Lippi et al. (2008, p.638) defined such an attitude as the "hypocrisy of central government": the legislator set reforms in very abstract terms, shifting the resolution of any conflicts generated by those reforms downwards to local governments.

Similarly, Galli Law did not seem to take into due account the likely consequences the reform could have on the power balances and relationships existing al local level, within the public administration or between public administrators and private companies. Such attitude can be seen as "coercive": Galli Law demanded conformity to a radically new governance model

without providing effective regulation and incentive. It required conformance rather than performance (Lippi et al., 2008, p.624).

One of the most apparent outcomes of such coordination gap between central government and local governments is that Regions were not proactive in implementing the reform. The process took several years, and Regions often did not do much more than producing "carbon copies" of Galli Law (Lippi et al., 2008, p.625). Asquer (2010) defines the period 1994-2006 as the actual reform implementation time. Figure 3.3 shows how still in 2006 not all the ninety-one ATOs designed by the various regional laws were operational: white bars represent the ATOs established; shaded bars represent the investment plans and tariff plans promulgated; grey bars represent the concessions awarded.

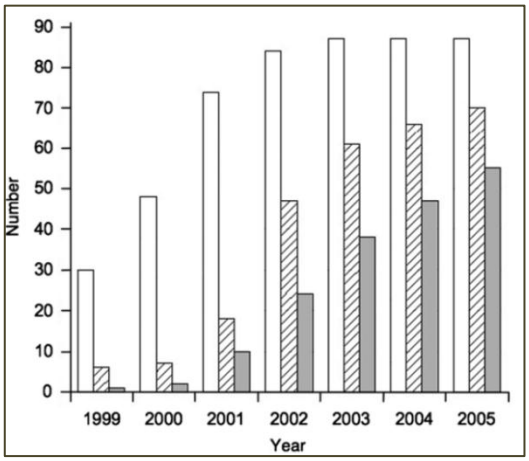

Figure 3.3 Implementation of Galli Law
(Source: Asquer, 2010, p.73)

As pointed out by Asquer (2010, p.74), local governments and water utilities controlled by local governments resisted the reform until the early 2000s, when changes in legislation allowed them to retain control on water services in some circumstances (Section 3.4.2).

In brief, the reform was formulated at the top of the governance pyramid without due inclusion of relevant stakeholders. At the same time, the Italian system is decentralised, so central government lacked the strength to play an direct role in the reform implementation. As a result, the reform was hindered by the same actors which were in charge of implementing it (Argento & van Helden, 2010, p.807). It can be concluded that "when reform is radical in terms of both goals and means, it will be successful only if all powerful stakeholders approve its content" (Argento & van Helden, 2010, p.807).

In addition, though Galli Law drew a formal separation of powers between regulator, political power and service provider, in practice the attainment of such separation has been often inadequate. In theory, two bodies coexist in each ATO: the ATO Authority (the principal); and the service provider (the agent). In practice, the separation between those bodies was not rigorously set. The same representatives of the municipalities are allowed to sit both in the ATO Authority and in the board of the concessionaire, since the latter does not need to be a private owned company (Lippi et al., 2008, p.625-626).

Therefore, ATO Authorities can hardly be viewed as proper "independent regulators". On the contrary, as consortia or agreements of municipalities they maintain markedly political character. Moreover, in several cases ATO boundaries correspond to existing Province

boundaries, so ATO Authorities tend to be de-facto embedded in Provinces (Lippi et al., 2008, p.629). It is thus possible to define such situation as a conflict of interest between “regulator and regulated” (Giannelli, 2006, p.291). Mechanisms of external control are essentially missing at local level (Giannelli, 2006, p.291), in the bigger picture of “loosely specified regulatory institutions” (Asquer, 2010, p.74).

Evidently, this allows high degrees of political interference in water service provision. In this sense it can be said that ATO Authorities have ended up being “virtual” institutions, ratifying decisions taken informally outside the Authority by local party chairmen, local governments and pre-existing public-owned water utility boards (Lippi et al., 2008, p.630-631). As mentioned above, representatives of local governments (i.e. municipalities) often sit in the board of public-owned or mixed water utilities, in contradiction with Galli Law’s principal-agent blueprint (Lippi et al., 2008, p.633).

This can be explained in terms of open dissatisfaction by local governments with the role Galli Law defined for them (Citroni, 2007, p.25; Lippi et al., 2008, p.633). Moreover, the weight of pre-existing context-specific power balances should not be overlooked: water services mobilise substantial finances and contracts, as “part of the configuration of local power systems” (Giannelli, 2006, p.310). Therefore certain local governments tended to see the water sector reform designed by Galli Law as a potential threat to existing power networks.

In addition, relationships exist between water service provision and political consensus. In the first place, water services are perceived as important by the population (Giannelli, 2006, p.310). Second, people were traditionally provided with water services by local governments – mostly by municipalities. As a result, price and quality of water services tend to influence voters (Danesi, Passarelli & Peruzzi, 2006, p.52). If the presence of municipalities in water provision might guarantee good service level and equitable profit distribution, that might occur at the expense of company account balances (Danesi, Passarelli & Peruzzi, 2006, p.53).

Galli Law designed a “competition for the market” system, based on concession as a contractual form aimed at guaranteeing stability and long term investments (Citroni, 2007, p.10-11; Giannelli, 2006, 289). As a matter of fact, due to the factors highlighted above, private participation in water service provision is still limited in Italy, as shown by Figure 3.4:

Kind of water firm	Number of water concessions awarded
In-house water firms	58
Mixed public–private ownership firms	14
Local government-owned firms traded on the stock exchange or partially owned by a financial institution	13
Safeguarded public sector firms	11
Private firms selected through tender offer competitions	5
Private firms in a negotiated temporary regime	1
Total	102

Figure 3.4 Private sector participation in water management
(Source: Asquer, 2010, p.76)

Whenever concessions were awarded, in most cases “ex-municipal” companies – still entirely public or mainly controlled by the public sector – ended up obtaining the concessions, i.e. companies created from the ashes of in-house water departments with little modification. Those companies can be seen as the only ones who combine decisive elements such as

technical expertise, financial viability, and “the (party-)political know-how that is made necessary by the delicate equilibria that underlie ATO Authorities’ decisions” (Citroni, 2007, p.22-23).

An additional barrier to private participation in water services can be represented by the existing tariff model. According to Galli Law, tariffs would be set by local governments according to a standard model elaborated by COMVIRI and named “normalised method”, designed to cover all costs including ROCE. In practice, the proposal by COMVIRI was never adopted, so municipalities compute tariffs based on a system elaborated by the Ministry of Environment in 1996. But those tariffs are “not sufficient to wholly finance investment plans” (Giannelli, 2006, p.293). On their side, municipalities – the institutions in charge of tariff setting – are often reluctant to charge their customers/voters with higher tariffs (Giannelli, 2006, p.313). On one hand, it seems that the need for private investments remains (Danesi, Passarelli & Peruzzi, 2007, p.53); on the other hand private participation certainly suffered a setback due to the results of the referendums held in June 2011 (Section 3.4.2).

Overall, it does not seem that an adequate enabling environment is provided for private actors to be attracted by the opportunity of investing in water sector in Italy. Galli Law does not seem to have generated a proper liberalisation programme. Much less it has generated a privatisation programme, since politicians are generally not willing to privatise public-owned companies, and customers may not find any advantages in privatising natural monopoly services (Giannelli, 2006, p.312). That was the case when, in early 2012, the Municipality of Rome announced the plan of selling to private shareholders 20% of its shares of ACEA, a mixed company managing water and electricity services in large areas of Lazio Region. Such announcement caused strong opposition by civil society associations as well as across the political spectrum. Il Post (2012) displays videos of the protests that took place at the Municipal Council of Rome. In summary, it can be said that “speaking of privatization in the case of Italian water sector reform is in fact an exaggeration” (Citroni, 2007, p.24).

In general terms, Galli Law designed a radical reform of water sector in Italy based on key principles of principal-agent theory and NPM, with the overall objective of enhancing effectiveness, efficacy and economy of the system. In practice, the reform implementation was hindered by the several factors described above. A recent poll showed that only 46% of the Italians has ever heard about ATOs, and only 15% knows about COMVIRI (Cittadinanzattiva, 2011, p.21-22).

Lippi et al. (2008) defined certain “grey zones” in which the structure of Galli Law is loose and as such might be the origin of most of the difficulties encountered. Those “grey zones” are: the lack of a national authority endowed with actual powers of coordination and control; the arbitrariness with which the Regions were allowed to implement the reform; the room left at local level for conflicts of interest between municipalities and service providers. The numerous controversies found in Galli Law appear to confirm the overall evaluation of the Italian regulation system by Transparency International Italia (2012, p.5): “The legal framework is fragmented, contradictory, and questionable. Laws contain margins of uncertainty and imprecise wording, leaving dangerous normative gaps”. Figure 3.5 represents the “grey zones” in the Galli Law design.

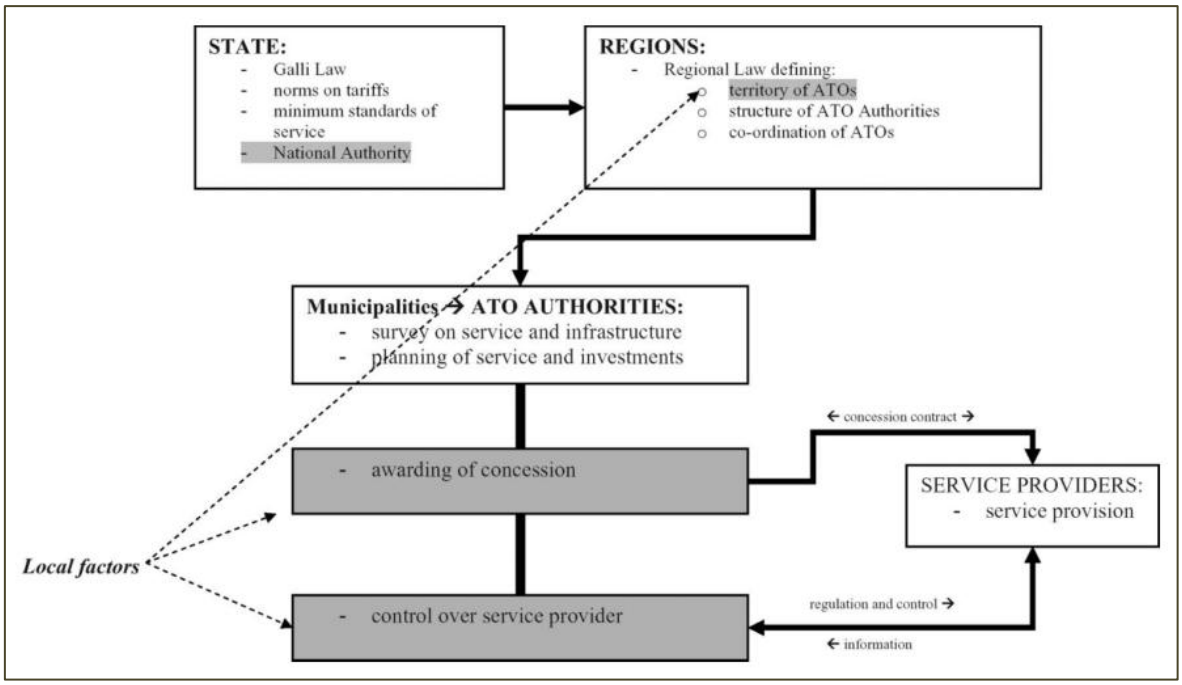

Figure 3.5 Grey zones in Galli Law
(Source: Lippi et al., 2008, p.634)

3.5 Conclusions

Due to the multifaceted nature of the research, this chapter covered several different topics, which all together represent the background of the research.

Section 3.1 examined the issue of arsenic in drinking water in general terms. It analysed the worldwide magnitude of the issue, as well as the impact on human health. Special attention was given to the situation in Italy and in particular in the region where the case study takes place. In addition it was showed how WHO updated the arsenic guideline value in 1993, how the European Commission integrated such value in the European drinking water standards, and how Italy followed with a national law.

Section 3.2 provided a general framework of water governance principles, and Section 3.3 analysed roles and responsibilities of the main stakeholders involved in water services: the service provider, the customers and the regulator. Those two sections aimed at providing a theoretical framework to contextualise the Italian water sector governance system.

Section 3.4 analysed water sector governance in Italy, characterised by a radical reform (Galli Law) whose implementation happened in a somewhat slow and fragmentary fashion, raising criticism from many parts.

As it will emerge in the following chapters, referring both to public health aspects related to arsenic in drinking water and to policy/governance aspects is essential for a full understanding of the case study object of the research.

Chapter 4. METHODOLOGY

Chapter three examined the available literature on the main aspects of the research, providing an overall background for the whole research process. Chapter four aims at describing, explaining and where necessary justifying the methods used in the research.

The primary objective is to provide the theoretical and methodological framework in which the research takes place. It is shown how the choice of the methods derives fundamentally from the research objectives or purposes.

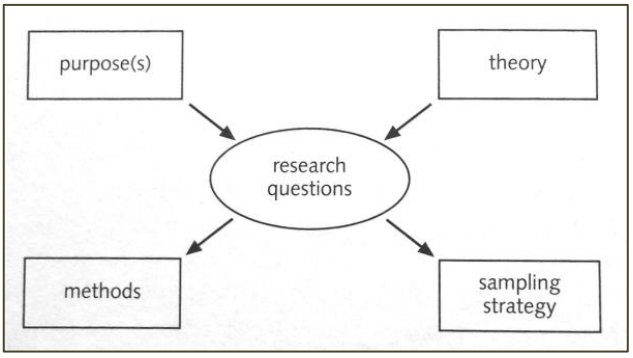

Figure 4.1 Choice of research methods
(Source: Robson, 2002, p.82)

Secondly, the methods and procedures used in the actual research are presented, in order to provide a clear overview of what the data needed are and of how they are collected and analysed.

Finally, possible sources of bias, methodological limitations and ethical issues are examined.

4.1 Research Aim

The research aims at understanding the factors that determined the delays occurred in the remedial actions for the issue of high arsenic concentrations in drinking water in Bracciano (Italy). The research seeks to understand and to clarify to what extent the different stakeholders involved can be retained accountable for the events, and to what extent the responsibilities lay at local level and to what extent at higher level (regional and/or national).

4.2 Research Objectives and Questions

Given the research aim, this study has the following objectives:

Objective 1	Identify how and why the municipality - as both service provider and local government – has failed to live up to its obligations towards the customers.
Objective 2	Identify the reasons why customers lack “voice” in requiring accountability: in demanding their right to a safe water supply and in requiring prompt responses.
Objective 3	Understand the regulatory regime during the years elapsed, and to what extent it had an impact on the service provider’s performances.

For each research objective, the following research questions need to be answered:

Objective 1	Objective 2	Objective 3
a) Is water service structure adequate to ensure service level? b) What is the rationale behind the choices the municipality has made? c) How do political level and service provision level interact within the municipality? d) Are there any relations between water provision and electoral consensus? e) How does the municipality perceive its own role in the course of the events?	a) What instruments do customers have to require accountability? b) Have customers received adequate information about the arsenic issue? c) Did customers use the public standposts? Why? d) Do customers perceive the issue as important? e) How do customers perceive the actions undertaken by the municipality?	a) Are regulatory tasks clearly defined and divided among the different authorities? b) What powers has the regulator vis-à-vis the municipality (as service provider and as local government)? c) What were the actions undertaken by the regulator? d) How does the regulator perceive its own role in the course of the events?

4.3 Conceptual Framework

As outlined in Section 3.3, in an ideal water service system government and service provider are separated, and customers are empowered with rights and tools for requiring accountability from the service provider and from the political power. The regulating authority or authorities, though governmental agencies, are operationally independent from the political power. Such governance structure takes place in a decentralised system, where local institutions are granted large margins of autonomy. Both the regulating function and the political power are embodied by local institutions or by local branches of central institutions.

Figure 4.2 represents an ideal application of such governance model (mainly based on World Bank, 2004, and on Batley & Larbi, 2004).

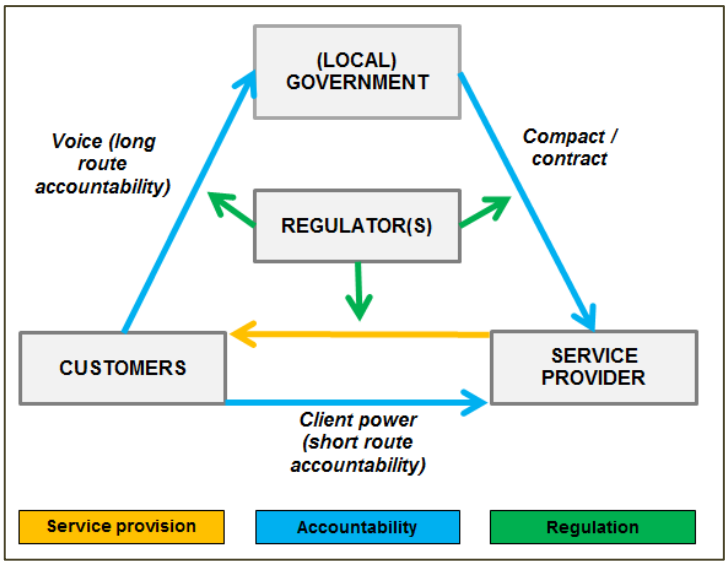

Figure 4.2 The ideal water service provision framework

Such system is prone to failure if one or more stakeholders do not live up to some of their responsibilities, and if the stakeholders' roles are not clearly distinct.

When such conceptual framework was applied to the case study, some criticalities seemed to emerge at a preliminary stage of the research.

First of all, Bracciano Municipality manages water services in-house, playing the double role of service provider and local government. Therefore "contract-based" accountability is not in place, and "client power" is weak or absorbed by "voice". Moreover, the regulator's role does not appear so well defined and its degree of influence looks uncertain. As a result, service provision is prone to failure, as shown by the tardy implementation of remedial measures to tackle the arsenic issue. Figure 4.3 shows these critical points:

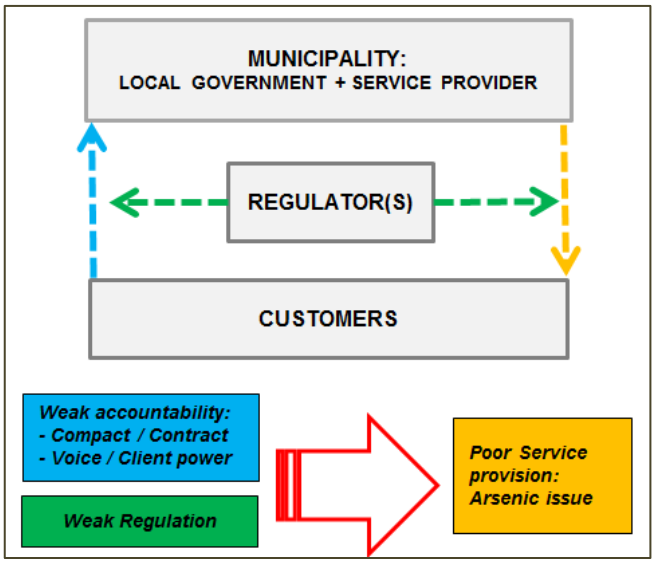

Figure 4.3 Water service provision framework in Bracciano

In this sense it should become clear why the research objectives focus on the municipality (research objective 1), on the customers (objective 2) and on the regulatory regime (objective 3), as those are the stakeholders involved in the local water provision system. Given this

conceptual framework, the hypothesis is formulated that the origins of the delays in the measures for the reduction of arsenic concentrations in Bracciano water networks are to be found in the failure of some of the stakeholders' roles and relationships.

4.4 Research Design

4.4.1 Qualitative or "flexible" design

The research aims at providing explanations mainly in terms of accountability and responsibility of the stakeholders involved and in terms of appropriateness of the existing management model. It investigates stakeholders' attitudes, behaviours and relationships. Therefore, most of such explanations do not take the form of numerical data. The general methodology followed can be generically described as qualitative or "flexible" (Robson, 2002, p.163-200).

The method used in this research is inductive, and as such it does not have the fixity of deductive processes. It is tailored to the research objective and questions and, though planned in advance, to a certain extent it "unfolds as the research proceeds" (Robson, 2002, p.5).

4.4.2 Case study selection

The case-study approach to research can be defined as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence" (Robson, 2002, p.178).

The very first approach to the case study was an informal and casual observation. The author was in Bracciano in January 2012 for personal reasons. He had the chance to observe a man filling several jerry cans with water from a standpost on the roadside, loading them on his car and driving away. The author's interest was triggered by two facts:

- Collecting water from a roadside standpost in a developed country indicates some level of malfunction in the water provision (e.g. interruption of the service or water quality issues).
- The standpost looked "new": it was in very good condition, and the design indicated that was a recently built facility and not an ancient public fountain.

The author had the opportunity to informally ask people living in Bracciano about why a public standpost was recently installed there and if collecting water from it was common practice. He was answered that, due to the presence of arsenic in the standard water supply network, some public standposts supplied arsenic-free water to the town areas where arsenic concentration was the most elevated. Water collection from those standposts was defined as "common" in the area, but no further details were provided.

A quick search on the Internet and particularly on the institutional website of Bracciano Municipality showed the author the magnitude of the issue, and that further research was appropriate.

Bracciano was chosen for a case study for the following reasons:

Representativeness:

- Bracciano is one of the several Italian towns concerned by the arsenic issue.
- The issue is especially widespread in central-northern Lazio, where Bracciano is located.
- Bracciano, by number of inhabitants, represents a typical instance of Italian small-medium sized municipality.

Accessibility:

- Due to the relatively small size of the town, the number of data required for the research and their accessibility were considered as manageable in the research timeframe.
- Part of the author's family presently live in Bracciano. That represented a practical advantage in terms of accessibility of the location, previous knowledge of the local context, and contacts with the stakeholders involved.

4.4.3 Research plan

The research was structured in the following phases:

Table 4.1 Research plan

Phase	Core activities	Location
Deskwork (preliminary)	Literature review	Loughborough
	Documentary research	
	First contacts with potential key-informants	
Fieldwork	Interviews	Bracciano (4-23/06/2012)
	Observation	
	Further documentary research	
Deskwork (final)	Data analysis	Loughborough
	Conclusions	
	Report finalisation	

4.5 Research Methods

Interviews, documentary research and, to a limited extent, observation were the research methods used in the research (see Section 4.7).

4.5.1 Key-informant interviews

Interviews are usually divided into structured, semi-structured and unstructured, related to how the interview is shaped and to the "depth" of the responses sought. Structured interviews follow predefined question lists, can take the form of questionnaires and do not need to be conducted face to face. Structured and semi-structured interviews are usually conducted on large samples of population and tend to provide quantitative data. Unstructured interviews are mostly used on smaller number of interviewees and, as the word suggests, the questions do not follow a predetermined structure. See Robson (2002), p.269-272.

The key-informant interview is a type of unstructured interview. Key-informant interviews are conducted when the interviewee is a person who is/was directly involved in the events that are investigated and thus is particularly knowledgeable about certain aspects of those events (Robson, 2002, p.283; USAID, 1996, p.2). As such, the interviewee is expected to be able to provide the researcher with opinions that are particularly relevant to the research topic. Key-

informants do not have statistical representativeness: they rather cast light on the research topic thanks to their in-depth knowledge on the subject matter. They may provide both qualitative and quantitative data (Tremblay, 1957, p.688-689). Key-informant interviews are particularly useful to understand stakeholders' motivations and perspectives, as well as to interpret data obtained from different sources. Moreover, key-informants can put the researcher in contact with other informants and facilitate access to further sources of data (USAID, 1996, p.1-2).

4.5.2 Documentary research

It may occur that certain documents contribute to answering the research questions. In this sense they represent a core part in a research and are treated as sources of data (Laws, Harper & Marcus, 2003, p.301). Such documents may be unpublished, or published outside the academic arena, or poorly accessible, so targeted research is necessary to obtain them. The researcher may need to leave his/her office to gain access those documents, and to get in contact with people who can facilitate his/her task. In this sense the boundary between desk study and fieldwork, and between primary and secondary data, is sometimes blurred (Gorard, 2003, p.15-16).

Documentary sources of data have the feature of being non-reactive (i.e. they do not have a behaviour that can be influenced by the interaction with the researcher), of having permanent forms (i.e. they are available to re-analysis), and of allowing the study of phenomena through time when they are available in series. Such documents are mainly in the written form and cover a wide range of sources such as diaries, letters, press articles, reports, public announcements, court sentences, laws. They have manifest contents (what a document explicitly states) and latent contents (what the researcher infers through interpretation). See Robson (2002, p.349-358).

4.5.3 Observation

In general terms, observation is meant as direct observation carried out by the human observer. It is used when the events under study are observable, and when data from other sources need to be cross-checked. Observation involves observing objects, processes, relationships, individuals, and recording those data. This needs to be carried out consistently and systematically. Observation is usually accompanied by other data collection methods. See Laws, Harper & Marcus (2003, p.304-306).

Observation can be defined in several ways and be conducted through very different techniques depending on the research discipline and approach. "Participant observation" is typically used in anthropology and ethnography for collecting qualitative data. The researcher seeks to become a member in the community studied and to observe it from within, and the process can last for years according to the classical anthropology model. In this type of observation the researcher is not required to have an external point of view. On the contrary, the researcher becomes a research instrument him/herself, and that requires high levels of skills and sensitivity. This approach implies great flexibility in the research design (Robson, 2002, p.314-315).

“Structured observation”, on the contrary, requires the observer to be detached from the observed phenomenon, not to influence it (ideally), and to be able to analyse the data observed in quantitative forms. This is achieved through the application of predetermined coding schemes, which allow the observer to define relevant concepts and how they can be measured. Coding schemes can take the form of broad category systems or of checklists to record the occurrence of the studied events. How to ensure that the observer does not influence the observed event to a too great extent is a relevant issue in structured observation. In order to keep this issue under control, the observer can try to minimise the interaction between him/her and the observed on one hand, and to allow the observed to get accustomed to the presence of the observer on the other hand (Robson, 2002, p.325-326).

4.6 Potential Sources of Data

The identification of the potential sources of data was an essential step in the preparatory phase of the research. The research objectives were analysed separately, the main stakeholders involved identified, the available data sources listed and the suitable data collection methods designated.

4.6.1 Research objective 1

“Identify how and why the municipality - as both service provider and local government – has failed to live up to its obligations towards the customers”.

Data sourcing model:

Table 4.2 Data sourcing model / Research objective 1

Sources of data	Data collection methods				Main stakeholder involved
	Literature review	Documentary research	Key-informant interviews	Observation	
Local and national legislation	x	x	x		Service provider
Reports from regulator(s)		x	x		
Communications and press releases from the municipality		x	x		
Court sentences		x			
Bids, plans and realisation of infrastructural works		x	x	x	
Organisation tree of local water services		x	x	x	
Institutional websites		x			
Reports from customers’ associations, environmental associations, newspapers		x	x		
Key-informants			x		

4.6.2 Research objective 2

"Identify the reasons why customers lack "voice" in requiring accountability: in demanding their right to a safe water supply and in requiring prompt responses".

Data sourcing model:

Table 4.3 Data sourcing model / research objective 2

Sources of data	Data collection methods				Main stakeholder involved
	Literature review	Documentary research	Customers interviews	Observation	
Local service charter(s)		x	x		Customers
Local and national legislation	x	x			
Communications and press releases from the municipality		x	x		
Court sentences		x			
Reports from customers' associations, environmental associations, newspapers		x	x		
Interviewees			x		

4.6.3 Research objective 3

"Understand the regulatory regime during the years elapsed, and to what extent it had an impact on the service provider's performances".

Data sourcing model:

Table 4.4 Data sourcing model / research objective 3

Sources of data	Data collection methods				Main stakeholder involved
	Literature review	Documentary research	Key-informant interviews	Observation	
Local and national legislation	x	x	x		Regulator
Reports from regulator(s)		x	x		
Communications and press releases from the municipality		x	x		
Institutional websites		x			
Key-informants			x		

4.7 Data Collection: Methods and Sampling

As mentioned in Section 4.5, the methods used in the research were interviews, documentary research and observation.

4.7.1 Informant and key-informant interviews

Once the desk study was completed, interviewing representatives of the main local stakeholders was essential. The reason of that is twofold.

Firstly, data triangulation (Section 4.7.4) required to cross-check data obtained through different methods. Secondly, whenever important information was unavailable through desk study, targeted questions were asked to the informants in order to obtain the relevant information and to gain access, whenever possible, to the relevant data.

The purpose was to interview people who were and/or are directly involved in the events studied and who are in a favourable position to provide the information and data needed. That is why key-informant interviews were selected as an appropriate tool. Additionally, a convenience and purposive sample of customers was selected for semi-structured interviews.

4.7.2 Documentary research

Documentary research also played a role in the research. It was necessary to collect data concerning the chronology of the events in Bracciano, the measures implemented through the years, the decisions taken, and the communications among municipality, customers and regulator. In addition, a historical record of the arsenic concentrations in the water networks in Bracciano covering a reasonably long period was needed. Finally, data about how the arsenic issue was addressed in Lazio region were needed to cast light on the case study.

All those data were accessed through documentary sources. As a consequence documentary research was a necessary step in the research process.

4.7.3 Observation

Observation had a limited role in this research. This is because several aspects of management, governance and power balance among stakeholders are not directly observable phenomena. In addition, events that took place in the past cannot be the object of observation.

Nevertheless, observation had a methodological role in data triangulation. Additionally, it represented a component in the general understanding of the situation. Therefore, observation was used as one of the research techniques, even though not as a major data source. The type of observation used was “structured observation”: the researcher maintained an external point of view and did not influence the events observed.

4.7.4 Triangulation

Data can come from different sources, can be obtained through different methods, by different research projects, and be based on different underlying theories. Triangulation takes place when one of those data sets is cross-checked with others (Robson, 2002, p.371). Triangulation compares a certain data set with others and checks to what extent they reach complementary conclusions. Comparing and contrasting data from different sources increases the validity of research.

In this research, triangulation is meant as "data triangulation" (Robson, 2002, p.174): data sourced through different methods (interviews, documentary research, observation) were analysed, compared and contrasted, in order to answer the research questions.

4.7.5 Sampling

The identification of the main stakeholders was essential to narrow down the range of potential informants and key-informants per each research question (see Tables 4.2, 4.3 and 4.4 above). The author identified potential key-informants in the preliminary phase of the research and contacted them by e-mail and by phone. As explained in Section 4.11, due to the fact that key-informants are public officials, and due to the weight of political and institutional balances in the local context, key-informants' names and positions are kept anonymous in the research.

1. The first stakeholder involved is Bracciano Municipality, in the double role of local government and of water service provider. Therefore, a person in a managing position in the municipality, who is competent on water services and on the arsenic issue, was found to be an appropriate key-informant. In addition, interviewing a person working in water service operations in the municipality was estimated useful. While the former was considered as a key informant, the latter was considered as a simple informant.

2. In the case of customers, the selection was not as immediate. Different customers have potentially different points of view, interests, levels of awareness and attitudes, and they are not necessarily cohesive (World Bank, 2004, p.49). In addition, no local customers' committee or association, formed to respond to the arsenic issue or pre-existing, was found in Bracciano. The option of proceeding with a thorough customer survey based on structured interviews or questionnaires with a representative sample was considered too complex and time demanding given the research timeframe. On the contrary, proceeding with the selection of a limited non-representative sample was retained as a preferable solution. The sampling strategy followed convenience and purpose criteria. The interviewees were informally selected among the population who lives in the town area where the arsenic concentrations were the highest and where public standposts were installed. In this sense the sample chosen is relevant to the purpose. The objective was to give the author a flavour of the perception and awareness on the arsenic issue among the customers. The interviewees, though not key-informants in the strict sense of the term, were treated as informants who are in a good position to cast light on the topic. Four customers were interviewed individually, of which three in person and one by telephone. Three other customers accepted to be interviewed in group. In addition, a representative of a civil society association based in a nearby village was interviewed (see Annex one).

3. As regards the regulatory regime, a criterion of influence was followed: the focus was narrowed on the regulatory body that has and/or had direct influence on the events in Bracciano. During the preliminary phase of the research, the SIAN (Hygiene, Food and Nutrition Service) of ASL Rome F was identified as the closest regulatory body. A person in a managing position in this regulating authority was identified as key informant.

The author was aware of the possibility that new sources of information become available during the research process. Among the informants not planned in the preliminary phase of the research, particularly relevant was the contribution by Dr Carlo Cremisini, director of UTPRA (Environmental Characterisation and Remediation – Natural Disaster Preparedness Unit) at Enea (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), research centre La Casaccia. See Section 3.

See Annex one for details on the research instruments used.

4.8 Data Analysis

After the data collection phase was completed, the following step was to systematically divide the data by collection method (documentary research, interviews, observation). Then data from each collection method were categorised or "reduced" (Robson, 2002, p.476) according to specific criteria and analysed with defined targets.

Interviews:

Table 4.5 Data analysis / interviews

Reduction criteria	Date, time, place of interview	Interviewee name and role	Manifest content	Latent content (if any)	Relevant to which research question(s)
Analysis targets	Consistency / contradictions within an interview or between interviews		Gaps within an interview or in the whole number of interviews		Evaluation of data reliability

Documentary research:

Table 4.6 Data analysis / documentary research

Reduction criteria	Date of issue (chronological order)	Source and type of document	Manifest content	Latent content (if any)	Relevant to which research question(s)
Analysis targets	Consistency / contradictions within a document or between documents		Gaps within a document or in the whole number of documents		Evaluation of data reliability

Observation:

Table 4.7 Data analysis / observation

Reduction criteria	Date, time, place of observation	Object of observation	Observer accompanied by	Event(s) observed	Relevant to which research question(s)
Analysis targets	Cross-check data from other sources (triangulation)				

Once data were divided by collection method and analysed, data gathered through different methods were triangulated (Section 4.7.3). In particular, data triangulation was used to (see Laws, Harper & Marcus, 2003, p.383):

- Check the trends: Consistency between different data sets potentially indicated the information was reliable.
- Check the contradictions: Contradictory data required explanation. If any of the data sources proved to be unreliable it was important to find out why and to what extent.
- Check the gaps: If relevant information was not provided by any methods, it could be due to methodological flaws and/or to omissions by the author. Alternatively, low accessibility of relevant data could be explained as a context feature and as such be useful to a better understanding of the context.

4.9 Possible Sources of Bias

Two forms of bias could threaten this research: respondent bias and researcher bias (Robson, 2002, p.172).

Respondents (particularly key-informants) were directly involved in the situation analysed and as such could be tempted to give answers that could cast a positive light on their role and actions. In this sense they could conceal or overemphasise some information or data.

The author (or researcher) is Italian and is to some extent familiar with the local context. This could be a source of bias insofar as the author could tend to overlap his own expectations and preconceptions to the data emerging from the research process. Secondly, some of the author's family members live in Bracciano: as such they belong to the water service customers' stakeholder group (even if they do not live in the area with the highest arsenic concentrations). Both factors could jeopardise the author's detachment and open-mindedness and make him appear as a "partisan researcher" (Denscombe, 2002, p.164-165).

The following strategies were adopted to ensure an unbiased research process (Robson, 2002, p.169 and 174):

- Triangulation. Data obtained from different sources and through different methods were compared and contrasted. This particularly reduced the risks deriving from respondent bias (key-informants' accounts were cross-checked with data of different origin).
- Expert debriefing/support. The author worked under the supervision of a WEDC academic staff and submitted him the preliminary findings. The supervisor's methodological skills and experience, and his fully external point of view, represented a guarantee against possible researcher bias.
- In addition, the reference to widely recognised principles, theories and practices in water sector governance elaborated independently from the research context was a further guarantee of objectivity.

4.10 Methodological Limitations

Nevertheless, some methodological limitations should be pointed out:

- The legal and policy framework constituted an important part of the research. Public administration and jurisprudence expertise would have been needed in order to get a wholly accurate analysis of the legal framework contextual to the research.
- A full and systematic customer survey in Bracciano would have been the ideal method to account for customers as a stakeholder group. Unfortunately, the time available for the research did not allow using such method.
- The research time horizon could not be fully defined in advance. In a preliminary phase, it was known that the EC Directive on drinking water quality was issued in 1998 and incorporated in the Italian law in 2001. It was also known that Bracciano had issues of compliance with arsenic regulations until 2012. On the contrary, it was not exactly known what key-events determined the present situation in Bracciano, and when they took place. Therefore the research time horizon could not be precisely defined prior to the research itself. The time horizon was gradually defined while the research was in progress.

Despite these limitations, the methodology was retained appropriate to the research objectives.

4.11 Ethical Considerations

Prior to undertaking the research, the author considered the possible ethical issues deriving from the research, following the Ethical Mini-Checklist of the School of Civil and Building Engineering, Loughborough University. The result was that according to the author and his Supervisor the research process did not represent a risk for any of the participants. The Checklist was submitted on 17/04/2012.

In addition, before conducting interviews the author notified each of the interviewees that:

- Their identities would be kept anonymous in all reporting;
- Any information that they gave would be treated as confidential; and
- They were free to withdraw from the research at any point and did not need to give a reason for doing so.

As described in Chapters five and six, there is a strong link between water service management, debate on the arsenic issue, political discourse and power balances in the case study context. For this reason it was essential to protect the identity of the people who participated in the research, both the public officials and the private citizens interviewed. As regards public officials, it was necessary not only to keep anonymous their names but also not to reveal the positions they cover in the institutions. Therefore they are referred to in the research as “the key informant from the municipality” and “the key informant from ASL/SIAN”. The same was done for the informant from the municipality and for the informant from a civil society association. Details about the customers interviewed (such as gender and household composition) are disclosed only when relevant to the research purposes and when doing so does not jeopardise the participants’ anonymity.

Chapter 5. RESEARCH FINDINGS

Chapter four described the methodology followed in the research, including the conceptual framework, the research design and methods, the potential sources of data, and the strategies for data collection and analysis, with reference to the research objectives. Additionally, account was given of possible sources of bias and ethical issues and, finally, of methodological limitations.

This chapter presents the research findings. Data are presented mainly in a chronological sequence, in order to highlight the evolution of the arsenic issue year by year. The focus is on Bracciano, after a first section (5.1) describing the key events at national level, which are essential to comprehend the course of the events in the case study.

5.1 Arsenic Issue at National and Regional Level

5.1.2 2010: Derogation denied

As explained in Chapters two and three, the Directive 98/83 on drinking water quality issued by the European Commission (European Commission, 1998) delineated a system of temporary derogations for Member States to implement the corrective measures needed to comply with the water quality standards prescribed by the Directive.

Ideally, Member States had five years to comply with the Directive, i.e. from 1998 to 2003. Subsequently, in case some water supply zones did not comply with some water quality standards, a derogation system was delineated by the Directive. Such system accorded each Member State the option of applying by its own initiative an initial derogation of maximum three years to the water supply zones requesting it. At the end of that derogation period, a second derogation of maximum three years could be applied. Once the time covered by those two derogations elapsed, in "exceptional circumstances" Member States had the option of applying to European Commission for a third derogation, covering three years maximum (European Commission, 1998).

Given such derogation mechanism, Italy applied two derogations for a number of water parameters in a number of Regions. The first derogation covered the years 2004-2005-2006, and the second derogation the years 2007-2008-2009. The second derogation expired on 31st December 2009 (Ministero della Salute, 2010). 50µg/l was established by the Ministry of Health as the Maximum Allowable Value for the derogations concerning arsenic. In other words, Italian Regions could not allow derogations above concentrations of 50µg/l. Different values were established for other parameters (Regione Lazio, 2003).

As reported by European Commission (2010), on 2nd February 2010 Italy officially asked the European Commission for a third – and last - derogation. Differently from the first two derogations, the third derogation could be applied by EU Member States only upon approval by the European Commission. The request by Italy mentioned the difficulties arising from the radical changes of some water quality parameters such as arsenic (lowered from 50µg/l to 10µg/l) introduced by the Directive EC 98/83. It also mentioned the difficulties in implementing systematic interventions due to the fragmentation of the Italian water resource management system, fragmentation partially reduced thanks to the creation of the ATOs (Section 3.4.1).

The request recognised that Italy was the EU country that asked the highest number of derogations for the highest number of parameters, at the same time emphasising that progress was made through the years: substantive investments were made – stated the request by Italy - in the period 2003-2009 in order to increase compliance to the European standards. Those investments focused on upgrading distribution systems, on finding alternative water sources and on installing specific water treatment systems. As a result, while the first derogation in 2004 applied to thirteen Regions and to ten parameters, the request for a third derogation in 2010 concerned six Regions and three parameters. The complexity of such long-term actions, and the time needed to implement them, was the basis on which Italy applied for the third derogation period (European Commission, 2010, p.2 and p.15-16).

The derogation was required for three parameters: arsenic, fluoride and boron. The Regions concerned were Trentino Alto Adige, Lombardia, Tuscany, Umbria, Lazio and Campania. Table 5.1 summarises the situation as regards arsenic:

Table 5.1 Coverage of Derogation request, 2009

Region	No. of water supply zones concerned	Population concerned
Trentino Alto Adige	10	29,221
Lombardia	8	25,962
Tuscany	19	102,743
Lazio	95	862,748
Total Italy	132	1,020,674

(Adapted from: European Commission, 2010)

For most of the water supply zones listed above, the derogation was asked for three years of time (2010-2011-2012) and for 50µg/l arsenic concentration. In other terms, Italy was asking for permission to provide the concerned population with water containing up to 50µg/l of arsenic, instead of 10µg/l, until 31st December 2012 (European Commission, 2010, Annexes I and II).

As stated by the Ministry of Health (Ministero della Salute, 2010), the European Commission was expected to make a decision in three months time. The process, though, required longer time than that. The first step taken by the Commission was to consult the independent scientific committee SCHER (Scientific Committee on Health and Environmental Risks).

The “opinion” by SCHER was published on 16th April 2010. SCHER took as a starting point that the provisional tolerable weekly intake of arsenic is exceeded when arsenic concentrations in drinking water are higher than 20µg/l, even though that does not mean that exposure to any arsenic concentrations higher than 20µg/l is automatically associated with health hazards (SCHER, 2010, p.7). The report continued by emphasising that available scientific data are “inconsistent” on the association between drinking water with arsenic concentrations below 100µg/l and increase in cancer incidence (SCHER, 2010, p.8). Therefore, the additional tumour risk associated with exposure to drinking water with 50µg/l of arsenic – i.e. the maximum derogation level requested - was estimated as “very low” (SCHER, 2010, p.9). The report concluded that the prolongation of exposure to drinking water with up to 50µg/l arsenic concentration for three years resulted in “no or, at most, very low additional health risks in the adult population” (SCHER, 2010, p.10). In conclusion, SCHER expressed favourable opinion on the derogation requested by Italy.

It is relevant to notice that SCHER retained necessary to report also the “minority opinion” emerged from the work of the Committee. The minority opinion emphasised that health risks,

though low for adults, are higher for infants and children under three, which should be considered as “sensitive groups”. According to the minority opinion, exposure to drinking water with more than 20µg/l of arsenic would be a reason of concern for those “sensitive groups”. As a result, the minority opinion expressed the view that exposure-related health risks for such groups should be taken into account (SCHER, 2010, p.10-11), suggesting a threshold of 20µg/l instead of 50µg/l.

The European Commission issued its official decision on the Italian derogation request on 28th October 2010 (European Commission, 2010). The months elapsed before the decision was issued suggest a certain degree of debate within the Commission and perhaps between the EC and Italian government.

Interestingly, the Commission adopted the minority opinion expressed by the SCHER instead of the overall opinion. Therefore, derogation was accorded to those water supply zones that had requested derogations up to 20µg/l, while it was denied to those water supply zones that had requested derogations above 20µg/l. In brief, the EC assumed a position clearly more cautionary and conservative than the main opinion expressed by SCHER. Additionally, the EC Decision stated that such derogation did not cover infants and children under three, so water below 10µg/l needed to be provided to them (in compliance with European Commission, 1998). Additionally, the Decision stated that customers needed to be informed about how to minimise the risks deriving from the consumption of water under regime of derogation, with a particular focus on children under three (European Commission, 2010, p.2-4).

5.1.3 2010-2011: Reactions by the institutions

Predictably, such decision triggered reactions in Italy, since the request of derogation for arsenic concerned around one million people, according to European Commission (2010). That meant that in the water supply zones that requested derogations above 20µg/l arsenic, restrictions to drinking water use needed to be enforced. It should be noticed though that, since several months elapsed between the request of derogation made by Italy and the decision made by the EC, in the meantime progress was made in some of the water supply zones concerned. As a result, the number of water supply zones and the amount of population concerned by the problem when the EC Decision was issued (October 2010) was actually lower than the figures reported in the Decision itself, since the figures in the EC Decision were reprised from the derogation request made by Italy several months before, i.e. on February 2010. See Istituto Superiore di Sanità (2010, p.4-5).

At any rate, the competent Italian institutions needed to take immediate action. On the public health side, Istituto Superiore di Sanità (Superior Institute of Health), the leading technical and scientific public body of the Italian National Health Service, issued an official note on 30th November 2010. The note briefly summarised the chronological framework of the arsenic issue and provided indications for water use in the areas concerned. It defined the following water use restrictions:

Table 5.2 Water use restrictions set by Istituto Superiore di Sanità

Arsenic concentrations	Uses	Restricted uses
> 10 ≤ 20µg/l	All human consumption uses, included potable use, household use and cooking use.	Rehydration and reconstitution of food and use by children under the age of three.

Arsenic concentrations	Uses	Restricted uses
> 10 ≤ 20µg/l (continued)		Food processing establishments.
> 20 ≤ 50µg/l	All personal hygiene operations (including tooth-brushing). All house cleaning operations. Preparation of food in which water: - Is not a significant ingredient; - Is in contact with food for short time and is mostly removed from the food surface (e.g. vegetable washing).	Drinking use. Cooking and reconstitution of food. Preparation of food in which water: - Is a significant ingredient; - Is in contact with food for long time (e.g. rehydration, brine preparation). Food processing establishments.

(Adapted from: Istituto Superiore di Sanità, 2010, p.6)

The same document anticipated the likely request of new derogations to the EC for the water supply zones which had their request denied by the EC Decision of October 2010 (Istituto Superiore di Sanità, 2010, p.6-7). It prefigured three typical situations:

1. Where arsenic was ≤ 10µg/l → No derogation needed;
2. Where arsenic was > 10 ≤ 20µg/l → Speed up of remedial measures and further derogation needed;
3. Where arsenic was > 20µg/l → Speed up of remedial measures, restriction of water use and further derogation needed.

In addition, the note by Istituto Superiore di Sanità invited the local health authorities (ASLs) to promptly inform the population on the derogation regime and on the conditions governing it. Information should be "exhaustive, quick, updated and bidirectional", involving the population including any relevant interest groups, as well as the local governments (Istituto Superiore di Sanità, 2010, p.6). See Section 5.5.1 on the efficacy of public communication in Bracciano.

On the public works side, the main initiative undertaken in Italy at central level was to declare the state of emergency in Lazio region, the Italian Region where the magnitude of the issue was by far the biggest. The state of emergency was declared on 17th December 2010 (Presidente del Consiglio, 2010 and 2011). Some brief explanations are needed here about the use of the state of emergency in Italy, in order to better understand why and how such measure was taken in relation to the arsenic issue.

To start with, the state of emergency is declared in Italy on a range of occasions. In some cases it refers to clearly recognised emergencies, such as major earthquakes, floods or similar calamities. In other cases, though, the state of emergency is declared with reference to events which would not strictly fall within the "emergency" definition. In these kinds of cases the state of emergency is essentially used as a means to speed up bureaucratic procedures, to skip time-demanding tendering processes, and to make new funds available, particularly where infrastructural/public works are involved. Secondly, the state of emergency in Italy tends sometimes to have political overtones. On the one hand, the state of emergency is declared by decree of the Prime Minister, with immediate effect. On the other hand, it gives full powers to the national Civil Protection, which is accountable directly to the Prime Minister. In addition,

the Prime Minister personally nominates a Deputy Commissioner (Commissario Delegato), who is in charge of planning and overseeing the overall activities related to the state of emergency, with the aid of existing institutional bodies and of external consultants. The Deputy Commissioner does not need to be an expert in the subject matter; on the contrary it is not unusual for such positions to be covered by leading members of regional governments. The Deputy Commissioner manages substantial funds and takes stroke-of-the-pen decisions with the degree of autonomy necessary to solve “emergency” situations.

Details on the state of emergency declared in Lazio are given in Section 5.1.6.

5.1.4 2011: Derogation accorded

At the same time, a medium-long term strategy was needed. Presumably, an exchange of communications between the Italian government and the European Commission took place between the end of 2010 and the beginning of 2011, resulting in a further request of derogation made by Italy via four official letters to the EC dated 31st December 2010 to 11th February 2011 (mentioned by European Commission, 2011, p.2).

Essentially, the request of derogation by Italy contained the updated list of the water supply zones still concerned by the arsenic issue, i.e. those water supply zones having water with arsenic concentrations above 10µg/l (the EC standard). For all those areas Italy asked for derogations at the maximum arsenic level allowed by the EC in the Decision of October 2010, i.e. 20µg/l. Table 5.3 summarises the number of water supply zones and the population concerned. Such figures were slightly smaller than the ones reported in European Commission (2010), presumably on account of the progress made in the meantime (compare with Table 5.1).

Table 5.3 Coverage of derogation accorded, 2011

Region	No. of water supply zones concerned	Population concerned
Trentino Alto Adige	3	27,061
Lombardia	6	24,512
Tuscany	13	71,260
Lazio	86	788,312
Total Italy	108	911,145

(Adapted from: European Commission, 2011)

The derogation request emphasised how the elevated arsenic concentrations were due to geochemical factors and how alternative water sources were not generally available. In addition, it specified that some of the water supply zones for which derogations up to 50µg/l had been previously required had arsenic concentrations actually below 20µg/l. In those cases the level of 50µg/l had been required as a precaution to cover completion of construction works, development of treatment plants, or testing of large infrastructure projects. In other water supply zones – continued the request – extraordinary interventions had been launched as a consequence of the Decision taken by the EC in October 2010, and scheduled works were speeded up. The aim was to comply first with the 20µg/l derogation value and subsequently with the 10µg/l standard. Finally, the derogation request presented by Italy included a summary of the situation Region by Region: population concerned, water service providers, actions underway, scheduled actions. The declaration of the state of emergency for Lazio region was reported in the document. See European Commission (2011, p. 2 and Annex III).

As probably expected, the EC accorded the derogations requested by Italy at the arsenic level of 20µg/l. Similar indications as in European Commission (2010) were given as regards children under the age of three and information to customers (European Commission, 2011, p.3). The Decision was issued on 22nd March 2011. The derogation covered three years: 2010 (retroactive), 2011 and 2012. It should be noticed that, since that was the third derogation to the water quality standards set by Directive EC98/83, no further derogation period will be possible after 31st December 2012 according to the European law.

5.1.5 2011: Reactions by civil society

The most notable reaction by the civil society was the action undertaken by CODACONS (Coordination of Associations for the Protection of the Environment and the Rights of Users and Consumers). CODACONS, a major association in defence of customers' rights in Italy, launched a public subscription and presented an appeal to the TAR (Administrative Regional Court) of Lazio. TARs are organs of administrative jurisdiction, competent to judge on appeals against administrative acts. The appeal by CODACONS dated 30th January 2011 (TAR Lazio, 2012, p.4).

CODACONS appealed against some Italian Regions (including Lazio), against some municipalities and against the Ministry of Health and the Ministry of Environment. The appeal, denouncing omissive behaviours by the institutions mentioned above, requested monetary damages for the customers who subscribed the appeal, based on the expenses incurred in purchasing household level water treatment devices, on the fact that water tariffs were not lowered, and on biological and moral damage (TAR Lazio, 2012, p.2). Essentially, CODACONS denounced delays on the Ministry of Health side after the Decision by EC on October 2010, with subsequent delays by Regions and by municipalities. In addition, CODACONS pointed out that the State (i.e. the central government) and the Regions omitted for years due information on the health risks related to the presence of arsenic in drinking water (TAR Lazio, 2012, p.4).

The TAR of Lazio sentenced on 20th January 2012. The sentence delved into strictly legal and jurisprudence aspects that are not the object of this research. The sentence emphasised some key points.

First of all, the sentence stated that the State and the Regions had the legal duty of solving the issue, while municipalities were just in charge of managing and maintaining water services. Municipalities could be held responsible for deficiencies occurred only after the EC Decision of 28th October 2010 was communicated to them by upper level institutions, together with orientation and advice. Given those premises, TAR found no legal faults by the municipalities mentioned by CODACONS. At any rate, municipalities had not the option of lowering water tariffs by their own initiative since tariffs are computed according to a fixed standard method (see Section 3.4). As a result, the Court rejected CODACONS appeal against municipalities (TAR Lazio, 2012, p.21-22).

A different type of decision was taken as regards central institutions, namely the Ministry of Health and the Ministry of Environment. Overall - pointed out the Court - such Ministries "do not appear to have taken specific and appropriate initiatives proportionate to the spread, severity and urgency of the problem" (TAR Lazio, 2012, p.22). On the other hand, TAR Lazio

recognised the difficulties to reduce the issue to “established legal parameters” (TAR Lazio, 2012, p.22). Therefore the Court decided to focus its attention on the actions undertaken by the Ministries in the period following the EC Decision of 28th October 2010. The Court pointed out specific procedural faults and delays on the Ministries’ side, which resulted in 73 days of delay overall (TAR Lazio, 2012, p.22-23). For such period of time, the Court recognised “a violation of the principles of impartiality and good performance, cost effectiveness, efficiency, openness and transparency”, with the aggravating circumstance of health risks which might be particularly severe for children under the age of three. The Court defined this as “unlawful conduct” and “negligent attitude” (TAR Lazio, 2012, p.23). As a result, the Court recognised moral, biological and existential damage to the population, with relation to the increased likelihood of contracting serious illness in the future, and for the psycho-physical stress incurred (changes in personal and family habits) due delayed and incomplete information (TAR Lazio, 2012, p.26).

Finally the Court, taking into account that customers paid water bills in exchange of services below standard, translated the damages listed above into monetary terms. Decision was taken that each customer subscribing the appeal was entitled to 100€ damage to be paid by the Ministry of Health and by the Ministry of Environment (TAR Lazio, 2012, p.27). Such amount only referred to the 73 days in which, according to the TAR, the Ministries of Health and of Environment did not live up to their legal obligations.

Though the appeal by CODACONS advantaged monetarily only its subscribers (around 2,000 customers), the sentence by the TAR of Lazio represented a step towards recognition of customers’ rights and of institutional liabilities in the arsenic issue.

5.1.6 2010-2011: Lazio region

Reconstructing the events at regional level was more complex than the events at national scale, since a plurality of local realities is involved.

In general, it can be said that many water supply zones in Lazio asked and obtained derogations through the years, based on the existing legislation. Such derogations were requested either by the municipalities or by larger water service providers serving several towns or even whole ATOs, according to the water management model in place. Derogations were accorded to the applying bodies according to the following overall mechanism: a municipality (or water service provider) presented its derogation request to the Region; the Region forwarded it to the Ministry of Health, which, upon agreement with the Ministry of Environment, authorised the Region to accord the derogation; finally, the Region issued the official document according the derogation to the “applicant”. While at national scale derogation periods lasted three years as by European regulation, specific local derogations covered varying periods, in any case shorter than three years. A thorough database of this type of documents can be found on the following webpage: Comitato Provinciale Difesa Acqua Pubblica di Latina (2012).

To the purpose of this research, attention was focused on the most recent years.

In recent years, emergency actions were undertaken by Regional institutions in Lazio. On early December 2010 the Environment department of Lazio Region stated 10,000,000€ had been allocated to address the issue in 2010. In addition, the option of installing arsenic removal plants and water blending systems were under scrutiny, as well as the option of using

"special powers" to speed up the processes. At the same time, the Environment department announced information campaigns addressed to the population (Regione Lazio, 2010a and 2010b).

On 20th December 2010 a meeting took place of the Regional Conference of Users and Consumers of the Integrated Water Service, a consultative organ in which representatives of consumers' associations participate. The Conference was chaired by the Regional Supervisor of the Integrated Water Service (in charge of defending customers' rights, but nominated by the Governor of the Region). The Supervisor pointed out how difficult was the coordination among ASLs, municipalities and water service providers, and that information to the population was still poor in most territories. The need for better information and stricter controls was also underlined by some of the participants (Consulta Regionale degli Utenti e Consumatori del Servizio Idrico Integrato, 2010).

On 30th December 2010 a Crisis Unit was created under the umbrella of Lazio Region, with the participation of a range of bodies, including: Provinces, ASLs, water service providers, STOs (Technical and Management Secretariats, organs belonging to ATO Authorities) and the regional Civil Protection. The aim of the Crisis Unit was to systematise the actions by the various stakeholders on matters related to the arsenic issue, and to provide support the mayors in solving problems in the local realities (Regione Lazio, 2010a and 2010b).

In the meantime, the state of emergency (the "special powers" mentioned above) was declared by the Prime Minister on 17th December 2010 concerning the arsenic issue in Lazio (Presidente del Consiglio, 2010). The state of emergency lasted until 31st December 2011. With an Ordinance dated 28th January 2011, the Prime Minister nominated the Governor of Lazio Region as Deputy Commissioner for the state of emergency, with the attributions summarised in Section 5.1.3 (Presidente del Consiglio, 2011).

The Deputy Commissioner presented an action plan on 14th March 2011 (Commissario Delegato, 2011). The action plan listed the several water supply zones in Lazio with arsenic concentrations above 10µg/l, divided by ATOs and water service providers, and reported arsenic concentration levels (reported by providers and by ASLs), as well as water sources, volumes of water supplied and population concerned.

The action plan strategically prioritised the situations where arsenic concentrations were above 20µg/l in the first phase of interventions. At the same expressed the commitment to assist ATOs and water providers to delineate plans to reduce arsenic concentrations below 10µg/l in the whole Region (second phase). Consequently the first phase – continued the document – consisted of actions aimed at providing the populations concerned by arsenic concentrations above 20µg/l with safe water supply. The action plan listed the planned infrastructural works needed to achieve such aim, including awarding institutions, brief descriptions of the interventions, and capital costs subdivided among financing institutions. Table 5.4 summarises the overall figures.

Table 5.4 State of emergency action plan

No. of interventions	Total amount (€)	Amount financed (€)		Amount to finance (€)
		By service providers / municipalities	By Lazio Region	
39	65,678,956.96	36,485,395.00	22,636,861.96	6,556,700.00

(Adapted from: Commissario Delegato, 2011)

As already described in Section 5.1.4, the European Commission issued on 22nd March 2011 its decision to allow the provision of water up to 20µg/l until the end of 2012.

A note was published on Lazio Region official website on 28th March 2011, emphasising the role played by the Region in quite eulogistic tones: “The derogation granted by the European Commission for arsenic recognises the good work [done by the Regional Executive]. [Lazio Region] has worked from the early days to resolve the arsenic issue in Lazio. […] This represents further confirmation of the commitment of this Executive to the environment and to public health.” (Regione Lazio, 2011a). Rather different tones were used by the key informant from Bracciano Municipality interviewed by the author: “A meeting was organised by the Region in 2010 […]. It was clear the arsenic situation was opaque and messy at all levels and that no planning had been done overall”.

5.2 Water Services in Bracciano

This Section describes water services in Bracciano: how they are managed and what water sources they are based on. A geographical, demographical and administrative overview on Bracciano was given in Chapter two (particularly Section 2.1.2).

5.2.1 Water services organisation

As mentioned in Chapter two, water services are managed by Bracciano Municipality in-house, i.e. through the municipal structure shown in Annex four. In other words, water services are under the direct responsibility of the municipality, with no separated and centralised structure in charge. That is the case, for instance, of the “municipalised company” Bracciano Ambiente, in charge of solid waste management. Bracciano Ambiente, though owned by Bracciano Municipality, is operationally autonomous, with its own board and its own managing director. No such structure exists in water services.

As explained by the key informant from the municipality interviewed by the author, four qualified workers are in charge of O&M (operation and maintenance) of the water systems. Two of them are in charge of core activities related to the state of the networks, pumps, boreholes, chlorinators and, more recently, of the arsenic removal plant. The other two workers are in charge of auxiliary interventions such as the installation of water meters. All those activities pertain to the municipality’s Technical Office, while the financial side of water management, i.e. tariffing and billing, falls under the responsibilities of the Finance Office. In the past, billing was contracted out to a private firm for some years, while starting 2008 the municipality manages billing in-house. For all major interventions, including system upgrades and major maintenance, the municipality uses external consultants and private firms.

Sewerage services are not operationally under the municipality’s responsibility, even though in practice the qualified municipal workers end up generally monitoring the state of the system. A private firm is called when maintenance is needed, e.g. for unclogging sewers. Wastewater is collected by a sewer ring encircling Bracciano Lake, as well as wastewater from the neighbouring towns. Wastewater treatment takes place in a plant situated near Anguillara, managed by the public-private company ACEA. The effluent is discharged into Bracciano Lake.

As can be seen in the organisation tree of Bracciano Municipality (Annex four), there is no water department - or office, or unit - as such. On the contrary, the various aspects of water service management are “scattered” across different Offices. As a result, hierarchical links are not always very clear, and access to comprehensive information about the system is not obvious. The four municipal workers in charge of O&M work within the Technical Office. As such, they should theoretically operate under the overall supervision of the councillor of Public Works. At the same time, their work falls partly under the attributions of the councillor in charge of Maintenance, who is not necessarily the same person as the councillor of Public Works. In addition, the councillor of Environment clearly plays a role as concerns environmental-related matters related to water. In case of major infrastructural works, the councillor of Public Works follows the process. All this regards only the technical aspects of water management, whilst the financial aspects - billing, tariffs – are the responsibility of the Finance Office. Such reconstruction was confirmed by the key informant from the municipality.

In addition Bracciano Municipality is quite a small-scale institution, so roles, responsibilities and hierarchical links tend sometimes to be adjusted on a case-by-case basis. That was partly confirmed by the key informant from the municipality as well as by an informant from the municipality.

5.2.2 Water sources and distribution

Bracciano Municipality (see Annex two for a map of the whole territory) is entirely supplied by groundwater sources, which explains arsenic presence in water. The vast majority of the territory and of the population is supplied via a water network called “Fiora”. Network Fiora serves the central area of the territory, the most urbanised and densely populated. The semirural and rural areas to the south (including a settlement called Vigna di Valle) and to the west are served by a second network called “Lega”. A limited area on the lakeside is served by a third network, “Cisterna”.

The overall water demand of Bracciano is around 7,500m^3/d. 1,000-1,200m^3/d are supplied by network Lega, and the remaining by Fiora and to a negligible volume by Cisterna. Demand peaks occur during summer months. Water demand represents principally domestic use and medium and small businesses. Though that would not be allowed, some domestic users in the semirural and rural areas tend to use potable water for gardening, for small scale irrigation and for recreational uses such as filling little swimming pools, as mentioned by the key informant from the municipality. Unfortunately, data about physical losses in the networks were not available to the author. At any rate, in 2009 physical losses in the five provincial capital cities of Lazio amounted to 38% of the water supplied to the networks (Cittadinanzattiva, 2011, p.31). All that could partly explain the high consumption levels reported above, which would put Bracciano at the top of the Italian ranking (Legambiente, 2010, p.22). Water demand data above were collected by the author through an informant from the municipality; they were not validated by any supporting documents. Unfortunately, the action plan presented in the framework of the state of emergency (see Section 5.1.6) did not report any water demand data about Bracciano.

The informant from the municipality allowed the author getting an overview on the water system in Bracciano. As mentioned above, Bracciano networks are supplied exclusively by groundwater. Network Fiora is supplied by ten boreholes in total, even though not all

boreholes are used at the same time, and not all of them have the same yields and water quality. Water blending is regularly effectuated (i.e. mixing water from different boreholes) in order to meet – or try to meet - water quantity and quality requirements. Water pumped from the boreholes blends in a collection tank and it is pumped from there up to two water towers supplying two different areas by gravity flow.

Slightly different is the situation concerning network Lega. The author could not get a clear picture of how Lega network worked in the past years, due to discrepancies between the accounts from different informants and to discrepancies between different documentary sources. Network Lega has two boreholes, one of which has been unused or almost unused according to the informant from the municipality due to water quality issues. At present a arsenic removal plant is connected to one of those boreholes, which means the other is in fact presently unused (details are given in Section 5.4.3, *Arsenic removal plant in network Lega*).

Network Cisterna, which serves little population, is supplied by a spring. Moreover, some users in rural and semi-rural areas are not connected to the municipal networks but have their own privately managed boreholes.

5.2.3 Overall system performance

Water management in Bracciano, especially in the past, has faced serious efficiency issues, both on the technical and financial sides.

As confirmed by the key informant from the municipality, particularly in the summer months (when water demand reaches its peak) water scarcity issues were common, and water supply intermittent. Valves were often shut in evening hours, and it was not unusual for customers not to receive any water in evening and night hours. The system was radically revised between the late 1990s and the early 2000s: water scarcity issues were minimised through a more rational management of the several boreholes supplying the system. According to the key informant from the municipality, water scarcity issues newly occurred in the years 2002-2007, when newly elected mayor, Council and Cabinet retained to discontinue the water management system introduced by the previous administration. Presently water supply is guaranteed 24/7 all the year round. A remote monitoring system is in place: electronic detectors monitor water levels and pressure in water tanks and pipes, and regularly send the recorded values to the municipal workers in charge of O&M via text messages (SMSs). Municipal workers intervene, e.g. by manipulating valves and pumps, whenever required. The workers are available 24/7 on shifts for such troubleshooting operations.

Also on the financial side, continued the key informant from the municipality, water management in Bracciano has not always been efficient. Particularly in the past, water metering tended to be loose. Some connections were made before water meters (so water consumption was not registered by the meter), and in some cases no meter was installed at all. In other cases, single households had no water contracts or contracts were lost, which implied billing did not take place since those customers were not actually registered. In recent years efforts have been made by the municipality to solve the issue through random checks and thanks to reports by the population. According to an informant from a civil society association based in a nearby town, a sort of “act of indemnity” was issued in 2010 by the municipality in order to regularise illegal connections upon payment of a lump sum. According to the key informant from the municipality, relevant results have been achieved so far, both on the financial side (reduction of non-revenue water) and on the water conservation side.

5.3 Arsenic Concentration in Drinking Water

Detailed chronological reconstruction was necessary to understand the role played by the different stakeholders (service provider, customers and regulator) in the arsenic issues through the years. Such timeline is exposed in Section 5.4. Before doing that, though, it is necessary to clarify what the arsenic levels exactly were and are in the water networks in Bracciano, in order to achieve a better understanding of the magnitude of the issue. That allows understanding why certain remedial measures were taken in certain moments, as well as their level of efficacy.

Two data sets were analysed by the author. The first data set was represented by the historical record of water quality data made available by the municipality, the second data set was represented by the historical record of water quality data made available by the local ASL, particularly by the SIAN (Nutrition, Food and Hygiene Service).

5.3.1 Data from the municipality: the boreholes

The data made available by the municipality covered the years from 2005 to 2010. Water quality data referred to water tests conducted mainly by private laboratories on behalf of the municipality. They can be considered as “internal controls”, i.e. controls made by the water service provider. Some other tests in that data set were conducted by the local ASL/SIAN in cooperation with ARPA (Regional Agency for Environmental Protection) and results were transmitted to the municipality. Those were “external controls”, i.e. conducted by the regulator.

According to the data set provided by the municipality, most of arsenic tests were done by the municipality via private labs, while tests by ASL and ARPA recorded arsenic levels only occasionally. It is interesting to notice though, as emerges in Section 5.3.2, that arsenic levels were actually monitored by ASL on a regular basis, even though the results of such tests were not found in the municipality data set. Water tests covered a range of microbiological, physical and chemical parameters. Only arsenic values were recorded by the author to the purpose of this research.

Overall, samples can be divided into two categories: samples taken at the boreholes and samples taken at the taps (via public fountains). Such distinction is essential, since samples taken at the boreholes reflect arsenic concentrations in groundwater (i.e. before water blending), while samples taken at the taps reflect arsenic concentrations in the water networks (i.e. after water blending). In other terms, recording a certain arsenic concentration at a certain borehole does not imply that such arsenic concentration is the same customers find at the tap.

Water samples were collected from a range of different sites. The author was unable to exactly locate some of the “tap” sampling sites. Due to such difficulties, the data set from the municipality was used by the author only to identify arsenic concentrations in groundwater: therefore only samples from boreholes were taken into account.

Table 5.5 and Figures 5.1 and 5.2 summarise the data regarding the ten boreholes supplying network Fiora. Data are displayed in two separate graphs for visual clarity.

Table 5.5 Arsenic concentrations in boreholes Fiora 1 to Fiora 10

Borehole 1		Borehole 2		Borehole 3		Borehole 4		Borehole 5	
Date	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**
27/12/05	9.64	27/12/05	29.75	27/12/05	6.78	27/12/05	29.98	27/12/05	13.79
15/01/08	4.96	15/01/08	19.35	15/01/08	3.71	15/01/08	21.02	15/01/08	7.29
22/01/08	7.79	22/01/08	26.64	22/01/08	4.88	22/01/08	24.84	22/01/08	9.45
12/10/10	7.85	12/10/10	22.59	12/10/10	6.67	12/10/10	27.13	12/10/10	9.93
Borehole 6		**Borehole 7**		**Borehole 8**		**Borehole 9**		**Borehole 10**	
Date	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**
15/01/2008	20.86	27/12/05	22.25	27/12/05	21.58	15/01/08	50.7	15/01/08	21.37
22/01/2008	28.68	22/01/08	23.55	15/01/08	14.53	15/01/08	68.61	22/01/08	23.62
				22/01/08	18.11				
				12/10/10	19.89				

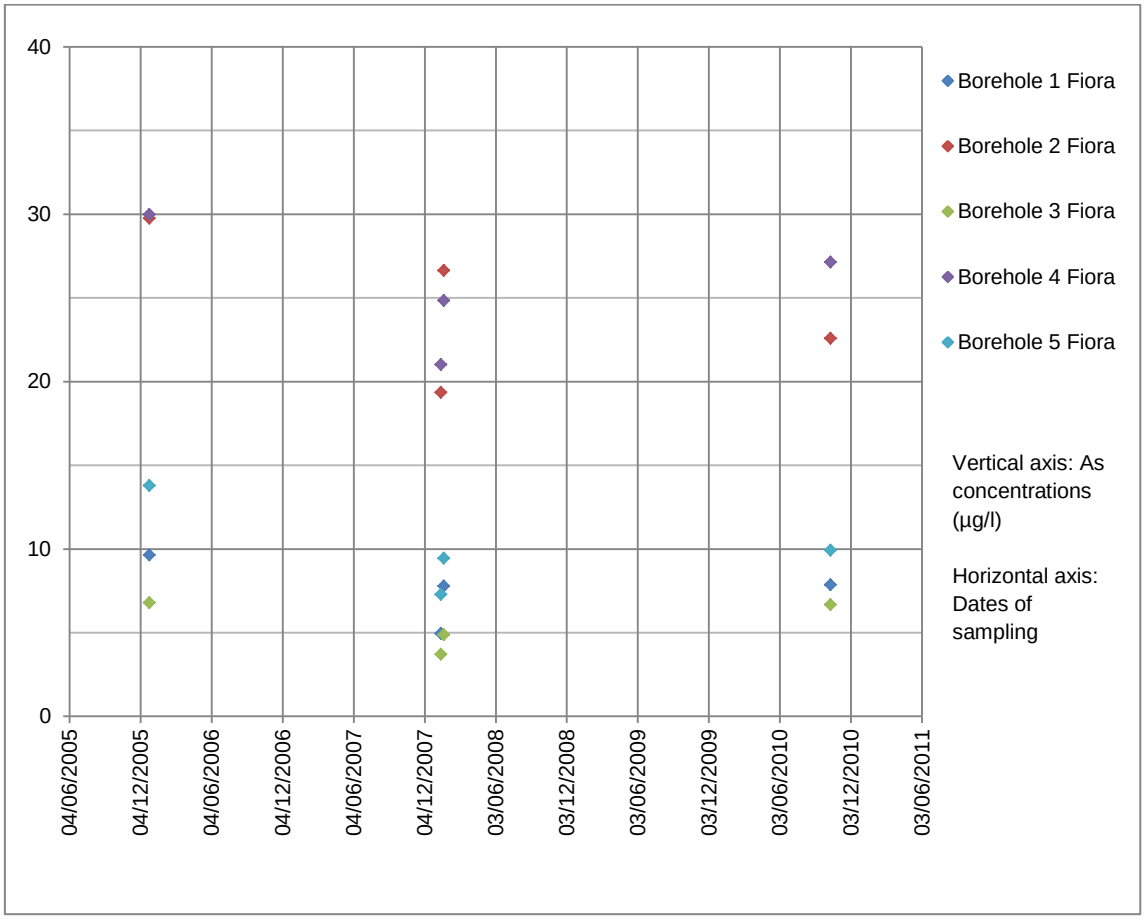

Figure 5.1 Arsenic concentrations in boreholes Fiora 1 to Fiora 5

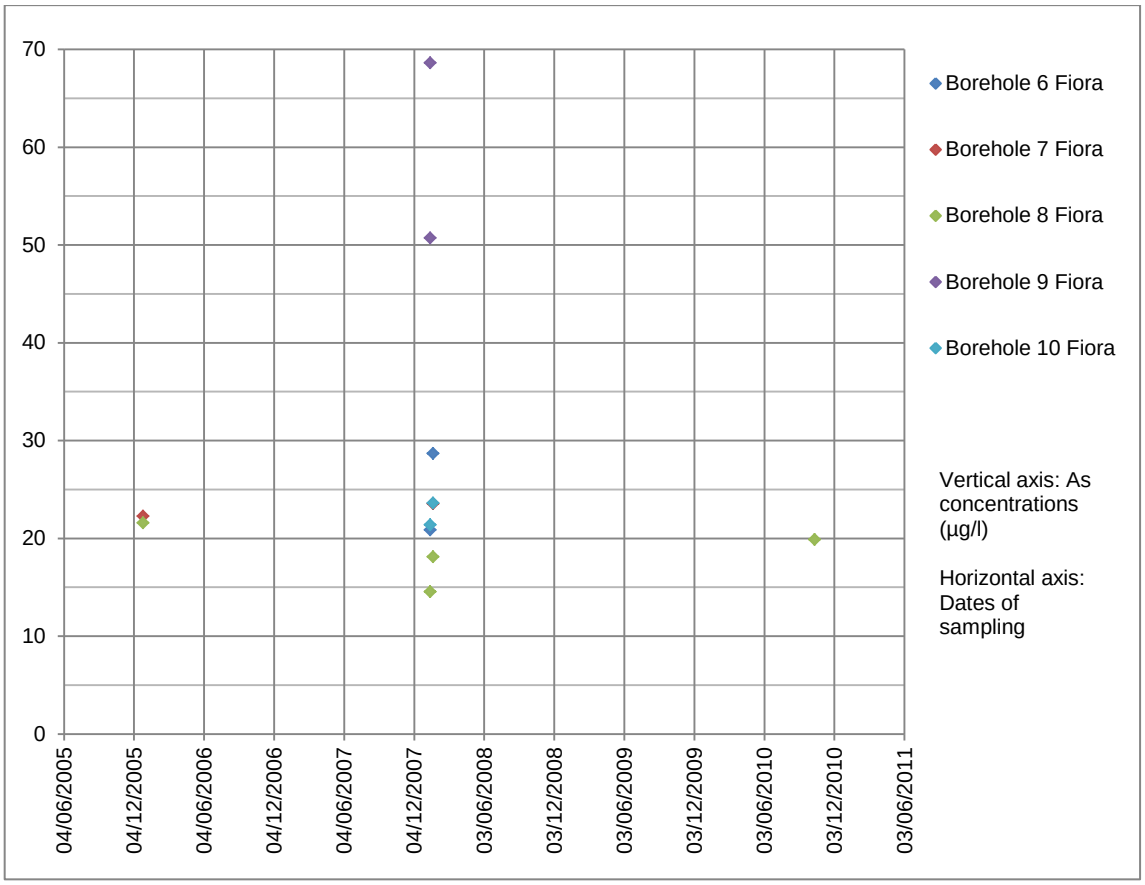

Figure 5.2 Arsenic concentrations in boreholes Fiora 6 to Fiora 10

It can be noticed that only boreholes 1, 3 and partially 5 present arsenic concentrations below the limit of 10µg/l set by the European and Italian law. Among the others, only borehole 8 presents arsenic concentrations below the derogation limit of 20µg/l allowed in 2011 by the European Commission. All the others have arsenic concentrations between 20µg/l and 50µg/l (the old arsenic limit), except borehole 9, which presents arsenic levels above 50µg/l.

Not all of those boreholes have the same yield, and they are not all equally used. In practice, as explained by an informant from the municipality, the boreholes in use are chosen based on the water quantity and quality requirements. As a matter of fact, the informant continued, network Fiora is usually supplied by boreholes 1 and 8, and to a minor extent by borehole 5, which are the boreholes providing the better compromise between high yield and low arsenic. The other boreholes are used on an irregular basis. In particular, boreholes 9 and 10 are nearly unused due to their high arsenic concentrations (especially borehole 9) and due to their modest yields.

Table 5.6 and Figure 5.3 display the data made available by the municipality concerning network Lega.

Table 5.6 Arsenic concentrations in boreholes Lega 1 and Lega 2

Borehole 1		Borehole 2	
Date	**As (µg/l)**	**Date**	**As (µg/l)**
20/02/2006	46.2	23/02/2007	22.06
20/02/2006	49.22	13/03/2007	11.2
12/10/2010	51.47	23/04/2007	21.76
		15/05/2007	21.78
		05/06/2007	21.18
		05/07/2007	18.28
		02/08/2007	21.32
		25/09/2007	20.75
		08/11/2007	20.6
		12/10/2010	20.04

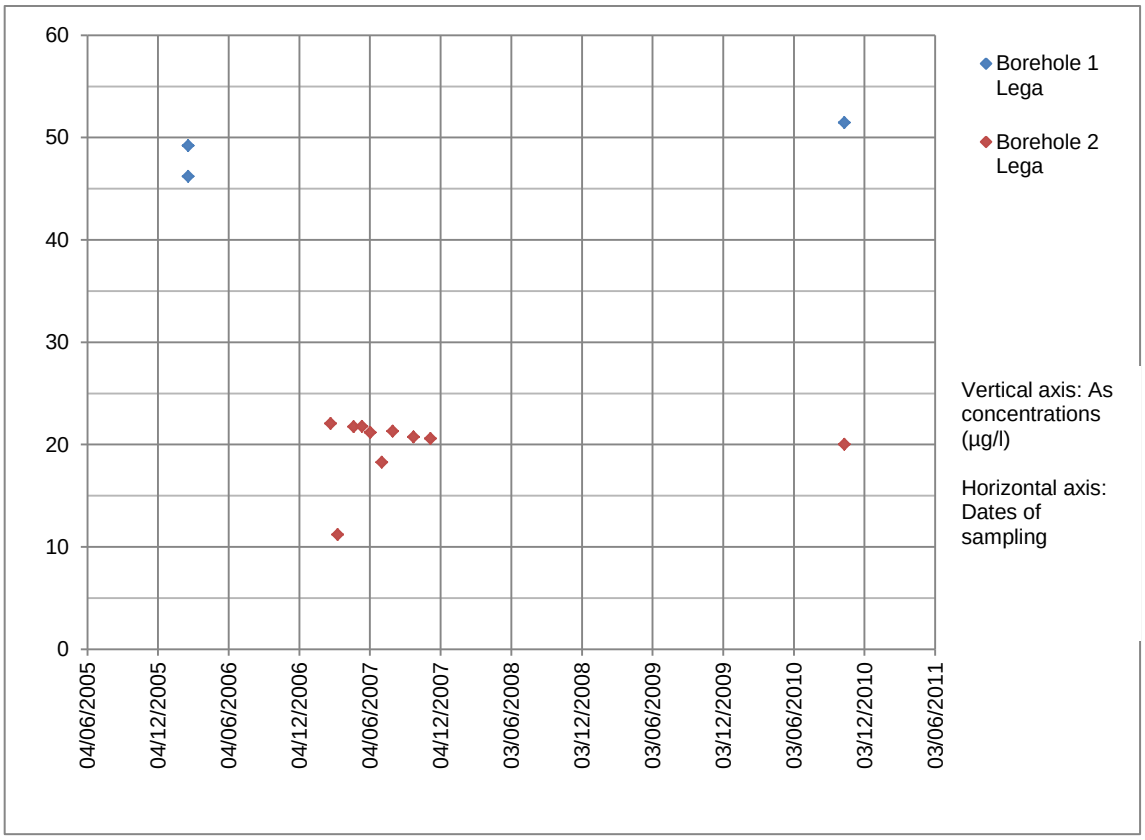

Figure 5.3 Arsenic concentrations in boreholes Lega 1 and Lega 2

It can be seen that borehole 1, though rarely tested, presents arsenic concentrations just below, and sometimes slightly above, the "old" limit of 50µg/l. Borehole 2 has lower arsenic concentrations, with values anyway slightly higher than the derogation limit of 20µg/l.

As mentioned above, the author received contradictory explanations about the use and the "history" of the two boreholes supplying network Lega. An informant from the municipality stated that borehole 1 has not been in use due to the elevated arsenic concentrations, but did not say exactly since when, adding that Lega was supplied in origin by one borehole only, and that an extra borehole was added successively. The key informant from the municipality stated

that the two boreholes supplying network Lega were drilled in the years 2002-2007 in order to minimise the low pressure issues in the system. The same key informant emphasised that, even though one of those boreholes had high arsenic values, it was put in use anyway.

The author could not find out which of those versions was truthful. The fact that borehole 1 was tested only twice in 2006 and in 2010 allows thinking that borehole 1 is not in use. On the other hand, also borehole 2 was not tested between 2007 and 2010. It is also not implausible that water testing data have been simply lost along the years. At any rate, the data from the ASL/SIAN analysed in Section 5.3.2 fill many of those information gaps.

5.3.2 Data from ASL/SIAN: the water networks

Data made available by the local ASL/SIAN cover the years 2008-2012. All water tests were conducted by ASL in cooperation with ARPA, as external controls on water quality. External controls are divided into “routine controls” and “verification controls” according to the parameters examined. Arsenic is examined in verification controls only. Unlike data from the municipality, water samples were collected at the taps only (mainly at public fountains), and not at the boreholes. In other words, they reflect the arsenic concentrations in the networks. The data set made available to the author did not show the exact sites where samples were taken, while the water networks were always specified. That allowed reconstructing the arsenic concentrations in the three networks Cisterna, Fiora and Lega in the years 2008-2012.

Table 5.7 and Figure 5.4 display the arsenic concentrations in the three networks.

Table 5.7 Arsenic concentrations in networks Cisterna, Fiora and Lega

Cisterna		Fiora		Lega	
Date	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**
09/12/2008	7	15/05/2008	16	08/01/2008	20
15/06/2009	7	01/07/2008	16	15/05/2008	23
03/09/2009	7	02/09/2008	16	02/09/2008	39
25/01/2010	8	02/12/2008	22	09/12/2008	46
23/02/2010	7	29/01/2009	16	29/01/2009	43
02/03/2011	7	19/02/2009	22	19/02/2009	45
09/08/2011	7	15/06/2009	14	15/06/2009	34
		03/09/2009	13	03/09/2009	46
		23/02/2010	16	25/01/2010	35
		01/06/2010	13	23/02/2010	23
		30/12/2010	15	01/06/2010	41
		07/02/2011	16	05/01/2011	47
		02/03/2011	15	07/02/2011	51
		04/05/2011	13	02/03/2011	23
		09/08/2011	15	04/05/2011	20
		14/11/2011	15	09/08/2011	27
		02/01/2012	16	14/11/2011	24
		10/04/2012	15		

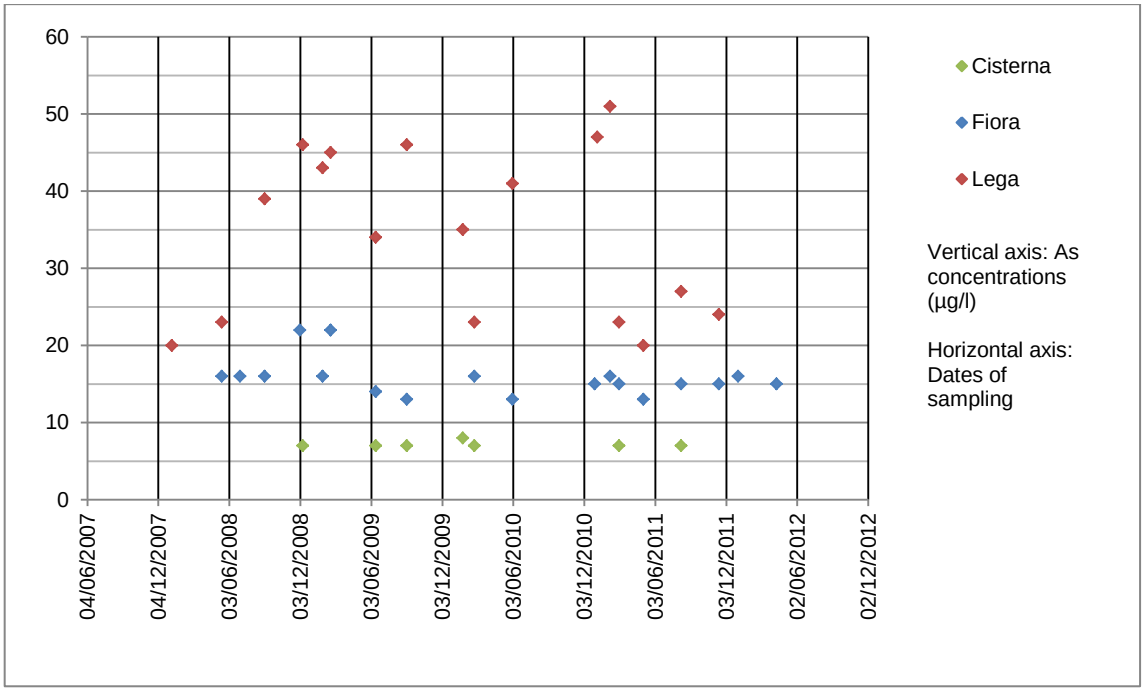

Figure 5.4 Arsenic concentrations in networks Cisterna, Fiora and Lega

Network Cisterna never gave any arsenic problems in the period covered by the data set. Arsenic concentrations were always below the limit of 10µg/l, with negligible variations. Network Cirsterna, it is worth iterating, serves a limited amount of population living on the eastern border of Bracciano territory, towards the lakeside, and is supplied by a spring.

Different is the situation as regards network Fiora. Arsenic concentrations recorded through the years indicate a range of 13µg/l to 22µg/l, i.e. above the standard of 10µg/l. It should be noticed, though, that starting June 2009 arsenic values were always below 20µg/l. In the

period taken into account, arsenic concentrations never came near the old standard of 50µg/l. Such arsenic concentrations in network Fiora seem to be compatible with the data from the municipality, considering that network Fiora is fed by a blend of water from various boreholes. At the same time, data show that the boreholes presently supplying network Fiora do not seem to have a potential to achieve arsenic concentrations below 10µg/l in the network, even if water blending operations are skilfully done.

The data set provided by ASL/SIAN shows that network Lega is by far the one with the higher arsenic concentrations, ranging between 20µg/l and 51µg/l. It can be seen that Lega arsenic concentrations not only were constantly above the derogation limit of 20µg/l set in 2011, but tended to get close to the old arsenic limit of 50µg/l, and in one case they exceeded it. If Figure 5.4 (arsenic concentrations in Lega network) is compared with Figure 5.3 (boreholes Lega 1 and Lega 2), it emerges that apparently borehole Lega 2 was not the only water source used to supply network Lega through the years, since arsenic concentrations in the network were higher than at borehole Lega 2. Data seem to suggest that borehole Lega 1 was used indeed, but data from borehole Lega 1 are not exhaustive enough to provide any evidence in this sense.

Moreover, networks Fiora and Lega can be put in communication by manipulating a valve. That means that each network can be used as a backup for the other in case of technical problems (pumps breakdowns, etc.). That also means, as explained in Section 5.4.3, that in recent years water from Fiora was pumped into Lega in order to decrease arsenic concentration for some periods. All this makes difficult to get an exact picture of what water source(s) supplied network Lega at the specific times water samples were collected.

At any rate, available data provide a clear picture of the arsenic concentrations present in Bracciano water networks through the years, which is a key element to this research. They show that, with the exception of network Cisterna, the whole territory was supplied with water having arsenic concentrations above the limits set by the European and Italian legislation. They also suggest the need for comprehensive upgrading interventions in Fiora and Lega in order to provide the population with water having arsenic concentration below 10µg/l. Full details are given in Section 5.4.

5.4 Chronology of the Events

According to the legislative framework, the population of Bracciano had to be provided with water with less than 10µg/l of arsenic starting 2003, i.e. five years after the issue of directive EC 98/83 (the Directive was transferred into the Italian law in 2001). If that was not possible, Bracciano Municipality had the option to request derogations to such limit starting 2004, at the same time working at appropriate solutions to abate arsenic concentrations below 10µg/l (see Section 3.1.6 and 3.1.7) Considering the arsenic concentrations in water networks in Bracciano summarised in Section 5.3, the second option was clearly the most likely to be adopted.

As mentioned in Section 5.1.6, derogations applied only to water supply zones requesting them. In other words, derogations needed to be requested first by the single water supply zones (in this case Bracciano Municipality) to the Region. Only then, the Region, upon authorisation by the Ministry of Health, was able to accord derogations to the water supply

zones requesting it. Moreover, the third derogation needed to be authorised by the European Commission.

5.4.1 2001-2008: Implementation vacuum

Derogation regime

Available data did not allow to exactly determinate the derogation regime applied to Bracciano Municipality through the years. Documentary evidence of derogations covering Bracciano before 2011 was not made available by Bracciano Municipality or by the local ASL/SIAN, and accounts given by key informants were contradictory.

The key informant from the municipality maintained that derogation regime covered Bracciano until 2009, but only for one part of the water networks. The key informant though was unable to provide any evidence of it, and seemed not to be sure about the details. On the contrary, the key informant from the local ASL/SIAN stated that no derogation was requested by Bracciano Municipality until 2009.

A press release published by Bracciano Municipality on 19th June 2009 stated: “Neighbour towns are covered by derogation accorded by Lazio Region and by ASL, which [Bracciano] municipality hasn’t requested yet” (Comune di Bracciano, 2009b). Conversely, an information note by the municipality dated 4th June 2011 mentioned that “in 2009 [Bracciano] had exploited all the derogations available from the European Union” (Comune di Bracciano, 2011c).

Certainly Bracciano, at least at the beginning of the derogation regime (2004) was covered by some derogation. That was showed by the Ordinance through which Lazio Region, authorised by the Ministry of Health, conceded derogations to a number of water supply zones in Lazio (Regione Lazio, 2003). Such document, though, did not specify for what parameters Bracciano was covered by derogation. In addition, it wasn’t Bracciano as a whole to be covered but only “Borehole Lega and Borehole 9 Fiora”. Bracciano was in a list of several water supply zones, so no further details were given in the document. The Ordinance, issued on 22nd December 2003, stated that derogations were valid until the issue of a “Provvedimento di Deroga”, i.e. a more specific legal document.

It was not possible to determine the exact legal status of Bracciano as regards the derogation regime after that date, until 2009. On the one hand, it would be possible to suppose that Bracciano was covered by derogation at least until the end of 2006 (i.e. when the first derogation period on a national scale ended). On the other hand, the author was able to find in the documentation made available by the municipality an official note by the ASL/SIAN addressed to the mayor on 24th August 2006, reporting an arsenic value of 35µg/l in network Lega and specifying that such value did not comply with the regulation. The note invited the mayor to take appropriate action. That suggests that Bracciano was not covered by any arsenic derogation regime, since the Maximum Allowable Value at that time was 50µg/l for the water supply zones covered by derogation (Regione Lazio, 2003). In addition, the numerous water test certificates made available by the municipality (covering the years 2005-2010) had captions specifying that the limit for arsenic was 10µg/l, which might suggest that the municipality did not have any derogation when the various tests were done.

The regulator

The regulating body functionally closest to the local reality of Bracciano is the local health authority (ASL) and in particular the SIAN (Hygiene, Food and Nutrition Service). The powers of the ASL/SIAN vis-à-vis municipalities are actually substantial. In the first place, local ASLs have the power to give instructions to municipalities on the public health measures to undertake. In case of non-compliance with such instructions, ASLs can make provisions for administrative sanctions, and report to the judicial authorities if needed. So the role of ASL/SIAN was described by the key informant from ASL/SIAN and confirmed by the key informant from the municipality.

In addition, ASL/SIAN is in charge of water testing, in collaboration with ARPA. As stated by the key informant from ASL/SIAN, personnel from ASL/SIAN are in charge of collecting water samples and to send them to ARPA. ARPA conducts water analyses and transmits the results back to ASL/SIAN: “That happens quite quickly when some of the parameters do not comply with regulations, while that can happen very slowly when all parameters are correct. In general, ARPA can be very slow”. The key informant from ASL/SIAN specified that the frequency of “routine controls” is set by law, while the frequency of “verification controls” is decided by ASL/SIAN (see also Section 5.3.2). “If certain parameters are under observation, those parameters are monitored through frequent and targeted verification controls. Municipalities do not request controls usually, even though ASL tends to decide in agreement with municipalities when to do verification controls”. The costs of water testing – continued the key informant from ASL/ARPA – are split between ASL and ARPA. Both those bodies are part of the Region, so it can be said that costs are covered by the Region.

As told by the key informant from the local ASL/SIAN, the local ASL/SIAN notified the municipality about the arsenic concentrations recorded in drinking water networks for years, specifying they exceeded the allowed limits and that adequate measures needed to be implemented. At any rate, such notifications to the municipality used to be in “mild” tones and as a matter of fact did not have any actual follow-up.

Such “relaxed” attitude on the regulator’s side was mainly due to two types of factors according to the key informant from ASL/SIAN. First, the ASL/SIAN was aware that municipalities - especially small and medium sized - often do not have adequate funds at their disposal to invest in infrastructural works, including the works needed to find alternative water sources and/or to install arsenic removal systems. Second, the key informant pointed out that local ASLs operate under supervision and guidance by the Region. In the specific case, for years no particular pressure was put on ASLs by the Region about the arsenic issue.

The municipality

Considering the years 2001-2009 as a whole, it is relevant iterating that, beyond the ambiguity on the derogation status of Bracciano between 2004 and 2009, at the end of 2009 Bracciano requested derogation for arsenic for the whole population, as mentioned in Chapter two and fully explained in Section 5.4.2. It is also worth to notice that, based on documentary sources as well as on key informant interviews, no temporary or permanent remedial measures were undertaken nor planned before 2009; and that arsenic concentrations were permanently far above the 10µg/l limit fixed by the European and Italian legislation in networks Fiora and Lega, as shown in Section 5.3.

The key informant from the municipality admitted: “It was a matter of willingness […] What counts is first of all the sense of awareness and of responsibility of the administrators, and also of the people in key positions in other institutions, who should have emphasised the issue. The issue should have been viewed in a much wider scope […]: derogations come to an end sooner or later. Moreover, indications by the European Commission were unequivocal, and limits were fixed more than ten years ago. We have started taking action with ten years of delay”.

5.4.2 2009: The issue is recognised

Changes in regulator’s attitude

The situation started changing in 2009. According to the account by the key informant from ASL/SIAN, Region Lazio assumed a different attitude, and started pushing ASL/SIAN to fully exercise their powers vis-à-vis municipalities and water service providers.

The key informant from ASL/SIAN was asked about the reasons of such change in attitude, and if and to what extent political dynamics influenced them, but preferred not to share his/her point of view. On the contrary, the key informant from the municipality was rather explicit: “[Political cycles] count a lot. The course to take is always decided at political level. Anything happening in public administration descends from politicians’ decisions. In short, political willingness counts a lot, together with the advice politicians receive by their technical advisors”. It seems possible that the imminent end of the second national derogation (31st December 2009), together with the likely need to ask the European Commission for a third “exceptional” derogation, played a role in such change of attitude.

As a result, ASL/SIAN sent an official note to the mayor of Bracciano on 21st May 2009, pointing out that arsenic values exceeded allowed limits in networks Fiora and Lega, and proposing water use restrictions in both networks (as reported by Comune di Bracciano, 2009a and 2009c). As underlined by the key informant from ASL/SIAN, on that occasion the pressure they put on the municipality was “heavy”, unlikely in previous years. The key informant added: “On one hand we can say that arsenic concentrations in water supplies in this area do not really represent a public health issue. On the other hand, the law prescribes levels below 10µg/l and such prescription must be enforced”.

The municipality is faced with the issue

Based on the instructions from ASL/SIAN, Bracciano Municipality issued two ordinances on 18th and 26th June 2009, prohibiting water drinking use in the areas served by networks Fiora and Lega (Comune di Bracciano, 2009a and 2009c). Together with arsenic, Bracciano also had issues with fluoride concentrations. To the purpose of this research, though, only arsenic is taken into account.

A press release was published by the municipality on 19th June 2009. The tones used in the press release tended to minimise the issue. The document stated that the presence of arsenic in water abstracted from volcanic rock was “a natural fact”. Water use restrictions were taken “purely as a precaution” due to arsenic levels exceeding “slightly” the limits, and that there

were “no significant reasons of risk to the health of the population”. The same press release stated that arsenic values in Bracciano were lower than in some neighbouring towns, with the difference that those towns were covered by derogation while Bracciano was not (Comune di Bracciano, 2009b). The municipality announced its intention to ask the Region for derogation (Comune di Bracciano, 2009a).

As regards the remedial measures to face the arsenic issue, in May 2009 the municipality passed a plan to install a pilot arsenic removal plant on one of the Lega boreholes (Comune di Bracciano, 2009a, 2009b, 2011b). The municipality announced that as soon as such pilot arsenic removal plant would be operational - theoretically not later than mid-July 2009 - regular water use would be restored (Comune di Bracciano, 2009b). It should be noticed though, as confirmed by informants from ASL/SIAN and from the municipality, that such pilot plant was actually never used to decrease arsenic levels in the water networks. On the contrary, it was used merely as a test to check the efficacy of such type of water treatment to decrease existing arsenic concentrations. In other terms, the operation of the pilot plant would not bring about any decrease in arsenic levels in network Lega, since treated water was not to be pumped into the distribution system. More details are given in Section 5.4.3.

As a matter of fact, in October 2009 the municipality renewed water use restrictions, at least as regards network Lega (Comune di Bracciano, 2009f). No document establishing a similar extension for network Fiora was found by the author.

Towards the end of year 2009, Bracciano Municipality made an official request to Lazio Region for derogation to the arsenic (and fluoride) parameters, via two documents dating 2nd October and 1st December, as reported by Comune di Bracciano (2011a). It is worth reiterating that the end of 2009 marked the end of the second derogation period on a national scale, and the third and last derogation could be accorded only upon approval by the European Commission. In brief, the derogation request by Bracciano Municipality was listed together with all the derogation requests from Lazio and from the rest of Italy, and submitted by the Italian government to the European Commission on 2nd February 2010, as described in Section 5.1.2.

Most of the water supply zones in Italy, and all water supply zones in Lazio, applied for a derogation level of 50µg/l, which was the Maximum Allowable Value for arsenic previously set by the Ministry of Health (Regione Lazio, 2003). Table 5.8 summarises the water supply zones concerned by the derogation request presented by Italy to the European Commission for arsenic. Bracciano applied for derogation covering a population of 15,500.

Table 5.8 Coverage of derogation request, Lazio, 2009

Area	No. of water supply zones concerned	Population concerned
Italy	132	1,020,674
Lazio Region	95	862,748
Province of Latina	9	283,642
Province of Rome	22	252,364
Province of Viterbo	64	326,742
Bracciano (Province Of Rome)	n/a	15,500

(Adapted from: European Commission, 2010)

At the same time, the population was informed about the arsenic issue via an internal page of the official website of the municipality, as reported by Comune di Bracciano (2009a and 2009c). On 26th May 2009 ASL/SIAN sent to the municipality a model of poster for public

information. It stated that “water can be used […] for all domestic uses, including washing vegetables and cooking food. We discourage drinking use by individuals under the age of 14 and by pregnant women” (ASL Roma F / SIAN F2-F3, 2009). The focus, though, was on fluorides rather than on arsenic. The same contents were reprised in a poster by the municipality dated October 2009. Such poster announced also that the pilot arsenic removal plant had been started up, that results were good, and that the system would be “soon” installed in the municipal water network as a definitive measure (Comune di Bracciano, 2009e).

In the meantime, the municipality issued a press release on 28th August 2009. It announced: “Thanks to [the pilot arsenic removal plant], we have lowered the levels [in network Lega] below the limits allowed by law, and by blending water in the pipes we have lowered these levels also in the water of network Fiora”. Such statement though was misleading, since, as explained above, water treated by the pilot arsenic removal plant was not actually pumped into the network. As a result, the municipality was obliged to quickly amend the message, via a second press release published few weeks later (15th September). This press release, disconfirming what was stated few weeks before, specified that the arsenic removal system was only under experimentation, and that benefits were expected for the future and not for the present: “As a partial correction and clarification of previously published information, we wish to communicate the good results of the filtering system tested in network Lega, which will lower the levels of the two substances [arsenic and fluoride] in the networks” (Comune di Bracciano, 2009d).

5.4.3 2010-2012: Emergency and long-term measures

Starting with the derogation request submitted by Bracciano Municipality at the end of 2009, the events in Bracciano began evolving more rapidly than in the past, in conjunction with the events at national level.

Derogation granted at 20µg/l

As described above (Section 5.1.2), the European Commission decided to reject any derogation request above 20µg/l of arsenic. The Decision was issued on 28th October 2010 and, as mentioned in Section 5.1.5, some delays occurred at national level as regards the transmission of information and of guidance from central to local institutions. Istituto Superiore di Sanità published guidance notes only on 30th November 2010 (Istituto Superiore di Sanità, 2010). It is worth iterating that such notes prescribed the following water use restrictions:

Table 5.9 Water use restrictions set by Istituto superior di Sanità

Arsenic concentrations	Uses	Restricted uses
> 10 ≤ 20µg/l	All human consumption uses, included potable use, household use and cooking use.	Rehydration and reconstitution of food and use by children under the age of three. Food processing establishments.
> 20 ≤ 50µg/l	All personal hygiene operations (including tooth-brushing).	Drinking use. Cooking and reconstitution of

Arsenic concentrations	Uses	Restricted uses
> 20 ≤ 50µg/l (continued)	All house cleaning operations. Preparation of food in which water: - Is not a significant ingredient; - Is in contact with food for short time and is mostly removed from the food surface (e.g. vegetable washing).	food. Preparation of food in which water: - Is a significant ingredient; - Is in contact with food for long time (e.g. rehydration, brine preparation). Food processing establishments.

(Adapted from: Istituto Superiore di Sanità, 2010)

In the meanwhile the exchange between Italy and European Commission for deciding on the third derogation was underway at national level, and resulted in the Commission finally according derogations up to 20µg/l to all water supply zones applying for it. It was 22nd March 2011. Due to administrative procedures, Bracciano was officially notified by the Region that the derogation was obtained only on 29th July 2011 (Regione Lazio, 2011b). Table 5.10 summarises the water supply zones and population in Lazio concerned by the derogation accorded by the European Commission in 2011:

Table 5.10 Coverage of derogation accorded, Lazio, 2011

Area	No. of water supply zones concerned	Population concerned
Italy	108	911,145
Lazio Region	86	788,312
Province of Latina	9	283,642
Province of Rome	23	210,364
Province of Viterbo	54	294,306
Bracciano (Province Of Rome)	Vigna di Valle	3,500

(Adapted from: European Commission, 2011)

It is interesting to notice that Bracciano required and obtained derogation only for the area served by network Lega, called “Vigna di Valle” for brevity but actually quite larger than Vigna di Valle settlement, and for a population of 3,500 (European Commission, 2011).

That was likely due to the consideration of the Decision issued on 22nd October 2010 by the European Commission of allowing derogations up to 20µg/l. Network Fiora had arsenic concentrations below 20µg/l starting 2009, so Fiora was probably considered as automatically covered by the 20µg/l derogation. On the contrary Lega, with concentrations constantly above 20µg/l, was probably seen as the only water network in Bracciano that did not comply with regulations and thus whose position needed to be regularised through a derogation request. It should be noticed, though, that according to the overall instructions provided by Istituto Superiore di Sanità (2010, p.6), both the areas served by Fiora and Lega would have needed to be explicitly covered by derogation, since both of them had arsenic values above 10µg/l (Section 5.1.2).

Water use restrictions

As shown by the arsenic tests conducted by ASL/SIAN, at the time the European Commission denied derogations network Fiora had arsenic concentrations just below 20µg/l, and network Lega had arsenic concentrations constantly higher than 20µg/l with peaks near 50µg/l. Network Cisterna had concentrations regularly lower than 10µg/l (Section 5.3.2). As a result,

water use restrictions indicated by Istituto Superiore di Sanità needed to be enforced in the areas served by Fiora and Lega.

The municipality enforced such restrictions through an Ordinance issued on 21st January 2011. The Ordinance essentially followed the instructions by Istituto Superiore di Sanità, prescribing to the areas served by network Fiora the restrictions indicated for arsenic concentrations between 10µg/l and 20µg/l, and to the areas served by network Lega the restrictions indicated for arsenic concentrations between 20µg/l and 50µg/l. The Ordinance slightly differed from the instructions by Istituto Superiore di Sanità as regards non-domestic water use: the Ordinance did not mention any special restrictions for food processing establishment using water with arsenic levels between 10µg/l and 20µg/l, and admitted the use of water between 20µg/l and 50µg/l "in businesses, being only occasionally used by customers" (Comune di Bracciano, 2011a). Such expression, as hinted by the key informant from the municipality, referred to businesses such as bars, where only very little quantities of water are consumed by clients and not on a regular basis.

The steering role played by ASL/SIAN in that period was relevant. The key informant from ASL/SIAN stated they fully used the powers at their disposal to provide guidance, and when necessary warnings, to several municipalities, including Bracciano. An official note sent by ASL/SIAN to the mayor of Bracciano on 2nd February 2011 was found by the author in the documentation made available by the municipality. The Note invited to publicise the water use restrictions prescribed by the Ordinance, by putting up posters on the streets and in public offices, and by sending information material to customers in conjunction with water bills. Additionally, ASL/SIAN invited to "put in place alternative supply of adequately low-arsenic water, particularly to safeguard sensitive subjects such as pregnant women, infants and children below the age of three, according to the precautionary principle". The note was found by the author among the documentation made available by the municipality.

In September 2011, ASL/SIAN published a public communication addressed to the population of Bracciano (ASL Roma F, 2011). The document, after mentioning the geological origin of arsenic in the local aquifers, summarised the situation by saying that the "average arsenic concentration" in potable water networks in Bracciano was 18µg/l, "higher than the parametric value established by law (10µg/l) but lower than the threshold of 20µg/l [allowed by derogation]". Consequently, the document invited the population to apply certain water use restrictions, essentially reprised from those restrictions Istituto Superiore di Sanità set for arsenic concentrations between 10µg/l and 20µg/l. It should be noticed, though, that arsenic concentration was not uniformly 18µg/l in the whole territory of Bracciano: as shown in Section 5.3.2, in mid-2011 Fiora had concentrations between 13µg/l and 15µg/l, but Lega still had concentrations between 23µg/l and 27µg/l. Such data suggest that the area served by network Lega, in September 2011, should still have complied with the water use restrictions Istituto Superiore di Sanità set for arsenic concentrations between 20µg/l and 50µg/l.

The document by ASL/SIAN, unlike in the Ordinance issued by the municipality on 31st January 2011, included indications for food processing establishments. It reminded that food processing establishments were not covered by any derogation regime and, as a result, they had to comply with the limit of 10µg/l. Food processing establishments were therefore requested to adopt all "the necessary measures, within self-monitoring plans" to ensure compliance with the 10µg/l standard. It is worth to notice that, in an information note the municipality issued on 4th October 2011, population was invited to comply with the Ordinance

issued on 31st January 2011, which did not mention any restrictions to food processing establishments using water between 10µg/l and 20µg/l (Comune di Bracciano, 2011e).

Overall, the attitude towards food processing establishments and similar businesses was rather tolerant. The key informant from ASL/SIAN was explicit on that point: “As regards businesses, canteens, etc., we took the decision not to shut them off, even if we could have done so. Other ASLs shut some businesses off… then some managers of those ASLs were sued”.

Emergency measures: water trucking and public standposts

The request by ASL/SIAN to provide the population with safe water through alternative supply (February 2011) required a follow-up by the municipality.

The municipality chose to prioritise the area served by network Lega. Lega had much higher arsenic levels than Fiora and, it is worth iterating, the derogation request concerning Lega was still pending in the first months of 2011.

The first action undertaken by the municipality was to install two water tanks, of $5m^3$ each, in two different locations in the area served by network Lega, Via della Macchia and Via di Pratigliolo. Annex three shows the exact location of the tanks. A third tank was planned in case of need. As confirmed by the key informant from the municipality, the tanks were installed by the local branch of the Civil Protection, in cooperation with the regional branch. Water supply was provided by the municipalised company Bracciano Ambiente by water trucking. The municipality played a coordination role. The decision to implement such emergency action was taken by the municipality on 21st January 2011, and the system was operational in February (Comune di Bracciano, 2011a; Mansi, 2011, p.3).

In March 2011, the municipality took the decision to purchase two standposts (also called “fountains”) equipped with built-in arsenic removal systems, in order to replace the previously installed tanks supplied by water trucking (Comune di Bracciano, 2011b). Each standpost had one tap. The two public standposts were installed in the same location as the water tanks – Via della Macchia and Via del Pratigliolo - and inaugurated respectively in May and in June 2011 (Comune di Bracciano, 2011d).

Figure 5.5 Public standpost on Via della Macchia
(Photographed by the author)

The public standposts – two of them for a population of 3,500 – never seemed to be very functional. As reported by all the customers interviewed, at least one standpost out of two was almost permanently dry, which made one operational standpost for 3,500 people. A customer indicated the standpost on Via di Pratigliolo as the one that did not function. According to another customer, "Water used to come and go […]. People used to go first to one of the standposts; if they found it was dry they moved to the other one and found water was scarce even there. Sometimes you queued and when your turn finally came water was over. People were just adrift".

One of the customers maintained that, according to what she was told by an acquaintance, the problem was that the municipality deferred payment to the firm in charge of maintaining the standposts, so the firm discontinued the service. Different was the explanation provided by the key informant from the municipality: "Difficulties [were] probably due to demand being higher than supply. There is a certain filling time for the tank where filtering takes place. So, especially in the standpost in the most populated area, the water going out was more than the water coming in". This version is coherent with a statement by the mayor, who additionally recognised the public standposts as "inadequate to the actual demand" (Panatta, 2011, p.3). Moreover, the key informant from the municipality hinted that the standposts ended up being rather an uneconomic solution: "We purchased those systems and in addition we spent a lot of money in ordinary maintenance".

An official letter sent by the mayor to ASL/SIAN on 16th March 2011 (Comune di Bracciano, 2011b) stated that, in conjunction with the measures described above, water blending operations had started on early February in order to decrease arsenic concentrations in network Lega: water with low arsenic concentrations from network Fiora was pumped into Lega. The letter stated that arsenic concentrations below 20µg/l were obtained, as certified by three water test certificates in attachment. At any rate, concluded the letter, water use restrictions for Vigna di Valle were still in force "for precautionary reasons". Unfortunately the water tests mentioned by the mayor were not made available to the author by the municipality, the most recent data provided by the municipality about network Lega dating 12th October 2010 (Section 5.3.1). Data from ASL/SIAN did not confirm arsenic levels in network Lega were below 20µg/l in February-March 2011 (Section 5.3.2).

Long-term measures: arsenic removal plant in network Lega

The measures described above were meant for the short term. At the same time, long-term measures were needed in order to achieve the objective of permanently providing the whole population with water with less than 10µg/l of arsenic by the end of 2012.

In 2010 the municipality monitored the efficacy of the pilot arsenic removal plant installed on a borehole of network Lega (Section 5.4.2). Results obtained were evaluated as "very good", with arsenic concentrations reduced by 60-70% (Comune di Bracciano, 2011a and 2011b). Based on such results, the municipality took the important decision to scale-up the system in order to solve the arsenic issue in network Lega. The installation of a full-scale arsenic removal plant was expected to abate arsenic concentrations to 8µg/l in network Lega. The decision to proceed with such plan was passed on 4th November 2010.

It is worth reiterating that in the same period the state of emergency was declared to tackle the issue of arsenic in drinking water in Lazio, and that the Governor of Lazio – nominated "Deputy Commissioner" of the state of emergency – presented a comprehensive action plan. The arsenic removal plant planned in Bracciano was listed as part of the action plan, specifying that required funds (400,000€) were made available by Bracciano Municipality (Commissario Delegato, 2011). The municipality was able to take on expenses thanks to a loan obtained from Cassa Depositi e Prestiti (Bank for Deposits and Loans), a public-controlled company providing loans to public bodies to implement infrastructural works (Regione Lazio, 2011b).

The choice not to apply for Regional funds available in the framework of the state of emergency was partly justified by time-bound reasons: "Applying for funding from Lazio Region […] would cause further delays and would make procedures, which are anyway complex and time consuming […], even longer" (Comune di Bracciano, 2011c). In addition, the key informant from the municipality stressed that the Region actually gave priority to other municipalities. The key informant explained that based on the fact that when the state of emergency was declared Bracciano already had some sort of plan to tackle the arsenic issue (the pilot arsenic removal plant): "The point is that they [the Region] consider us as a "virtuous" municipality because we are proactive, so they do not give us any assistance. Other municipalities with different difficulties and much more behind schedule than us have obtained funds".

Competitive bidding procedures took place, and a construction contract was stipulated with a private firm in March 2011 for 356,000€. The realisation of the arsenic removal plant started in May (Comune di Bracciano, 2011c). Despite construction was announced to last approximately ninety days (Comune di Bracciano, 2011c), the arsenic removal plant was operational only on 6th April 2012. The site of the plant is indicated in Annex three. One of the reasons of the delay in construction works, emphasised by the key informant from the municipality, was that a dedicated power supply line was needed, the realisation of which was the responsibility of the Electric Company and took some months. As mentioned by the key informant, even though a private firm was in charge of the realisation of the arsenic removal plant, the two municipal workers in charge of O&M of the water systems contributed with suggestions during the construction phase, based on their hands-on knowledge of the water system's requirements and characteristics.

Figure 5.6 The arsenic removal plant
(Photographed by the author)

Bracciano Municipality issued an information note on 6th April 2012 to announce to the public that the plant was completed and operational. The news was reprised by different local magazines. The note, after describing the technical features of the plant, iterated that works were fully financed by Bracciano Municipality, and that "Bracciano Municipality […] has not adhered to ACEA ATO 2 and considers keeping water a public good as one of its binding principles" (Comune di Bracciano, 2012). It is worth to notice that municipal elections were to be held on 6th May 2012. The significance of the hints to "ACEA ATO 2" and to "water as a public good" is explained in Section 5.6. It can be anticipated here that such hints are part of a general politicisation of the debate on water management that took place in recent years, not only in the local context.

Water treated by the arsenic removal plant was tested on 7th April 2012 by a private laboratory on behalf of the firm that built the plant, and results reported arsenic concentration lower than the "quantification limit", i.e. lower than 1µg/l. Also fluorides – the other water quality parameter under observation - were essentially absent from water (Farm, 2012).

The arsenic removal plant makes use of an "adsorption" technology, which removes both arsenic and fluoride through specific adsorbing media. An automated backwashing system activated during night hours ensures the self-cleaning of the adsorbing media, and discharges into a stream flowing nearby. The maximum capacity of the plant is 15 l/s, slightly smaller than the maximum yield available from the borehole, 20 l/s. Due to this discrepancy, at the time when the author was in Bracciano (June 2012) the area served by network Lega had lower pressure than before the plant was in use, even if the plant worked at full capacity. Not 100% of the volume of water abstracted needs to be treated though, since arsenic concentrations up to 10µg/l are allowed. Therefore, it is planned to exploit the available 20 l/s provided by the borehole by treating only part of the water abstracted and blending it with "untreated" water before supplying it to the network. By doing so, the network would get the right water pressure as well as arsenic concentration below 10µg/l. Such technical features were described in Comune di Bracciano (2012) and essentially confirmed by an informant from the municipality.

The plant had a breakdown on 12th April, allegedly due to a manufacturing defect in a pump. The municipality was obliged to inform the concerned population. The malfunctioning parts were replaced by the firm that installed the plant, and the plant was newly operational on 19th

April. The key informant from the municipality admitted: “After the arsenic removal plant was started up, the pump broke down just before the elections due to a manufacturing defect. As you can imagine, it wasn’t very easy to explain to people…!”

Anyhow, technical problems did not seem to come to an end, and the key informant from the municipality told the author that just before 21th June 2012 – i.e. the day the author was conducting the interview – the system encountered other technical problems and water supply was discontinued for some hours in the areas served by network Lega. Once solved these technical issues, though, the arsenic removal plant should be able to permanently provide network Lega with water having arsenic concentrations below 10µg/l, in full compliance with European water quality standards.

Long-term measures: new groundwater sources in network Fiora

Once a solution to the arsenic issue in network Lega was found - even with the technical difficulties mentioned – the same issues needed to be solved by the end of 2012 in network Fiora, which still had arsenic concentration above 10µg/l. Available options were examined by the municipality, assisted by external consultants.

The first type of option consisted in the realisation of an arsenic removal plant on network Fiora. That would use either the same technology as in Lega – adsorption - or a different technology - filtration. Finance was a key factor in decision making: the difference in size between the two networks (Lega serving around 3,500 people against the 15,000 served by Fiora) involved very different costs. In brief, installing an adequately dimensioned arsenic removal plant on network Fiora would have been uneconomic (Comune di Bracciano, 2011c). In addition, filtration technology would create issues of mineral slag disposal (Panatta, 2011, p.3). Therefore, the municipality decided not to proceed with the arsenic removal of network Fiora.

The other main option was thus examined: the exploitation of alternative groundwater sources. The idea was to find groundwater sources having adequately low arsenic concentrations and adequately high yields. The new sources would be used to improve the existing water blending system in a way that final arsenic concentrations fall below 10µg/l. If adequate groundwater sources were found, water from the new boreholes, together with - or instead of - water from existing boreholes, would provide the right water blend to permanently abate arsenic concentrations below 10µg/l. In order to do so, the municipality asked and obtained by the Province the authorisation to drill new boreholes (Panatta, 2011, p.3; Comune di Bracciano, 2011c).

The key informant from the municipality told the author that development of new boreholes was underway and that only the transmission pipework between the new boreholes and the existing system was missing at the time the interview took place (June 2012). The new boreholes, continued the informant, had arsenic concentrations around 8µg/l, which according to calculations would be enough to provide Fiora with water having arsenic below 10µg/l, in conjunction with some of the existing boreholes. The informant was confident that such upgrades would be operational before the deadline set by the derogation in force: “We can say we have done much, and 31st December 2012 is still far away”.

5.5 Customers of Water Services

Section 5.4 analysed the events between 2001 and 2012, describing the derogation regime, the water use restrictions, and the remedial measures undertaken. The actions undertaken by the ASL/SIAN as regulator and by the municipality as both service provider and local government were analysed, as well as the interaction between the two institutions.

A vital aspect of the research was not presented though, i.e. the point of view of customers in the course of the events. This section is devoted to filling the gap.

5.5.1 Communication with the customers

As described in Section 5.4, along with the actions undertaken by the municipality and by ASL/SIAN according to their respective attributions, public announcements were issued and addressed to the population. Those announcements took the form of press releases, information notes and posters. As explained by the key informant from ASL/SIAN, most of the communication was carried out by municipalities (Bracciano as well as others) upon solicitation and following guidelines by ASL/SIAN. In some cases ASL/SIAN was in charge of graphics and contents, while printing and dissemination was the responsibility of municipalities.

In addition, in Bracciano most of the public communication material issued was made available in pdf format via the official website of the municipality, initially published in an internal page, then accessible through a link displayed on the homepage: “Interventions on municipal water networks”. As the author verified, the link was present on the website homepage until spring 2012. Successively it was accessible via the “Environmental policies” button present on the homepage. As verified by the author, the webpage “Interventions on municipal water networks” was updated until April 2012. Significantly though, the two contradictory press releases the municipality issued on August-September 2009 (Comune di Bracciano, 2009d) were not made available through the dedicated webpage.

As suggested by the documentation examined in Section 5.4 and as confirmed by the key informant from the municipality, reassuring the population was a core priority for the municipality. The key informant explained the municipality strategically emphasised certain aspects in order to achieve such aim: “We started by stating that arsenic levels in the area depend on geological features and not on any new factors. That reassured people. We stated that people have always drunk water with those arsenic concentrations in this area, which reassured people who recently moved here from elsewhere”. The key informant added: “Information that some parameters were above the allowed limits was promptly given […]. Keeping people informed about what was done step by step contributed to providing information without generating alarm”.

Starting mid-2009, local media begun paying attention to water quality issues in the area, and tried to make some clarity on the matter. A local magazine, L’Agone, covered the topic in four issues from 2009 to 2011. That contributed to raise awareness on the issue and clarified some points, but an exhaustive reconstruction of the events, of the regulatory framework and of the arsenic concentrations was still generally missing, probably due to the fact that most of the featured articles were based on statements and interviews by representatives of local institutions.

Useful indications on to what extent and how effectively information was disseminated were obtained by the author through interviews conducted with some customers. The author had the opportunity to individually interview four customers and to carry out an informal focus group with three other customers. All interviewees, apart from one of the participants in the focus group (or group interview), lived in the area served by network Lega.

Most of the customers interviewed recalled they received some form of information from the municipality at some point - via street posters, letters at home or leaflets - but generally did not remember exactly when they got informed and what those communications said. None of the customers interviewed remembered to have received any clear information from the institutions (municipality or ASL/SIAN) in 2009. Some of them mentioned they heard rumours about presence of arsenic in drinking water starting 2008-2009, but most of them told they received official information from the municipality only in 2011. Only one customer mentioned the municipality website as a source of information: that was how he got the certitude the issue of arsenic in drinking water was real, after hearing rumours about it. Two customers did not know, on the dates the interviews took place in June 2012, that the arsenic removal plant had been started up and that it was operational.

Most of the interviewees were aware that a change took place at some point in European legislation about arsenic levels, but only one of them was aware that the issue originated long ago ("2002" he said). He said he got such information by searching the Internet by personal initiative, because he is particularly attentive to these kinds of issues. The other interviewees who mentioned changes in European legislation did not locate them in time, and did not seem to be aware the issue was not a recent one. The author interviewed a member of a civil society association based in a nearby village and that promoted the referendum about water governance held in June 2011 (Section 3.4.2). The informant said some people asked them questions about the arsenic issue during the referendum campaign and expressed their concern about it, but nobody showed to be aware that the issue was not a recent one, that delays had occurred and that it could have been tackled years ago. People were eager to get information just about the "here and now".

Likely due to difficulties in getting information from the municipality, most of the customers interviewed took the initiative to proactively contact the municipality at some point. Two of them used the official channel, i.e. municipality's public relations desk. One of them recalled that employees at the Desk were not able to give any "concrete" answers, only "formal" answers, and it looked "as if they always had something more important to do". As a result, he was obliged to bypass the public relations desk and to contact the Technical office and a member of the Municipal Cabinet. That was not very useful either. The other customer who contacted the public relation desk did that by email, and was impressed by the fact the Desk replied, without providing any substantial support though. Another customer declared he used "personal channels" to get more information, i.e. acquaintances among municipal staff and in the Municipal Council.

Two of the customers explicitly listed public communication as a major weakness on the institutions' side and as a major reason of distress. They especially complained that no timescale was given for sorting out the overall issue, and that they got no information about the duration of breakdown time when public standposts were out of order. Communication to customers was defined as "very poorly managed" and "slightly reticent particularly in the early phase".

Not dissimilar was the opinion by the key informant from ASL/SIAN. The key informant mentioned cases (not related to Bracciano) of mayors issuing ordinances of water use restriction without publicising them at all, so population was kept in the dark about the issue. In those cases the pressure exercised by ASL/SIAN to do so was crucial. Overall, the key informant recognised that “not enough was done” on the communication side, and that lack of a dedicated budget played a role on the ASL/SIAN side as well as on the municipalities’ side.

5.5.2 Reactions by the customers

Based on documentary sources as well as on interviews with key informants and with customers, it was observed that no organised protest of customers took place in Bracciano with relation to the arsenic issue. In this regard, it is relevant to notice that interviews with customers highlighted a variety of behaviours and of emotional perceptions of the issue.

First of all, nearly all customers interviewed declared they did not generally drink tap water before water use restrictions were enforced in 2009-2012, so they continued not drinking it when the issue was acute, and they still don’t. Some of them explained the fact of not drinking tap water as a mere habit, some of them said water sometimes had unattractive colour in the past, one of them specified she used to drink bottled water even when she lived somewhere else. Such behaviour does not represent an exception, considering that 54% of the Italian population does not drink tap water and that 50% drinks bottled water (Cittadinanzattiva, 2011, p.14-15). Some of the customers said they always had the habit of collecting drinking water from public fountains in the region, while some others used bottled water.

It should be noticed that, as a result, the customers interviewed were affected by water use restrictions concerning cooking but not drinking, since the habit not to drink tap water was already widespread.

The three customers interviewed in the informal focus group - two of which had always lived in the area - generally agreed that the whole arsenic issue did not influence their water use behaviours: “Arsenic in water is natural in this region because it’s volcanic rock. It has always been like that. Also, I told you we always have drunk bottled water. So no, my behaviours didn’t change for the arsenic issue”. In addition, a certain sense of distrust towards the institutions was mentioned as deterring from following water use restrictions: “How can I trust them? How do I know if [water from the standposts] is not just the same as from the tap? Standposts are not transparent, how can I know if they have filtering mechanisms inside?”

Other customers interviewed, though, followed the indicated water use restrictions. Since public standposts were often out of service, they developed their own coping strategies. One of them ended up using tap water only for personal hygiene and for house cleaning, and bottled water for all other uses, including all cooking. Three of the other customers interviewed integrated bottled water with alternative sources: one of them used to collect ten litres of water every day from public fountains in town centre (network Fiora) by using jerry cans. Another did the same every time he visited his mother, who lives in town centre. Another customer too integrated bottled water by collecting safe water at her mother’s place, with the difference her mother lives in Umbria (“Can you imagine? Going to Umbria to get potable water?”).

Once the arsenic removal plant was installed and operational, people tended to recover their usual water consumption habits, with the exception of one of the customers who did not know the plant was operational (Section 5.5.1) and of a customer who complained water now left a deposit: “You don’t want to use that water if you’re cooking soup”.

Differences in the emotional responses to the issue were even more marked than the behavioural responses examined above, and accounts from some of the customers were rich in nuances.

The three men who participated in the informal focus group did not show any particular concern about the issue, as hinted by the fact they essentially snubbed the water use restrictions issued by the municipality. One of them, though, ended up asking the author questions about health risks related to arsenic and about the efficacy of arsenic removal technologies: “Tell us, what is arsenic, can it be filtered, is it really harmful? Is it a poison? Is it true that human body cannot get rid of it? I heard that a lot of people died in Africa for that, didn’t they?” He added that he did some Internet search on the issue.

One of the customers individually interviewed, who had been living in the area for some years, stated he and his family were not worried about the issue initially: “They didn’t tell us (or we didn’t know) not to use tap water for cooking”. The household had already the habit not to drink tap water. They got worried when they realised water could not be used for some cooking uses, and started following the instructions by the municipality. The interviewee was certain that almost all of his neighbours had the same attitude, at the same time suggesting that people who had always lived in the area did not pay much attention to the issue anyway.

Another customer, who was quite well informed on the topic, did not hesitate to say that he followed all the water use restrictions, and that the situation did not give him “a lot of stress”. He explained that on the basis that he knew the issue was not a recent one, and that “water was the same, just the legislation changed”. He could compare several different positions on the arsenic issue via the Internet, ranging from alarmist to reassuring. At local level, he heard the current administration and the past one accusing one-each-other, which made the situation even more nuanced in his eyes. He reported, though, that many people in his neighbourhood were “much angrier and more disappointed […]. People think they “know-it-all” […], they have answers to everything”.

Another interviewee recognised deep differences between his and his wife’s perceptions of the issue. He was inclined to view the issues as “one of the many nuisances you cope with”. His wife, on the other hand, showed different sensitivity. First of all, explained the interviewee, she has a tendency to cumulate heavy metals in blood as a physical condition, so the elevated arsenic concentrations in drinking water made her truly alarmed. In addition, the couple has an autistic daughter. The interviewee explained: “It seems that heavy metals are a major issue in relation to autism. So you see my wife’s concern: Did autism develop beforehand? Or did it develop as a consequence of heavy metal exposure including from water? […] My wife is an expert in nutritional biotherapy… in sum you can imagine how the arsenic issue was experienced on her side. I had a somewhat more relaxed attitude; I suppose that’s a matter of personality”. He and his family accurately followed the water use restrictions indicated by the municipality, but he saw “resignation and underestimation” as widespread attitudes among the population.

The presence of children emerged as a critical factor during the interview with a young woman: “I was pregnant last year, and now my daughter is seven months old. Can you imagine our stress level? In addition, not having potable water at home is very stressful in itself. That affects the way you cook, the way you use water, and also the way you shape your days, since you need to fetch water from a public standpost and you are not even sure the standpost will be working that day. […] I have to be careful with my daughter”. Her husband, who was present during part of the interview, was on the same wavelength. He said he posed many queries to the municipality, to the Civil Protection and to Bracciano Ambiente (through the public relations desk and through personal contacts) but confirmed that the general attitude of the population was rather passive: “Some people living around here grow acrimonious if a streetlamp burns out but they didn’t protest at all for the arsenic issue”.

5.5.3 Customers’ degree of satisfaction

Overall, customers did not look too dismissive of the role played by the municipality in managing the arsenic issue.

Particularly one of the customers interviewed fully endorsed the strategy followed by the municipality, in the framework of his own wider political views: “I earnestly support public management of water services, so I strongly appreciate the fact that the municipality did all works by using public money, taxpayers’ money, and not by using funds from private companies”. It is interesting to notice that the same interviewee was aware that the issues originated in the early years 2000s and not in the late 2000s as others seemed to believe.

Other interviewees also declared themselves rather satisfied with what the municipality did, even though not as enthusiastic. One of them drew a line between the practical measures implemented and the communication strategy followed: “They have operated efficaciously from a practical point of view – since results were finally achieved – but the communication side was very poor”. He defined municipality’s communication as quite reticent, especially at the beginning, and tried to explain it as follows: “Nowadays citizens are probably a bit smarter than they were in the past. Information - even though sometimes biased and not always truthful - is available from various sources. […] Maybe they were trying not to generate alarm, but you actually end up generating higher alarm by not telling things than by telling things”. Some of the customers’ views on the efficacy of public information are reported in Section 5.5.1.

On the far end of the spectrum, a customer defined herself as “not satisfied at all” of how the arsenic issue had been managed by the municipality. She was the only one among the customers interviewed to point out that she had been paying potable water bills while receiving non-potable water and to emphasise that as a relevant issue. In fact, also one of the participants in the informal focus group quickly mentioned the same point, revealing that he heard about a possibility of demanding water bills to be reimbursed. He was referring to the legal action undertaken by CODACONS, which he dismissed as follows: “You could sign an appeal against the municipality but you had to pay something like 50€ to do that. So you see, it wasn’t really worth to pay 50€ to sign the appeal. Where was the advantage? I did nothing”. It is worth iterating that Bracciano was not among the municipalities mentioned in CODACONS’ appeal (Section 5.1.5).

The husband of one of the interviewees, who was present during part of the interview, summarised his and his wife's main points of dissatisfaction, at the same time hinting at what could have been done differently: "First of all, they should have found a solution in the shortest time, which was not the case. Second, they should have communicated us what the timescale was for the problem to be solved. Third, they should have put in place a more efficient public relations desk […]. Finally, provisional back-up service (tanks and standposts) should have been efficient really. […] Also, I want to say the different parties were not well coordinated: the Civil Protection, Bracciano Ambiente and the municipality". No-one among the other customers indicated any alternative approach he/she would have preferred the municipality to follow, except from the interviewee who would have preferred more transparent communication throughout the process.

It is worth to point out on this regard that during the interviews a certain sense of disenchantment emerged about the municipality as an institution. That was expressed in clear terms of lack of confidence by one customer: "How can you be satisfied with the municipality, they always *screw* us over…" In other cases, bureaucracy was mentioned in partial justification of the delays and mishaps occurred. It was referred to as "red tape", "technical and organisational difficulties" and similar expressions defining common barriers to achieving objectives quickly. Nearly all customers interviewed mentioned such category of factors. Among them, only one stated that bureaucracy, even though representing an obstacle, cannot be used as an excuse. He was the only one – together with his wife – who expressed a categorically dissatisfied point of view on how the arsenic issue had been overall managed.

5.6 Political Factors

Some factors that did not strictly pertain to the arsenic issue but more generally to the political discourse related with water management, at local level and at nationwide level, emerged during the research. They deserve to be reported because they were mentioned by many of the people interviewed and had an impact on how the arsenic issue was managed as well as on how it was perceived.

Bracciano Municipality manages water services in-house despite directions given by Galli Law and by its successive modifications (Section 3.4). Specifically, Bracciano geographically belongs to "ATO Lazio 2" (called "ATO2" for brevity), which is one of the five ATOs in Lazio. The area of ATO2 essentially corresponds to the territory of the Province of Rome. ACEA, a public-private company based in Rome which is in the process of being privatised (Section 3.4.3), obtained in 2002 the concession for water management in the whole ATO2 area, including Bracciano (ATO Lazio 2, 2002). That involved that water services in Bracciano would be handed over by the municipality to ACEA within a given timeframe. Nonetheless, that never happened.

The key informant from the municipality confirmed that Bracciano Municipality has put up resistance to handing water services over to ACEA and is still trying to find viable ways for keeping in-house water service management: "We are trying now to understand what the legal procedures can be, since the Region recently sent us a warning requiring us to join the ATO. [We] are trying to find a legal way out, based last but not least on the referendum, which stated water is a public good on which no profit should be made". The key informant justified their defence of in-house water service management on the basis of service level issues: "There would be issues of promptness of interventions and skills if ACEA takes water

management". Similar opinion was expressed by an informant from the municipality: "If ACEA gets water service concession they will struggle for six-seven years before they get the hang of it".

In addition, official documents issued by the municipality openly mention the commitment to keep water service management in-house: "Bracciano Municipality […] has not adhered to ACEA ATO 2 and considers keeping water a public good as one of its binding principles" (Comune di Bracciano, 2012). Public water management was also emphasised as a key point in the political programme of the coalition that administered Bracciano in 2007-2012. The programme was presented for the municipal elections of 6th May 2012 (Unione Democratica per Bracciano, 2012, p.35).

Moreover, the member of the local civil society association interviewed saw a link between the recent decision to centralise water management at regional level (Section 3.4.2), and the announced privatisation of ACEA: in the informant's opinion ACEA is likely to be the only company with adequate capacity to take over water management in the whole Lazio, so the informant expressed the view that the centralisation of water services at regional level would be as a matter of fact a favour done to ACEA and particularly to its private shareholders.

A clear link between autonomy in water service management and remedial measures to the arsenic issue was found by the key informant from the municipality, who defined in-house management as "absolutely an advantage" in handling the arsenic issue in Bracciano. The key informant added: "Everything has been done [by the municipality] without any extra costs for the population. Infrastructural works have had an impact on the municipal budget but not on water bills, unlike what happens in towns under the ATO. […] I can say I am satisfied of how we have managed the issue, and I believe that hardly we would have achieved the same results if we were an ATO member. Certainly we would have waited long time to get what we needed…"

As the chronology of the events shows, the arsenic removal plant in network Lega was inaugurated on 6th April 2012, in the midst of the municipal electoral campaign (elections took place on 6th May). That might suggest a sort of "strategic" coincidence between the resolution of the arsenic issue in network Lega and the incoming election date. The key informant from the municipality recognised: "Yes, of course sometimes it happens that who sits in the government has his good reasons… I have to say that in our case we have worked hard for our five year term and, yes, we have got some reward before the elections […]. In any case, it was important for the people to get results, before or after the elections". On the other hand, as attested by the fact that some of the customers interviewed were not even aware that the arsenic removal plant had been operational since April, it does not seem that the municipality did very much to promote such achievement. As a matter of fact, the political coalition that administered Bracciano from 2007 to 2012 was re-elected, and the same mayor and the core of his Municipal Cabinet will be in charge for a further term, until 2017.

Also political events occurred on a national scale had an impact on the situation in Bracciano and on the arsenic issue. As mentioned in Section 3.4.2, a referendum took place in Italy in June 2011 about water sector governance. It was articulated into two proposals: one aimed at abolishing the obligation to partially privatise water services within a given timescale; the other aimed at crossing out ROCE (Return On Capital Employed) from tariff calculation methods. Referendum results showed that the vast majority of voters were favourable to both proposals. The promoters of such referendum, as well as the national mass media, tended to summarise

the referendum proposals under the umbrella definition of “public water” and “water as a public good”. Such was the political framework in which to locate the hint at “water as a public good” found in Comune di Bracciano (2012) (Section 5.4.3). As reported few paragraphs above, also the key informant from the municipality mentioned the referendum results. The key informant utilised them as an underpinning argument to back the choice made by the municipality not to hand water services over to a public-private company even at the cost of generating conflicts with upper level institutions such as Lazio Region.

Such position on “water as a public good” (to use a simplified definition) emerged as a common ground between Bracciano Municipality and civil society. The member of a local civil society association interviewed, which participated in promoting the June 2011 referendum, hinted that the referendum campaign, the resistance against “privatisation” of Bracciano water services, and the arsenic issue ended up supporting one-each-other. During their referendum campaign - told the interviewee - the association stressed the fact that Bracciano Municipality was active in tackling the arsenic issue, in contrast with neighbour towns in which water services were managed by a public-private company and in which no actions had been undertaken. The association used such argument to support their referendum campaign against private management of water services, at the same time backing the municipality’s struggle to keep water service management in-house. In its turn, as explained above, the municipality tended to present its struggle for in-house water services as a struggle for “public water” (the referendum main slogan), and perceived the referendum results as corroborating their political line.

In this respect, one of the customers interviewed (quoted in Section 5.5.3) explicitly considered the arsenic issue in the bigger framework of the debate on “public water”, and an informant from the municipality expressed the opinion that handing water services over to ACEA would be in contradiction with the referendum results.

An additional factor contributed to make the arsenic issue interwoven with the political discourse. As reported by some of the customers interviewed as well as by the key informants from the municipality and from ASL/SIAN, some companies started promoting household level water filtration systems in the period when the arsenic issue became of public domain in the area. Not only such devices were on sale in the local shopping mall; tradesmen also carried out on-the-phone and door-to-door promotion. The informant from the local civil society association reported that tradesmen used to carry out practical demonstration of the efficacy of their products by filling a glass from the potential client’s tap and by adding a reagent. After a while a deposit formed on the bottom of the glass, and that was used by tradesmen as evidence that tap water was “dirty” and that household treatment was needed. The informant – who has a background as a chemist – pointed out that such deposit was likely to simply be coagulated residual chlorine. The informant added that household water filtration systems tended to be purchased particularly by elderly people, sometimes easier to circumvent, and that the informant advised people not to purchase such devices whenever asked the question.

ASL/SIAN even retained to warn the population against the abuse of such filtration devices via a public communication: “We wish to warn [the population] against household level treatments intended to reduce arsenic concentration in drinking water, due to their complexity and to their difficult maintenance” (ASL/SIAN, 2011). The key informant from ASL/SIAN explained during the interview that “some of those firms work correctly while perhaps other firms are not completely regular”, and that a judicial inquiry on the matter was in progress in a different

region of Italy. Articles from the national press confirmed that (see for instance Martinenghi, 2011).

The participants in the informal focus group were aware of such commercial campaigns and demonstrated a certain degree of interest in the topic. One of them explained: “You know, all these people started selling those machines that you install below the sink […]. [A tradesman] did his demonstration with his equipment and all, but at the end of the day he gave me no guarantee: what happens if I buy your machine, I make water tests privately, and arsenic is still present? So I didn’t really trust him and I didn’t buy the machine”. Scepticism shifted to explicit distrust for another participant, who emphasised the price aspect: “At the beginning those machines were on sale for 2,500-3,000€. After a while you could buy the same machines for 1,000-1,500€. How comes they can change prices so quickly? What does that mean? That means they were trying to *screw* you over when they proposed you the price of 3,000€. So you really cannot trust anyone”.

The risk of commercial speculation (even on a larger scale) was hinted at by the key informant from ASL/SIAN: the key informant suggested that manufacturers of household level water filtration systems might have had lobbied European policies on drinking water quality. “If you ask me why the European Commission in 2010 followed the minority opinion expressed by SCHER committee instead of the majority opinion, I do not know. I do not know what the dynamics were. My hypothesis is that firms commercialising household level water filters had an influence in decision making”. It should be noticed that such view was expressed as a personal opinion not based on any particular evidence.

5.7 Conclusions

The aim of this chapter was to expose the research findings, based on the data collected and analysed during the research process. Data were presented mainly in a chronological sequence, in order to show the evolution of the arsenic issue, as well as of the legal framework governing it and of the remedial measures adopted along the years.

Section 5.1 described the evolution of the arsenic issue in Italy at national level and briefly at Lazio Region level. Italy enjoyed two derogation periods, and the European Commission initially rejected the request for a third one. The request was subsequently accepted, but only up to 20µg/l of arsenic in drinking water, and is valid until the end of 2012. The declaration of the state of emergency in Lazio Region played a role in such decision. The facts at national level were essential to understand the course of the events in Bracciano and were strictly interwoven with them.

Section 5.2 examined water services in Bracciano: how they are structured and managed. Bracciano Municipality manages water services in-house, despite indications by Galli Law and despite the concession awarded in 2002 to ACEA, a public-private company. The whole territory of Bracciano is supplied by groundwater sources, via two main water networks (Fiora and Lega) and a third network, Cisterna.

Section 5.3 focused on the available data on arsenic concentrations in the different water sources supplying the territory of Bracciano as well as in its three water networks. It showed that arsenic concentrations were constantly above 10µg/l in Fiora and Lega until 2012, and

that given the existing water sources general system upgrading was needed to abate arsenic concentrations in water networks.

Section 5.4 reconstructed the course of the events in Bracciano since year 2001, with a special focus on 2009-2012. Contextually with water use restrictions implemented starting 2009 upon request by the local ASL/SIAN, the municipality put in place emergency safe water supply measures: water trucking and public standposts. At the same time a pilot arsenic removal plant was tested, and a full-scale plant installed in network Lega in 2012. That should permanently solve the arsenic issue in Lega. Upgrading of network Fiora is underway, through the exploitation of new boreholes with low arsenic concentrations, which are expected to solve the problem in Fiora by the end of 2012.

Section 5.5 described how the arsenic issue was experienced by the customers living in the area of Bracciano the most concerned by the issue. Information customers received by the municipality and from ASL/SIAN did not appear very prompt and transparent. No organised protests by customers took place though. On the contrary, they reacted to the issue individually, each one according to his/her own sensitivity and awareness. Overall, customers did not look too dismissive of the actions undertaken by the municipality.

Finally, Section 5.6 briefly highlighted political factors that emerged from the research with relation to the arsenic issue in Bracciano. They essentially refer to the resistance put up by the municipality against the plan of handing water services over to the company awarded with the concession in 2002, to the municipal elections held in May 2012, to the impact of the referendum held in June 2011, and to the attempts by private firms to take advantage of the issue by extensive promotion of household level water filtration devices. All that resulted in a certain level of politicisation of the debate on water management, with relevant consequences on the debate on the arsenic issue.

Chapter 6. DISCUSSION

Chapter five exposed the research findings. Chapter six will examine those findings in the light of the research objectives and questions presented in Chapter one. The goal is to provide answers to the specific research questions and by doing so to the research objectives. Once that is done, Chapter seven will draw overall conclusions.

The research objectives and questions are iterated below for clarity:

Objective 1	Identify how and why the municipality - as both service provider and local government – has failed to live up to its obligations towards the customers.
Objective 2	Identify the reasons why customers lack "voice" in requiring accountability: in demanding their right to a safe water supply and in requiring prompt responses.
Objective 3	Understand the regulatory regime during the years elapsed, and to what extent it had an impact on the service provider's performances.

Objective 1	Objective 2	Objective 3
a) Is water service structure adequate to ensure service level? b) What is the rationale behind the choices the municipality has made? c) How do political level and service provision level interact within the municipality? d) Are there any relations between water provision and electoral consensus? e) How does the municipality perceive its own role in the course of the events?	a) What instruments do customers have to require accountability? b) Have customers received adequate information about the arsenic issue? c) Did customers use the public standposts? Why? d) Do customers perceive the issue as important? e) How do customers perceive the actions undertaken by the municipality?	a) Are regulatory tasks clearly defined and divided among the different authorities? b) What powers has the regulator vis-à-vis the municipality (as service provider and as local government)? c) What were the actions undertaken by the regulator? d) How does the regulator perceive its own role in the course of the events?

6.1 Research Objective 1: The Municipality

6.1.1 An unreformed institution

"Is water service structure adequate to ensure service level?"

Water service management in Bracciano can be defined as "unreformed". Such definition entails two main aspects.

First of all, the reform elements introduced by Galli Law (Section 3.4) did not seem to have had any impact on water service management in Bracciano. The organs delineated by Galli Law are not present locally, or if they are present do not have any actual weight, and nobody among the key informants interviewed mentioned the institutional structure designed by Galli Law. That seemed to confirm the definition given by Lippi et al. (2008) about ATO Authorities as “virtual institutions”, and of Galli Law as characterised by a number of “grey zones” in which roles and powers were not adequately defined (Section 3.4.3). The ATO structure was mentioned by the key informant from the municipality and by documents issued by the municipality only in the framework of the battle undertaken through the years by Bracciano Municipality to keep direct control of water services against the incorporation in ATO-level centralised water service management. That confirmed the top-down nature of Galli Law and the lack of consultation of local stakeholders during its implementation (Section 3.4.3).

Second, and perhaps more important, water service management in Bracciano can be defined as “unreformed” from a more general point of view, insofar as it does not reflect any New Public Management principles (Section 3.2). That clearly appears when considering the organisational structure: the municipality – i.e. the local government – has never stepped back from service provision. On the contrary, service provision is integrated in the organisational structure of the municipality. In other terms, water services are managed in-house and are financed by the municipality through taxation. As a result, Bracciano Municipality plays the double role of water service provider and of local government. Therefore, one of the basic accountability lines defined in Sections 3.3.1 and 4.4 is missing: the “contract-based” accountability, which binds a service provider to the local government which awarded the concession, through a legally enforceable agreement or contract. The “contract” type of accountability is missing in Bracciano, since there is no distinction between the municipality as local government and the municipality as water service provider. The case of Bracciano is not unique in Italy: Section 3.4.3 showed that the implementation of Galli Law has been slow and gradual in the whole country.

A state of overall organisational entanglement between water services and general municipal structure needs to be highlighted. In fact, as already described in Section 5.2.1, no water service department, unit or office exists within the municipality: no operationally autonomous structure is in charge of water services. On the contrary, water services are managed through different bureaux and end up being the responsibility of different hierarchies. Nothing like an autonomous management level could be found by the author. The author observed that the qualified workers in charge of water service O&M often report directly to a councillor, i.e. to a political member of the Municipal Cabinet in charge of one or more departments.

It appears that such a structure is at least able to keep the system functioning. At the same time, the impression is that much of what is done and how it is done depends on the degree of individual competence, goodwill and commitment of the people sitting in key positions: councillor(s) on one side, and municipal workers on the other. The author observed a sort of alliance based on mutual esteem and open communication between the municipal workers on one side and a councillor on the other, all of them showing a substantial degree of commitment to water management. Such “informal alliance”, though, is not backed by any solid organisational structure, and is can be heavily affected by political cycles.

As a result, strategic monitoring of the water system in all its aspects seems to be essentially missing and no centralised database seems to be in place, as shown by the difficulties encountered in reconstructing the history of network Lega on one side and the arsenic

derogation regime before 2009 on the other (Sections 5.3.1 and 5.4.1). For instance, the water test certificates made available to the author by the municipality were filed in a loosely chronological order and, as mentioned in Section 5.3.1, most tests conducted by ASL were missing from the municipality's dataset. Some official notes sent by ASL/SIAN to the municipality were filed in the same folder, but not all of them and without any apparent rationale. In addition, the same folder also contained documents unrelated to water quality testing. Who is in charge of filing those documents and, most importantly, to analyse them, is not clear. The lack of any "contract-based" accountability certainly does not stimulate transparency and good performance, since water service management in Bracciano does not report to any external organ.

As mentioned above, if the system works it is largely due to the skills and commitment of the qualified municipal workers in charge of O&M, as well as to the presence in the Cabinet of a councillor willing to motivate them and to make the most of their skills. Such "craftwork approach" though, as shown by the delays in solving the arsenic issue, presents serious limits when it comes to long-term planning and to system upgrading: adequate competences, and management structure seem to be largely missing. In this sense, organisational culture can be considered as an issue: ensuring basic service levels and being able to react to emergencies seems to be enough to suit municipality's ambitions.

6.1.2 Reactive attitude

"What is the rationale behind the choices the municipality has made?"

In the light of the facts reconstructed in Chapter five, it can be said that the attitude of the municipality towards the arsenic issue has been reactive more than proactive.

Section 5.4.1 showed that nothing was done in Bracciano to tackle the arsenic issue in the years 2001-2008, despite arsenic concentrations being significantly above 10µg/l in nearly the whole territory due to geochemical features of the area. Not only were no remedial measure planned and implemented nor customers informed about the issue; but it seems possible that Bracciano Municipality was not even covered by derogations as allowed by national regulations. That was also due, it is worth iterating, to a rather "relaxed" attitude on the regulator's side (discussed in Section 6.3 below).

Things started changing only in 2009, when the local regulator (ASL/SIAN), upon pressure by Lazio Region, faced the municipality with the issue. In short, what the municipality did in that occasion was to react to pressure by ASL/SIAN. The municipality was obliged to come up quickly with some sort of plan and seemed to have been taken by surprise, as suggested by the initial ambiguities on the pilot arsenic removal plant and by the efforts to minimise the issue in the eyes of the public (see Section 5.4.2). Similar reactive dynamics occurred between 2010 and 2012. It was a note from ASL/SIAN to "invite" the municipality to enforce water use restrictions in 2011, as well as to provide alternative safe water supply as an emergency measure and to give information to the population (Section 5.4.3, *Water use restrictions*). Most actions undertaken by the municipality followed notes by ASL/SIAN.

The mainly reactive attitude by the municipality was clearly shown in particular by the emergency measures implemented in the area served by network Lega in 2011 (water trucking and public standposts). Such measures were supposed to provide customers with

safe water supply, as demanded by ASL/SIAN, but they largely failed the objective: first, two water points were not enough to supply the population concerned; second, one of them was very often out of service (Section 5.4.3, *Emergency measures*). Consequently, the impression is that the primary objective of those emergency measures was for the municipality to formally comply with the indications by the regulator: how effective the service was and to what extent people actually used it, seemed to be a secondary concern. At the same time, though, it should be kept in mind that the capacities at the municipality's disposal for water management have limits, as explained in Section 6.1.1, and that the support by upper level institutions in handling the arsenic issue was poor, so it is possible that in fact the municipality did not have the resources to design and to implement a functioning alternative water supply service.

Similar reactive – or defensive - attitude can be found as regards communication to the public: the municipality seemed to have the objective of minimising the issue and of reassuring the population, especially in the early phase (2009), rather than explaining the situation and proposing solutions (Section 5.5.1). As shown by the chronology of the events, communication and information to the public mainly followed instructions by ASL/SIAN. Communication to the customers is discussed in Section 6.2.2.

A more proactive attitude was displayed by the municipality in finding permanent solutions to the arsenic issue (full-scale arsenic removal plant and new water sources). Once faced with the issue, and once the issue could not be further deferred, the municipality certainly had the merit of examining the available options with the support of external consultants and to come up with solutions without waiting for the operational and/or financial inputs by upper level institutions such as the Region (Section 5.4.3, *Long-term measures*). It cannot be denied, though, that generally the reactive attitude was largely predominant over the proactive attitude, and that the arsenic removal plant (Lega) and the new water sources (Fiora) were planned and implemented at the very "last minute", after it became clear that the regulator would have not tolerated further inaction.

6.1.3 Little autonomy from politics

"How do political level and service provision level interact within the municipality?"

The research question about the interaction of political decision making level with technical/management level can be rather simply answered by saying that there is not actual separation between the two.

Section 6.1.1 already emphasised that no autonomous operational structure to manage water services exists in Bracciano. Further, there is no management tier below politicians, so municipal workers often report directly to councillors. On one hand that could be viewed as normal given the relatively small size of Bracciano Municipality as an institution; on the other hand it can be argued that a town with a growing population of 19,000 inhabitants served by a rather complex water supply system would deserve a proper water service management structure.

As a matter of fact, the absence of autonomy of water services from the political level is undeniable. As a result, the weight of political cycles is great and not balanced by any non-political technical/managerial structure. For instance, based on the account by the key informant from the municipality, the change in political majority in term 2002-2007 heavily

impacted on water service management in Bracciano (Section 5.2.3). More generally, water service management in Bracciano is highly exposed to political factors at many levels (Section 5.6). Interestingly, the key informant from the municipality commented: “We absolutely need to establish procedural standards, to be followed disregarding the individual awareness by people who cover this or that position. […] Minimum requirements need to be set, in order to promote goodwill and to limit negligence”. Nonetheless, the key informant did not mention any actual plan to do so, nor mentioned the option of unbinding water services from direct political control, confirming the organisational culture issues highlighted in Section 6.1.1.

6.1.4 A biased debate

“Are there any relations between water provision and electoral consensus?”

Water provision is one of the several services provided by Bracciano Municipality, it is a service covering the whole population, and water services are closely depending on local political decision-making. As a result, it would be expected that service level in water provision has some weight in terms of electoral consensus. The “strategic coincidence” between inauguration of the new arsenic removal plant and municipal elections was mentioned in Section 5.6 and partially confirmed by the key informant from the municipality. If looking at the bigger picture, though, it does not seem that water services are perceived as so important to crucially influence how people vote.

A single mayor has governed Bracciano since 1994 to 2012, except between 2002 and 2007. This mayor has also been recently re-elected in May 2012 with his political majority. Such extensive continuity suggests the growth of a strong “power block” able to hold municipal government for nearly twenty years in a row, and suggests that voters in Bracciano tend to be reluctant to change their voting habits. A range of factors must have determined such situation in time, understanding which is outside the scope of this research.

At the same time, some sort of link between water services and electoral consensus can be found, even if not as obvious as a correlation between service levels and voting preferences. First of all, Bracciano has a history of ineffective billing and of irregular connections. That was certainly a weakness from the point of view of water management (unaccounted-for water). On the other hand, at least some of the customers benefited from such relaxed attitude, having water at their disposal without necessarily paying for it. From their point of view, the municipality’s inefficiency could be seen as an advantage and possibly influence their voting preferences. That would be an instance of vicious circle between low willingness to pay on the customers’ side and low willingness to charge on the service provider’s side, as described in Section 3.3.2.

In more recent times the debate on water management in Bracciano was quite politicised (Section 5.6). The June 2011 referendum results highlighted an overall sense of mistrust by the public towards private sector management of water services, depicted as interested in profit-making instead of in safeguarding customers. Given the referendum results, the municipality was able in a sense to “ride the wave” and to present its efforts not to transfer water service management to the public-private company ACEA as a battle for “water as a public good”.

In addition, it is worth iterating that the municipality of Rome announced in early 2012 its plan to sell to private investors a proportion of its ACEA shares, and that such decision was strongly opposed by a range of political parties and of civil society associations (Section 3.4.2). This confirmed that public opinion is suspicious of private participation in water services, reinforcing in a way the political line by Bracciano Municipality. It is also worth mentioning the efforts made by private firms to profit from the arsenic issue in Bracciano by extensively promoting household level water filtration devices, and how they aroused suspicion among customers, municipality and ASL/SIAN (Section 5.6). The public image of the legal/political battle sustained by the municipality to keep water services in Bracciano as a "public good" probably indirectly benefited from the generally bad impression customers had of such private traders. As a result, a rather schematic and polarised view in which private companies (greedy and distant from the population) are countered by the municipality (protective and close to the population) seemed to be prevalent.

Overall, it seems that the political debate about public vs. private water management, together with the controversy between Bracciano Municipality and Lazio Region about local water service management, ended up overshadowing the debate on the arsenic issue in the eyes of the public. In other terms, the consonance between mainstream public opinion and municipality's political line on water management played a relevant role in consensus-building, much more than the recognised weaknesses shown by the municipality in handling the arsenic issue. In fact there is a link between water service management and electoral consensus in Bracciano: such link is based on a broadly political-ideological platform more than on unbiased evaluation of the water service level provided by the municipality, including the arsenic issue. "Where conflict is rife, or society is polarized, the politician's stance on conflict or polarization may dominate voter attention, allowing the politician to get away with poor performance on other issues" (World Bank, 2004, p.88).

6.1.5 Happy with themselves

"How does the municipality perceive its own role in the course of the events?"

As emerged from the interviews with the key informant and with the informant from the municipality, as well as from public information documents issued by the municipality in recent years, the municipality tends to perceive its own role as generally positive.

As regards water service management in general, a veritable sense of pride emerged from the words of the key informant from the municipality. The key informant utilised the skills and commitment of the qualified municipal workers in charge of O&M as a key argument to justify the battle undertaken by the municipality to keep in-house water service provision. The key informant pointed out that such qualities would hardly be available if a private or public-private company ended up managing water services in Bracciano. Another informant from the municipality was on the same wavelength in saying that any "newcomer" would take some years before mastering the local water system (Section 5.6). Such attitude seems to confirm what was defined as "craftwork approach" in Section 6.1.1, i.e. an approach based on skills and commitment by the individuals rather than on systems, standards and procedures.

As regards the arsenic issue, the key informant from the municipality was honest in admitting that a great deal of delay had occurred, and that it was due to lack of awareness and of sense of responsibility: "It's not a matter of funds, it's a matter of willingness. Funds have been found

now, in the very midst of a financial crisis, and could have been found easily in the past. What counts is first of all the sense of awareness and of responsibility of the administrators". See also Section 5.4.1. It should be noticed in this regard that, even though overall political continuity characterised Bracciano, councillors changed several times, so the statement above should be seen as a criticism of the people who sat in key positions in the past rather than as a self-criticism. Conversely, the key informant commented in very positive terms the results achieved in recent years in tackling the arsenic issue ("We have done very well"; "Winning strategy"), especially emphasising that all actions were undertaken by the municipality in full financial and operational autonomy from the Region. At the same time, the key informant admitted that the role of ASL/SIAN was critical in triggering the initiatives undertaken.

Similar tones were used in official documents by the municipality, such as an information note dated 2011: "The water system in our country has always been a showpiece. We manage our water directly […] thanks to the efforts of our technical staff and thanks to our surveillance technologies" (Comune di Bracciano, 2011c). On one hand it can be considered as normal that the municipality uses such appreciative tones in official documents. On the other hand, it is significant that none of the documents by the municipality contained any self-criticisms on how the arsenic issue was managed, nor any hints to the delays occurred before 2009.

In brief, nothing suggests that the municipality perceives the nearly ten years of delay cumulated in facing the arsenic issue, the failure of water trucking and public standposts, and the ineffective communication to customers (Sections 5.4 and 5.5.1) as any sort of "scandal". Once again, this can be probably explained in the light of the overall attitude displayed by the municipality towards water management and towards the arsenic issue (Section 6.1.1): ability to ensure basic service levels and to react to urgent specific problems seems to suit the ambitions of the municipality in water service management.

6.1.6 Conclusions

Research objective no.1 was to "Identify how and why the municipality - as both service provider and local government – has failed to live up to its obligations towards the customers".

The extent to which the municipality failed to meet its obligations towards the customers was shown mainly in Section 5.4, and can be summarised in four points:

- Long delays in remedial measures
- Unclear derogation regime
- Poor information to customers
- Ineffective short-term measures.

Even though numerous factors determined such failures on the municipality's side, it can be said that the "unreformed" water service management structure in place was the main reason, from which the other factors derive. Knowing how water services are managed in Bracciano, the organisational structure and culture as well as the available capacities do not seem adequate to respond to criteria of efficacy and effectiveness, thus to cope adequately with the arsenic issue. In addition, the fact that no "contract-based" accountability exists decreases the potential degree of control water services undergo.

The vacuum in the organisational structure between O&M on one side and the political level on the other determines a significant management gap. The gap is even bigger knowing that no dedicated water service department exists. Given those systemic weaknesses, it should not raise great surprise that the municipality was not able to deal with the issue promptly and systematically. The impression is that the existing organisational structure and culture do not match up with the degree of responsibility that management of water resources and supply for a growing population of 19,000 involves.

In summary, Bracciano water services are managed through an unreformed institution, where management is closely dominated by political cycles and by political decision-making, where unbiased service level evaluation is overshadowed by the overall political discourse, and where non-political management level is very poor if not inexistent. Given such premises, it is plausible that municipality's reactive attitude (Section 6.1.2) was essentially the only one the municipality had the capacity to display in relation to the arsenic issue. Therefore it can be concluded that the systemic weaknesses in water management in Bracciano largely determined the weaknesses in addressing the arsenic issue. In fact, it is indeed remarkable that the municipality was eventually able to get itself out of trouble and to implement solutions that are likely to solve the arsenic issue in the whole municipal territory before the end of 2012.

6.2 Research Objective 2: The Customers

6.2.1 No client power

"What instruments do customers have to require accountability?"

Customers of water services can be viewed as the main right-bearers: "Customers should have a clear legal right to service of a specified standard, at a specified price, and […] should have a way to hold the utility accountable if it does not deliver" (World Bank, 2006, p.143). The service provider should be accountable to customers as clients of water services: customers bear "client power". See Sections 3.3 and 4.4.

In the case of Bracciano, as it often happens when water services are managed in-house by the public sector, the "client power" accountability route is poor or missing. That is demonstrated by the fact that no water service charter seems to be in place, as confirmed by the key informant from the municipality. The absence of a service charter can be seen as seriously compromising customers' control vis-à-vis the service provider. Additionally, none of the customers interviewed referred to water services as a structure detached from the main municipal structure. All customers referred to "the municipality" to designate both the body in charge of water service provision and the local government, without any distinction (Section 5.5). This should not be interpreted as lack of awareness on the customers' side but as a picture of the actual situation, as explained in Section 6.1.1.

The only hint to a client-like relationship between customers and municipality is represented by the municipal public relations desk, which allows people to submit queries and complaints to the municipality. The Desk is not dedicated to water services though, rather covering the whole range of services provided by the municipality. In addition, some of the customers interviewed mentioned they contacted the Desk but without receiving significant assistance. As a result, most of the customers interviewed who were interested in getting answers and

information were obliged to bypass the public relation desk and to contact councillors or municipal employees through personal channels. Once again, the weight shifted from a client - provider relationship towards a citizen - government one.

Due to the lack of client power, the only accountability route customers have is “voice”, i.e. the power customers have towards the local government, which can be exerted via both formal channels (elections) and informal channels (campaigning, advocacy, lobbying). This is called “long route accountability” since it represents a complex and indirect way customers have to try to control service provision (Section 4.3). As a result of the identification of water service provider and local government, “voice” is the only accountability tool customers have in Bracciano.

In this respect it is worth emphasising that customers in Bracciano enjoy all the civil rights people enjoy in an advanced democracy: not only freedom of vote, but also freedom of speech and freedom of association. That means customers have instruments to “raise their voice” not only when it comes to local elections but also through awareness-rising and public debate. It is equally important to underline, though, that no organised protest took place in Bracciano regarding the arsenic issue even in the period when the issue was of public domain (Section 5.5). No committee was formed, even in the area served by network Lega, and existing civil society associations did not seem to incorporate the arsenic issue as a key point in their agenda. Customers had “voice”, but as a matter of fact they did not make any use of it. The likely reasons of such substantial inaction/passivity on the customers’ side will be explained in Sections 6.2.2 to 6.2.6.

6.2.2 Inadequate information

“Have customers received adequate information about the arsenic issue?”

The importance of thorough and transparent information to customers could not be overestimated. “Information is power” (World Bank, 2004, p.56) means that receiving adequate information is the first step for customers to be aware of their rights and to require accountability from the service provider and/or local government. See Section 3.3.2.

It appears that no information at all was given to customers about the arsenic issue and about the derogation regime in Bracciano in the years 2001-2008. As explained in Section 5.4.1, the derogation regime Bracciano enjoyed before 2009 is not clear. In any case, public information concerning that period can be considered as very poor: if Bracciano was correctly covered by derogations, then no information was given to the population about the derogation regime, in contrast with the European and Italian legislation (Sections 3.1.6 and 3.1.7). If Bracciano was not covered by derogation, then water use restrictions should have been issued and publicised, which did not happen either. It is worth emphasising though that municipalities are not the only institutions in charge of public information, as described in Section 3.1.7, and that the attitude by ASL/SIAN can play an important role on how public information is conducted.

The first public communications on the arsenic issue dated 2009. Chronological account of the main public communications published was given in Sections 5.4.2, 5.4.3 and 5.5.1. In the light of the public communication documents analysed and in the light of the accounts given by the customers and by key informants interviewed, substantial criticalities need to be highlighted on quality and quantity of information received by customers.

First of all, overall information tended not to be very transparent. An account of the situation in the years 2001-2008 was never given to the population, even when the arsenic issue was of public domain. Significantly, none of the communications analysed mentioned that the European legislation on the issue dated 1998 and the Italian legislation 2001, nor how the derogation mechanism works and what the duties of the different stakeholders are. Many times customers were told that water use restrictions were issued based on a "precautionary principle" (e.g. Comune di Bracciano, 2009b and 2009e) but the rationale of the precautionary principle was never defined. Derogations were mentioned for instance in Comune di Bracciano (2011c) and ASL Roma F (2011), but no explanations were given about on what basis derogations were requested and accorded, by what institution(s), and what those derogations entailed in terms of rights and duties of the different stakeholders. Public communication tended to be vague and not factual, except when specific achievements were announced to the public, such as in the case of the arsenic removal plant (Comune di Bracciano, 2012).

Similarly, information to the customers was always fragmentary. Letters were sent to customers, posters put up in the streets and documents made available on the municipality website, but no comprehensive report addressed to the population was released. The only official information the population received was represented by piecemeal communications issued by the municipality and/or by ASL/SIAN.

Moreover, the information provided to customers tended to be contradictory in many occasions and on many regards. Comune di Bracciano (2009b) and Comune di Bracciano (2011c) gave contradictory hints about the derogation regime. The pilot arsenic removal plant was initially presented as a permanent solution, when in fact it wasn't (Comune di Bracciano, 2009d). Rules for food processing establishments were never fully clarified (Comune di Bracciano, 2011a; ASL Roma F, 2011; Comune di Bracciano, 2011e). Other instances of such contradictions can be found in Sections 5.4 and 5.5.

Additionally, and by recognition by the key informant from the municipality, the strategy by the municipality involved efforts to reassure the population. In practical terms, especially at early stages, public communications clearly tried to minimise the issue, such as in Comune di Bracciano (2009b and 2009g). As noticed by one of the customers interviewed, communication style sounded slightly reticent. See also Section 5.4.2.

Finally, some sort of political bias emerged from some public communication documents, such as self-appreciative expressions: "Arsenic has been for us a matter of conscience since 2009. [This is evidence] of the seriousness with which we have dealt with the issue" (Comune di Bracciano, 2011c). Other documents on the arsenic issue contained hints to political points not directly related to the arsenic issue such as: "Bracciano Municipality […] considers keeping water a public good as one of its binding principles" (Comune di Bracciano, 2012).

Annex five reproduces the literal English translation and graphic layout of a poster published by the municipality (Comune di Bracciano, 2009g). The document, undated, most probably was issued in 2009 according to the order it was published in the municipality website. Such poster exemplifies many of the weaknesses reported above:

- Unclear and contradictory messages: "Considering the importance of *safeguarding health*, [the Ordinance] prohibits drinking use of water […]. Anyhow […] there are *no significant reasons of danger* to population's health […]".

- No factual information: “Arsenic and fluoride concentrations exceeding *the parameters* defined by the European Directive 98/83”. What the parametric limits were and how much they were exceeded it was not said.
- Minimisation of the issue: “*No dangers* but only caution”; “A *precaution*”; “No *significant* reasons of danger”. That made it difficult to understand why drinking water use was prohibited since there was no actual health risk involved.
- Deceptive promises: “We count on *re-establishing soon* full compliance with the parameters”. That suggested that non-compliance was just a temporary condition and that a quick fix would solve the issue, which was not a truthful representation of reality.

Therefore it can be said customers received insufficient information on the arsenic issue: promptness, transparency, consistency, completeness and objectivity were points of weakness. Confirming such analysis, most of the customers interviewed showed not to have sufficiently accurate knowledge of basic facts. Each of the customers interviewed by the author gave a different account of the facts, and many of them had been obliged to proactively search for information through formal or informal channels, which anyhow did not necessary help to clarify key points (Section 5.5.1).

6.2.3 Limited functionality and limited use

“Did customers use the public standposts? Why?”

The public standpost solution was not effective enough to provide alternative water supply to the population living in the area served by network Lega. The little number of standposts (two) in comparison with the population concerned (3,500), together with the fact that at least one of the standposts was very often out of service undermined the service efficacy. See Sections 5.4.3, *Emergency measures* and 5.5.2. The widespread habit of drinking bottled water represented an additional limit to the importance of water trucking first and of public standposts then. For one reason or another, none of the customers interviewed had the habit of drinking tap water from before the arsenic issue, in line with countrywide trends (Cittadinanzattiva, 2011, p.14). This factor of course limited the actual demand on public standposts.

Some of the customers, although aware of water use restrictions, just ignored them and continued cooking with tap water as before: water use restrictions did not change their water use habits, so they did not consider public standposts. Therefore, they did not use public tanks and standposts simply because they did not retain to follow water use restrictions. Other customers, aware of the water use restrictions enforced but finding that public standposts were not functioning, ended up putting in place coping strategies: water collection from public fountains or from relatives in Bracciano centre or in other locations, or using bottled water for all drinking and cooking. More detailed explanations are given in Section 6.2.4 below.

Overall, it can be said that the limited functionality of public standposts, together with lack of interest by part of the population concerned, determined that not very large use could be made of them.

6.2.4 Not a decisive issue

“Do customers perceive the issue as important?”

This point is closely related to the previous one, as the behaviours people observed relatively to the water use restrictions and to the public standposts were related to how they perceived the arsenic issue.

The reasons why some customers followed water use restrictions and some did not, were numerous and varied. At any rate, apart from specific cases (a young mother with her new-born baby; people with peculiar physical conditions), it did not seem customers considered the arsenic issue as crucial in their lives. It seems their level of stress and concern about the issue was generally limited, within a wide range of individual perceptions. The message (iterated several times by the municipality and by ASL/SIAN) that the presence of arsenic in water was due to “natural” factors and not to man-made pollution seemed to partially reassure many of the interviewees. See Section 5.5.2.

Even among the customers who showed awareness and concern, adaptation was the main reaction to the arsenic issue. Each household found its own way, according to their sensitivity and practical options. The impression is that, once households found their own coping strategies to get safe water supply, such strategies quite quickly became integral part of their everyday habits without too much emphasis. The customers interviewed did not show to be particularly stressed, shocked or surprised by the situation. They described the problems encountered and how they coped with them with a sense of quiet resignation, as if adapting to the situation was the natural thing to do more than demanding prompt solutions.

It is relevant to underline, in this regard, that any right-based discourse was largely absent from customers’ accounts. Only one of the interviewees described the matter in terms of service provider’s duties and of customers’ rights. Even that interviewee, though, did not develop such approach into a structured view (Section 5.5.3). In general, essentially nobody seemed to view the issue in terms of failure of the municipality to live up to its duties and in terms of rights of customers to accountability. The consideration of customers as right-bearers, and the consideration that customers’ rights might have been infringed in the way the arsenic issue was handled through the years, did not appear to be part of the mainstream vocabulary.

That probably explains why no organised protest took place, and casts light on the information issue: the institutions continued not providing adequate information to customers also because they were not pressurised into doing so by any local group of interest. In turn customers, not having enough information, were not aware of the issue thoroughly enough to be motivated to act collectively. Such vicious circle seems to confirm the difficulties related to information in customers’ “voice”: “Politicians seldom create information about outputs and outcomes. Individuals know about the quality of the services they confront, but they have a difficult time translating that knowledge into public power” (World Bank, 2004, p.56).

Additionally, the polarisation and politicisation of the local debate (Sections 5.6 and 6.1.4), together with the stringent social, political and economic issues Italy is facing at present (Section 2.1.1), can be viewed as decreasing customers’ attention on the arsenic issue. In other words, the polarisation of public debate discouraged any dispassionate approach on the arsenic issue. At the same time, other problems people were confronted with might just be

perceived as more important, and the arsenic issue ended up being downgraded from the priority list. As a result, customers generally retained the issue important up to a point, but not as something that heavily impacted on their lives, and not decisively enough to push them to undertake any collective action.

6.2.5 Customers not unsatisfied

"How do customers perceive the actions undertaken by the municipality?"

As described especially in Section 5.5.3, customers tended not to be dismissive of the role played by the municipality in the arsenic issue, even though many different points of view emerged from the interviews.

At first sight, that might seem at odds with the objective weaknesses in the municipality's action analysed in Section 6.1, some of which were emphasised by the customers themselves during the interviews (Section 5.5). Once put in context, though, customers' relative satisfaction with the municipality's action does not appear so surprising.

First of all, the lack of information customers received regarding the years 2001-2008 can be seen as a key factor. The customers interviewed tended to believe the arsenic issue originated from a sudden and inexplicable change in European regulation in the late 2000s, and that in the space of three years the municipality was able to take action and to ensure compliance. In this sense it is understandable why people tended to be satisfied with the municipality's action.

Secondly, as explained particularly in Section 6.1.4, the debate on the arsenic issue tended to be biased by national and local political matters and to assume quite marked political overtones. It would not be easy for a person in Bracciano to be sympathetic to municipality's political line on "water as public good" and at the same time critical of the municipality on the arsenic issue. People have been implicitly pushed to take side: either with "water as a public good" or with private investors. Either with the no-profit water management by Bracciano Municipality of with the profit-oriented management by the "outsider" company ACEA. Moreover, it should not be forgotten that essentially the same political majority has governed Bracciano for nearly twenty years in a row, demonstrating great ability in building and keeping consensus.

Third, the general electoral consensus enjoyed by the political majority governing Bracciano does not necessarily mean that people are enthusiastic and that they have great expectations. On the contrary - as pointed out in Section 5.5.3 - a generalised sense of disenchantment towards the institutions emerged from most of the interviews with customers, as if the degree of expectations they had was not very high indeed. Together with disenchantment, most interviewees showed a certain level of tolerance towards the municipality, mentioning bureaucracy and procedures as well-known barriers to efficiency, and suggesting them as "extenuating circumstances" to be granted to the municipality. Eventually the municipality did something tangible and effective to solve the arsenic issue: that seemed enough for many interviewees to be satisfied and to prevent them from questioning any further.

All such elements (poor information, polarised political debate, disenchantment) cast light on customers' views on the actions undertaken by the municipality. Given such background, it becomes understandable why most customers, though pointing out some specific flaws,

defined themselves as rather satisfied of how the arsenic issue had been handled by the municipality.

6.2.6 Conclusions

Research objective no.2 was to "Identify the reasons why customers lack "voice" in requiring accountability: in demanding their right to a safe water supply and in requiring prompt responses".

The research showed that the "voice" of water service customers in Bracciano was weak and had little or no influence on the arsenic issue. Customers seemed to never play the role of interlocutor of the institutions. By not using their "voice", by not requiring accountability, they ended up being "silent stakeholders", to use an expression by Batley & Larbi (2004, p.65).

The factors weakening customers' voice in the arsenic issue were numerous and varied. To begin with, the simplest or "short" route of accountability is denied to customers in Bracciano: an autonomous water service provision structure is not in place, so customers do not have "client power". The only ways customers have to require accountability from the municipality are the ones they have as citizens, which represent the "long route" of accountability. Such type of accountability, though, is prone to political interference and bias, as happened in Bracciano. In this sense, the entanglement of different political themes with the arsenic issue and the politicisation/polarisation of the public debate deserve to be emphasised: it seems little room was eventually left in Bracciano for dispassionate public debate on the arsenic issue.

Moreover, as mentioned in Section 2.1.1, the social, political and institutional climate has been rather tense in Italy in recent years. Therefore it can be supposed that only very strong messages are able to trigger reactions by the population, while more nuanced and politically neutral issues draw public attention only to a limited extent. In this sense customers did not "raise their voice" on the arsenic issue probably also because they were already exposed to much more noisy and polarised battles. On top of it, it is interesting to notice that a rights-based understanding was largely absent from the accounts given by the customers interviewed, and that the overall level of expectations did not seem very high, in a quite disenchanted consideration of the institutions. In this sense satisfying the customers might not be very difficult, since they do not demand much.

A further element hindering customers' voice was that they actually never received adequate information from the institutions about the arsenic issue. It is difficult to develop awareness, to put forward any proposals and to carry out any actions if exhaustive and transparent information is not available in the first place. Nonetheless, the analysis needs to be bidirectional. On one hand customers did not develop great awareness (and did not take action) because institutions did not give them adequate information. On the other hand, institutions did not give them adequate information because customers – for matters of mentality, habits and attitude in public life – were unable/unwilling to push the institutions to do so.

Therefore, describing customers merely as "victims" of systemic failures on the institutions' side would not be a truthful representation of reality: customers' voice was silenced also by their own inability to develop collective awareness of the situation and to challenge the institutions consequently.

6.3 Research Objective 3: The Regulator

6.3.1 Fragmented regulation

“Are regulatory tasks clearly defined and divided among the different authorities?”

The regulatory regime of water services in Italy is complex and fragmented, as the overall water governance system is. Section 3.4 described the regulating authorities delineated by Galli Law in 1994, and Chapter five described how in practice regulatory powers were administered in the case of Bracciano with regard to the arsenic issue.

Overall, the research found a number of authorities or institutions with regulatory powers with regard to water management:

- Ministry of Health (in cooperation with the Ministry of Environment): It is in charge of setting technical procedures of water analysis. The MoH played a central role in the derogation system Italy enjoyed since 2004 by authorising Regions to concede derogations to different water supply zones, and by negotiating the third derogation period with the European Commission.
- Istituto Superiore di Sanità: As the technical and scientific body of the MoH, it is in charge of technical guidance and advice. As regards the arsenic issue, it published an Information Note in November 2010, providing guidance for local ASLs. That had a strong impact on the events in Bracciano.
- COMVIRI: Technical-political national authority set by Galli Law. It is in charge of monitoring water sector governance countrywide, with a focus on efficiency, efficacy and economic criteria. It includes monitoring on tariffs and on customers’ rights. COMVIRI though was not found to have any role in the arsenic issue in the case study.
- ARPAs: In charge of environmental protection at region level, they have various tasks. With regards to water provision, ARPAs are in charge of conducting water quality tests on samples provided by the local ASLs and to transfer results back to the respective ASLs. Therefore, water samples from Bracciano are analysed by ARPA Lazio.
- Regional Conferences of Users and Consumers of the Integrated Water Service: Consultative councils made up of representatives of consumers’ associations. They are chaired by the Regional Supervisors of the Integrated Water Service, officers in charge of safeguarding water service customers’ rights but designated by the Governor of the Region. The Regional Conference does not seem to have had any actual weight in the arsenic issue in Lazio.
- ATO Authorities: Set through an update of Galli Law, they are made up of the representatives of the municipalities belonging to the ATOs and are supposed to be the main local regulating authorities. Their rulings include controls and directions on asset management, infrastructure planning, contracts/agreements and tariffs. The local ATO Authority had no weight in how the arsenic issue was managed in Bracciano, probably due to the “anti-ATO” policy carried out by the municipality. ATOs (as well as ATO Authorities) are planned to be reabsorbed by Regions in order to reduce public expenditure.

- TARs (Administrative Regional Courts). TARs are not regulatory bodies: they are organs of administrative jurisdiction present in every Italian Region, competent to judge on appeals against administrative acts. TARs' attributions are not specific to water management and services but cover many different topics. At any rate, TARs represent a sort of "last option" at people's disposal against administrative acts. TAR Lazio as a matter of fact was the only institution clearly defending customers' rights in the course of the arsenic issue (Section 5.1.5).
- Regions. Regional governments have a wide range of powers in many domains. As regards the focus of this research, Decreto Legislativo 2 febbraio 2001 n.31 (the Italian law corresponding to Directive EC 98/83) stated Regions were in charge of conceding derogations to the water supply zones applying for them, in compliance with directions coming from the MoH. In this sense regions played a regulation role. In addition, the law gave Regions the responsibility of providing emergency water supply when needed and to take over from water service providers if they proved unable to provide adequate services. Finally, Regions were given the task to ensure populations were provided with information and guidance. In practice, as emerged from the research, Lazio Region did not accomplish such task directly: it seems local ASLs were delegated to communication to the population in conjunction with municipalities.
- ASL/SIAN: ASLs are local health authorities. SIANs are ASL departments in charge of Hygiene, Food and Nutrition: as such, the local SIAN ended up being the regulating body the closest to Bracciano. ASL/SIAN is in charge of conducting regular water quality monitoring, and of communicating the results to water service providers and/or to municipalities. Additionally, it gives directions to municipalities on public health issues as well as on information and guidance to population. It can determine administrative sanctions and report to judicial authorities in case of non-compliance by service providers / municipalities.

It does not seem that such regulatory system is always able to provide adequate regulation on water service provision. The actual inefficacy of the national authority COMVIRI is already documented in the literature (Lippi et al., 2008, p. p.634), and the complex and fragmented structure of the whole system is not likely to help performance. In addition, calling it a "system" would be somewhat inappropriate, since tasks and responsibilities do not seem to be coordinated and the various institutions do not seem to be complementary. The numerous modifications to the legal framework (described in Section 3.4.2) probably contributed to such unclear situation.

In particular, while water quality and public health issues are rather clearly monitored and regulated (by Ministry of Health, Istituto Superiore di Sanità, ASL/SIAN), it is not very clear who regulates investment plans, asset management and water resources management. The weakness of ATO Authorities highlighted by Lippi (2008, p.630-631) doubtless plays a role in the weakness on that side of regulation. Additionally, it does not seem that customers' rights are adequately recognised and protected. Regional Conferences of Users and Consumers of the Integrated Water Service do not seem to respond to criteria of political independence and, as consultative bodies, they do not bear decision-making power. TARs have substantial powers, but they belong to the judicial and not to the regulatory domain. Appealing to TAR can be expensive and extremely time demanding for an individual, and the role of CODACONS in the appeal on 2011 was decisive (Section 5.1.5). Generally, apart from TARs (which are not regulators) hardly any of the institutions listed above seem to fully respond to criteria of independence and autonomy.

The overall inefficacy of such system was broadly confirmed in the case of Bracciano, where the only regulating body the municipality interacted with was the local ASL/SIAN. Lazio Region was mentioned by key informants only in relation to allegedly politically-biased decision making, which at any rate had significant impact on the course of the events (Section 5.4.2). The other regulatory bodies listed above did not seem to have any role and impact on the arsenic issue in Bracciano.

6.3.2 Substantial powers

"What powers has the regulator vis-à-vis the municipality (as service provider and as local government)?"

The local ASL/SIAN is the regulatory body the research focused on, as the only regulatory body which showed direct relevance to the management of the arsenic issue in Bracciano.

It is necessary to specify that, even though ASL/SIAN is generally defined as "the regulator" in this research, such definition is to a certain extent imprecise. ASL/SIAN in fact is not an independent authority but a local branch of the national health system, which is governed by the Ministry of Health at national level and by Regional governments at regional level. In this sense ASL/SIAN is not autonomous from other institutions, bears a number of different tasks, and is not safeguarded from external (political) direction. Strictly speaking, ASL/SIAN probably could not be considered as having the statutory and actual independence, public accountability, mandate and resources that regulatory functions require (Section 3.3.3). Nevertheless, given the reality of the case study and knowing the overall picture of the regulatory system highlighted in Section 6.3.1, the local ASL/SIAN can be identified as the body that most resembles a regulatory authority in the local context. For this reason, and for brevity, ASL/SIAN is called "the regulator".

As emerged in Section 5.4, the powers of ASL/SIAN vis-à-vis municipalities are actually substantial. In the first place, local ASLs have the power to give instructions to municipalities on the public health measures to undertake. In case of non-compliance with such instructions, ASLs can make provisions for administrative sanctions, and report to the judicial authorities if needed. In such terms the role of ASL/SIAN was described by the key informant from ASL/SIAN and confirmed by the key informant from the municipality and by documentary sources (e.g. Section 5.4.3, *Water use restrictions*). Therefore, it can be said that the local ASL/SIAN has adequate powers to play an influential regulating role vis-à-vis Bracciano Municipality. How such role was played along the years is analysed in Section 6.3.3 below.

6.3.3 Inconsistent enforcement

"What were the actions undertaken by the regulator?"

The fact that ASL/SIAN has substantial powers vis-à-vis the municipality does not mean that those powers were always consistently enforced. On the contrary, ASL/SIAN's attitude changed quite abruptly at times, determining different degrees of pressure on the municipality, and as a result, determining different reactions by the municipality.

In the years 2001-2008, ASL/SIAN applied its powers very mildly. ASL/SIAN was essentially inactive in the years 2001-2008, which allowed Bracciano Municipality to ignore the limit of

10µg/l on arsenic concentrations in drinking water. It is worth iterating though that ASL/SIAN is controlled by the Regional government, so the responsibilities of the regulatory failure in 2001-2008 should be shared between ASL/SIAN and Lazio Region (Section 5.4.1).

The importance of the steering role by the Region emerged in 2009, when – as stated by the key informant from ASL/SIAN – a change in attitude at regional level determined a change in attitude by ASL/SIAN and resulted in Bracciano Municipality taking action (Section 5.4.2). What determined the change of attitude by Lazio Region was not clarified during the research, and was not strictly relevant to the research objectives. It is plausible that, knowing that the end of the second national derogation period was approaching, the Region meant to clarify once and for all the situation in the various local municipalities. It is also plausible that the Region wanted to shift the responsibility for the delays down to municipalities and to service providers, in order to show that delays were not due to weaknesses in regulatory action. At the same time, it is possible to imagine an increased pressure by the central government on Regional governments, knowing that the Italian government needed to account to the European Commission in order to obtain a third derogation. All these hypotheses presuppose strong political interference in the regulatory regime, which was confirmed in Section 5.4.2, *Changes in regulator's attitude*. Investigating that sort of dynamics, though, is beyond the scope of this research.

The actions undertaken by ASL/SIAN as regulator between 2009 and 2012 were described in Sections 5.4.2 and 5.4.3. Starting 2009, as pointed out by the key informant from ASL/SIAN, the pressure they put on the municipality was "heavy". The actions undertaken can be categorised as follows:

- Water quality testing. Water quality testing was regularly done by ASL/SIAN, at least starting 2008. That included arsenic. According to the key informant from ASL/SIAN results were sent to the municipality every time one or more parameters did not comply with regulations, but interestingly none of the arsenic tests conducted by ASL/SIAN were found by the author in the data set from the municipality (Section 5.3).
- Water use restrictions and public health indications. ASL/SIAN imposed Bracciano Municipality to enforce water use restrictions starting mid-2009. Particularly marked was the role of ASL/SIAN starting early 2011 when, following the derogation denied by the European Community and the indications by Istituto Superiore di Sanità, ASL/SIAN prescribed very precise restrictions in Bracciano, especially in the area served by network Lega. At the same time, ASL/SIAN took a steering role as regards public health indications. The key informant from ASL/SIAN summarised: "We tell mayors what to do as public health measures".
- Information to the population. ASL/SIAN pressurised the municipality to adequately publicise water use restrictions and public health recommendations, suggesting key messages to transmit to the population. See for instance Comune di Bracciano (2009e). To a limited extent, ASl/SIAN issued communications to the public independently from the municipality (e.g. ASL Roma F, 2011).
- Emergency measures. ASL/SIAN played a decisive role in 2011 in prompting Bracciano Municipality to put in place an alternative supply of safe water, i.e. public water tanks and standposts in the area served by network Lega (Section 5.4.3).

Overall, it can be observed the regulator's attitude evolved along the years, from a very "relaxed" attitude in 2001-2008, to a stricter attitude in 2009-2010, to a close control and steering of the municipality in 2011 (i.e. after the decision by the European Community not to

concede derogations above 20µg/l of arsenic). Initiatives by ASL/SIAN triggered most of the actions by Bracciano Municipality: that was defined “reactive attitude” in Section 6.1.2.

Besides, a certain degree of ambiguity characterised ASL/SIAN positions also in recent years. ASL/SIAN “invited” the municipality to implement alternative water supply measures in 2011, but apparently did not monitor the efficacy of such measures, which as a matter of fact were insufficient to supply the targeted population. In the same period, ASL/SIAN let the directives concerning food processing establishments to be vague and contradictory. That was done quite deliberately, as recognised by the key informant from ASL/SIAN (Section 5.4.3, *Water use restrictions*). In addition, ASL/SIAN stated in a public communication in 2011 (ASL Roma F, 2011) that average arsenic concentrations in drinking water in Bracciano were 18µg/l and thus invited to follow the water use restrictions indicated for arsenic levels below 20µg/l, but – based on available data - arsenic concentrations in network Lega were still quite higher than 20µg/l at that time, so stricter restrictions should have applied (Section 5.4.3, *Water use restrictions*).

In summary, the substantial powers at ASL/SIAN’s disposal (Section 6.3.2) were not enforced consistently along the years. Moreover, those powers were not always transparently enforced: the rationale behind ASL/SIAN’s decisions and initiatives vis-à-vis the municipality was not explained and made fully comprehensible to the municipality as well as to the public. It can be said that such regulatory instability directly contributed to the delays and inefficiencies by the municipality in handling the arsenic issue, as well as to the lack of information received by customers.

6.3.4 A pragmatic view

“How does the regulator perceive its own role in the course of the events?”

The interview conducted with the key informant from ASL/SIAN, some passages of which were quoted all through Chapter five, was decisive to understand the perception the regulator has of its action through the years as regards the arsenic issue. The key informant did not always answer the author’s questions directly and thoroughly, and preferred not to share all relevant personal opinions. In addition, the territory of the local ASL/SIAN covering several municipalities, the informant’s views tended to be more general than focused on Bracciano. All that, however, did not diminish the relevance to the key informant’s account.

The key informant, somewhat confirming the analysis in Section 6.3.3 and explaining the facts described in Chapter five, showed a pragmatic and disillusioned attitude, at the same time displaying a certain sense of commitment and “fighting spirit”.

The key informant recognised that the change in attitude towards the arsenic issue in 2009 originated from the Region, and that up to that moment the role of ASL/SIAN was limited to sending some “mild warnings” to the municipality. Upon pressure by the Region, those warning became “heavy” in 2009. The difference between “mild” and “heavy” warnings was not specified, but it seems reasonable to suppose that “mild” warnings were issued as mere formalities, while “heavy” warnings required follow-up by the recipient. At any rate, the key informant openly recognised the top-down relationship between political direction (Region) and regulation enforcement (ASL/SIAN).

In general, the key informant from ASL/SIAN was fully aware of the structural limits of the institutions involved in the arsenic issue. Apart from municipalities, the key informant maintained that ARPA Lazio is understaffed, and gave a quite crude picture of Lazio Region: "People who sit at the Region often are not aware of the issues we face in the field. […] Massive use of consultants has been made in the public administration, often with nepotism and political exchange dynamics involved. Not all consultants are as competent as they are supposed to be. Besides, existing capacities are rather underexploited. All this gives you a flavour of the present situation, not only concerning water quality issues".

Given such framework, the main point the key informant showed to be genuinely disappointed about was public communication, explicitly defining it as "unsatisfactory", blaming the lack of a dedicated budget at ASL's disposal for public information and poor municipal budgets. The key informant did not seem to regret about any other specific points in particular or about the role played by ASL/SIAN in general, including the inaction in the years 2001-2008. The informant's awareness of the scientific uncertainties about health risks at low arsenic exposures seemed to carry some weight: "We can say that arsenic concentrations in water supplies in this area do *not* really represent a public health issue. On the other hand, the law prescribes levels below 10µg/l and such prescription must be enforced" (Section 5.4.2). Therefore it seems the key informant considered the regulations on arsenic levels as important but not crucial from a public health perspective.

As suggested above, an overall sense of pragmatism emerged, together with a quite disenchanted view about the regulatory system and a substantial distrust of decision making processes happening at Region level. Given such framework, on balance the key informant from ASL/SIAN seemed to suggest that there was not much ASL/SIAN could have done quicker and better.

6.3.5 Conclusions

Research objective no.3 was to "understand the regulatory regime during the years elapsed, and to what extent it had an impact on the service provider's performances".

First of all, it is important to emphasise that ASL/SIAN, as a branch of the national health system and as an organ under the direction of the Region, can be defined as a "quasi-regulator" rather than as a proper regulator: the degree of autonomy, independence and public accountability of ASL/SIAN is limited, in contrast with basic regulation requirements (Sections 6.3.2 and 3.3.3). At any rate, ASL/SIAN displayed substantial regulatory powers vis-à-vis Bracciano Municipality, as a matter of fact acting as a regulator in the years taken into account in the research.

The impact of ASL/SIAN on the municipality's performance as water service provider was substantial, for better or worse (Sections 5.4, 6.1.2 and 6.3.3). In this sense it can be said that, even during the inactive years 2001-2008, ASL/SIAN had an impact on the municipality: if Bracciano Municipality essentially ignored the regulation on arsenic concentrations, it was essentially because ASL/SIAN allowed that. ASL/SIAN's role in those years was important not for what it did but for what it did not. At the same time a relevant share of responsibility can be shifted towards the Region, since the Region "lays down the law" to ASL/SIAN and, indirectly, to Bracciano Municipality. ASL/SIAN exerted its powers more strictly in 2009-2012, though still with a certain level of inconsistency (Section 6.3.3)

It is worth highlighting at this stage that ASL/SIAN, though not independent from the Region, is independent from the municipality. In other words, ASL/SIAN is not autonomous from political directions coming from upper hierarchical levels, but seems to be autonomous from the institutions upon which it exerts regulatory powers. No conflicts of interest could be found between ASL/SIAN and municipality, which allowed a seemingly open and frank regulator/regulated relationship between the two institutions, at least since 2009. Even though the situation before 2009 was definitely more ambiguous and difficult to investigate, the research could not find any conflict of interest or any "gentlemen's agreement" between ASL/SIAN and Bracciano Municipality as a cause of the inactivity by both the regulator and the regulated. Though lack of motivation to take action could be found both on ASL/SIAN's side and on municipality's side before 2009, nothing indicated any explicit complicity between them to do so. In this sense at least, ASL/SIAN can be viewed as an independent regulatory body.

Considering the whole timeframe of the research, it is undeniable that the action by ASL/SIAN showed many weaknesses, if evaluated in the light of very general principles of regulation (Section 3.3.3). If the Five Principles of Good Regulation are taken as a reference (Better Regulation Commission, 2000), it can be said that ASL/SIAN acted poorly as regards accountability to the public, consistency and transparency. In terms of the conceptual framework defined in Section 4.3, it can be said that ASL/SIAN was not always able to ensure that the water service provider (i.e. the municipality) lived up to its obligations towards the customers in terms of service level.

It needs to be emphasised that ASL/SIAN is essentially a public health organ, and it does not seem to have any powers of control on the water system functionality. If the case of public standposts is taken as an example, ASL/SIAN had the power of prompting the municipality to provide alternative water supply and of formally checking if that was done, but it does not seem ASL/SIAN was in charge of verifying how and to what extent the system was actually functioning. As highlighted in Section 6.3.1, such aspect of regulation on water services seems to be particularly poor in Italy overall. In addition, considering the conceptual framework in Section 4.4, it should be noticed that ASL/SIAN is not in charge of regulating the relationship of "voice" between customers and municipality if not, quite indirectly, by ensuring that municipality informs the population about water use restrictions and public health measures. In fact TAR can be seen as having a regulatory role upon the relationship between citizens and public administration – not by chance TAR Lazio was involved in the arsenic issue in 2011-2012 – but at the same time TAR is a judicial body and not a regulator (Section 6.3.1), and as a matter of fact Bracciano Municipality was not affected in the sentence by TAR Lazio (Section 5.1.5).

In brief, the research showed that the whole regulatory framework in Italy is rather fragmented, unstructured, non-transparent, and non-independent from governmental politics both at national and at regional level. Such systemic weaknesses tend to be reflected in how regulation works "in the field", as the study of the events in Bracciano confirmed. The regulatory action of ASL/SIAN on the municipality should be viewed in the light of such bigger picture, and evaluated accordingly.

In this sense, merely depicting ASL/SIAN as an inadequate regulator would not do it justice. If it is true that the municipality has been mostly reactive to ASL/SIAN's initiatives (Section 6.1.2), then ASL/SIAN's role should not be neglected, and the efficacy of its action should not be dismissed. In fact, if the weaknesses of the overall regulatory framework are kept in mind,

and if the attention is focused on the effects of ASL/SIAN's regulatory action on Bracciano Municipality, it should be recognised that ASL/SIAN operated with a certain level of pragmatism: ASL/SIAN can be seen as "stinging" Bracciano Municipality into action, prompting it to gradually transition from inaction to action and to solutions. Undeniable improvements have been made in 2009-2012 as regards the arsenic issue in Bracciano, and the role of ASL/SIAN in that should not be denied. It might well be the case that the only means ASL/SIAN had to achieve any objectives was to act in a tactical and discreet manner, in full awareness of the actual regulatory framework and of the existing power balances, and that operating quicker and better would not have been a realistic objective. In this sense ASL/SIAN's attitude can be defined as "pragmatic".

6.4 Two Levels of Interpretation

This chapter has implicitly delineated two possible levels of interpretation of the events concerning the arsenic issue in Bracciano and of the roles and relationships of the stakeholders involved.

The first level of interpretation is quite straightforward, and focuses on customers as right-bearers and as recipients of the actions by the municipality and by ASL/SIAN. From this point of view, customers were deprived of their rights. The municipality as service provider did not give them "client power". Customers would therefore be obliged to use "voice", the long route of accountability, to demand adequate service levels and to nail the municipality to its responsibilities if needed. But customers ended up being deprived of such accountability instrument too, since the municipality never provided customers with thorough information on the issue, so they were not enabled to develop sufficient awareness. ASL/SIAN had the duty of ensuring that the municipality constantly complied with its obligations in terms of water quality and of information to population, and by doing so to safeguarded customers' rights. But ASL/SIAN seemed not to be able to exert steady and consistent control over the municipality. Such failures on the municipality's and on ASL/SIAN's side resulted in poor services provided to the customers who - according to this interpretation of the situation - would be the ultimate victims of such systemic failures. The diagram in Figure 6.1 represents this interpretation:

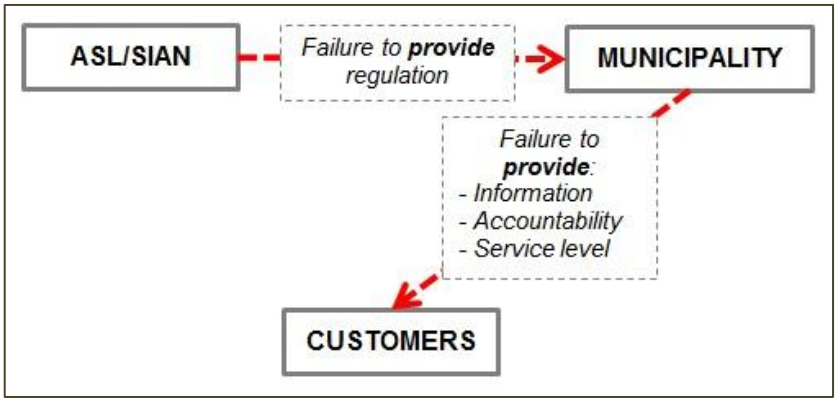

Figure 6.1 First level of interpretation: customers as right-bearers

However, such kind of interpretation, though not incorrect as such, would be too simplistic. It jumps hastily to conclusions, sketching at the stroke of a pen who is right, who is wrong, who bears rights and who bears duties, who is a "victim" and who is an "offender". Therefore a second level of interpretation is needed in order to do justice to the complexity of the relationships among stakeholders emerged in the research.

If the first kind of interpretation focused on customers as right-bearers, the second interpretation focuses on the reciprocity of the relationships among stakeholders. In fact, the idea that customers are the main right-bearers can be accepted but needs to be put in context. It is undeniable that the municipality should have guaranteed accountability to customers of water services, in their position of citizens if not of clients. But, once such point is made, the issue arises of what customers actually did to require accountability. Said that client power is absent, that a service charter is not in place and that adequate information was never provided to customers, the issue arises of what customers did to require client power, a service charter and information. In brief, once the faults by the municipality are acknowledged, the issue is what customers did to address those faults. The research suggested that customers did not do much in that sense, and that no significant pressure was put on the municipality from their side. So it can be said that the municipality did not live up to some of its duties not only due to organisational weaknesses and to regulatory failures, but also because the recipients of such duties allowed the municipality doing so.

In the same way, it was shown that ASL/SIAN exerted its powers on the municipality not consistently overall, and that weighted on municipality's performances. That said, the municipality could have demanded ASL/SIAN clarifications on derogation regime, legislative framework, arsenic concentrations, health risks, possible solutions, and could have worked together with ASL/SIAN to develop a systematic approach on the arsenic issue. The municipality could have addressed the Region too if it emerged that actual decision making happened at Regional level. In brief, the municipality could have prompted the regulator to comply with its own regulatory tasks, which in turn would have allowed the municipality achieving better performances. But it appears that the municipality did not do anything like that, and that no pressure to comply with its regulatory duties was put on ASL/SIAN by the municipality. Customers did not pressurise ASL/SIAN either. So it can be said that ASL/SIAN did not live up to some of its regulatory duties not only due to systemic failures, but also because it was allowed doing so by the municipality and by the customers, i.e. by the recipients of those duties.

In brief, on one hand the municipality failed to live up to its obligations towards the customers, on the other hand customers let the municipality do so. On one hand ASL/SIAN failed in its regulatory duties upon the municipality, on the other hand the municipality let ASL/SIAN do so. The delays in the response to the arsenic issue in Bracciano can be seen as a result of such attitudes. It can be said that for any "failure to provide" there was a "failure to require". See Figure 6.2:

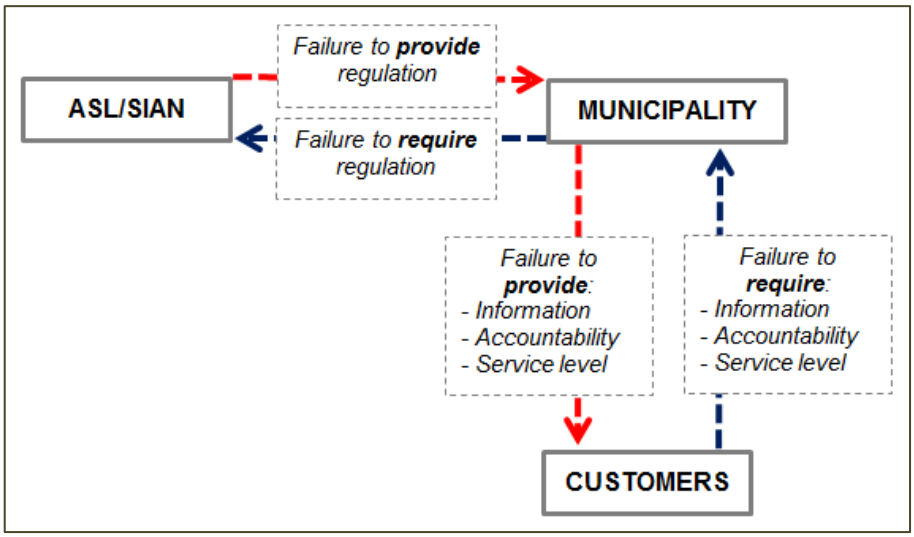

Figure 6.2 Second level of interpretation: reciprocity

This second interpretation of the events occurred in Bracciano emphasises the reciprocity of the relationships among stakeholders. It suggests that in any successful relationships among stakeholders none of the parties can assume a passive attitude and wait for the other parties to take the initiative. Even customers, the main right-bearers, need to prompt the other stakeholders to respect their rights. In this sense a right-bearer is not only a recipient of duties, but also has the duty to prompt the other stakeholders to live up to their obligations.

This interpretation shows that a representation of customers as purely victims of municipality's and ASL/SIAN's inaction would not be truthful. It shows that no schematic separation between right-bearers and duty-bearers can be actually drawn in the case study. On the contrary, it suggests that any failures by one stakeholder to live up to its obligations can be partly ascribed to lack of initiative by the potential recipients of such obligations. This does not mean levelling off or smoothing out specific responsibilities, but providing meaningful accounts of them.

Chapter 7. CONCLUSIONS AND RECOMMENDATIONS

Chapter six provided answers to the research questions presented at the beginning of this dissertation and, by doing so, to the research objectives. Chapter seven draws conclusions from the research and provides recommendations for the case study and for further research.

7.1 Notes on Methodology

It can be said that the methodology followed - described in Chapter four - was adequate to the research objectives. Through the analysis of documents of various nature and from various sources, and through interviews with informants from the institutions and with customers, it was possible to obtain the full picture of the role played by the different stakeholders involved in the arsenic issue in Bracciano and to understand the reasons determining the delays occurred along the years as well as the present situation. That was the overall research aim, highlighted in Section 1.4.

Qualitative data played a central role in the research, and the answers to the research questions were given in qualitative terms. In this sense the qualitative research approach defined in Section 4.5 was appropriate. Nonetheless, the importance of quantitative data was not secondary: data on arsenic concentrations were essential to reconstruct the chronology and the magnitude of the issue in the case study. The choice of a case study approach also appeared to be appropriate: Bracciano responded to criteria of representativeness, relevance and accessibility. In addition, even though the situation in Bracciano was closely interconnected with the situation at regional and national level, enough context-specific elements were present in Bracciano to allow the research objectives being achieved by focusing on the case study itself. The conceptual framework defined in Section 4.3 was useful all through the research process, and provided a framework for discussion of findings (Chapter six). The overall structure of the conceptual framework was confirmed by the research findings, but some aspects of it were challenged and modifications are suggested in Section 7.3.

7.2 The Research Objectives

The qualitative nature of the research, and the complexity of the elements examined, determined that most research questions could not be answered in short and schematically. Chapter six showed that numerous factors played a role in the arsenic issue in Bracciano, and that the actions – or lack of action – by the stakeholders involved were determined by many different elements. Such complexity, though, did not hinder the achievement of the research objectives.

Research objective n.1 focused on the municipality, as both service provider and local government. Municipality's failure to live up to some of its obligations towards the customers can be explained in terms of organisational structure and culture. In brief, it does not seem that water services in Bracciano are organised in a sufficiently structured way to allow long-term planning and strategic vision. The fact that Bracciano Municipality plays the double role of service provider and of local government is one of the factors. Even more important, though, is the fact that no water office, department or unit is in place within the municipal structure, and that non-political management level is too weak to ensure independence from

political cycles. Given these premises, it should not be surprising if the overall attitude displayed by the municipality was “reactive” rather than proactive. In fact, even though the faults by the municipality especially before 2009 are undeniable, the ability to respond to solicitations by the regulator, to mobilise funds, and to find solutions should be acknowledged. In brief, it seems fair to conclude that water management in Bracciano has structural points of weakness, and that those points of weakness largely determined the municipality’s deficiencies in handling the arsenic issue. See Section 6.1.

Research objective n.2 concerned the customers of water services in Bracciano. Their failure to demand prompt resolutions to the arsenic issue and to hold the municipality accountable (delineated in the research objective no.2, Section 1.5) was confirmed by the research findings. Particularly multifaceted explanations were needed in this regard. Customers in fact represent a composite stakeholder group, and the data collected and analysed clearly showed a plurality of perceptions and of reactions to the issue by customers, and substantial lack of cohesiveness. Overall, inadequate information – and inadequate capacity to push to obtain it – played a central role, together with the absence of “client power” and of right-based culture. The polarisation/politicisation of the debate did the rest. A general attitude of resignation and disenchantment by the customers pushed them to adapt to the issue rather than to battle to get it solved by the institution(s) in charge. In this sense customers cannot be considered only as “victims” of municipality’s and ASL/SIAN’s failures: if they did not “raise their voice” it is also because they seemed not to be willing and/or capable to do so. See Section 6.2.

Objective n.3 regarded the regulatory regime. The choice made at the early stages of the research to focus on the local ASL/SIAN as the regulatory body closest to Bracciano (Section 4.8.5) revealed to be appropriate, since the regulatory powers of ASL/SIAN vis-à-vis the municipality are in fact substantial. At the same time, it appeared that ASL/SIAN could be defined as a “quasi-regulator” rather than as a regulator, since its degree of autonomy, independence and public accountability is limited. In particular, the influence of top-down decisions taken at Regional government level was great on ASL/SIAN. As a result, it can be said ASL/SIAN ended up in an uncomfortable position: caught between its regulatory duties vis-à-vis the municipality and its hierarchical rank behind the Region. In addition, the whole regulatory system in Italy appears rather fragmentary and ineffective, which did not help the local ASL/SIAN in its tasks. As a matter of facts, it can be said that ASL/SIAN did not live up to its regulatory duties before 2009, and its positions maintained a certain degree of ambiguity also after 2009. At the same time, the pragmatic attitude displayed by ASL/SIAN should be acknowledged: eventually ASL/SIAN pressurised the municipality to cope with the arsenic issue and prompted the municipality into action and into the process of finding solutions. Given the framework in which ASL/SIAN operates, it can be suggested that the only realistic means ASL/SIAN had to achieve any objectives was to act in such a tactical and discreet manner. See Section 6.3.

7.3 Final Considerations

Overall, it can be concluded that the delays occurred in dealing with and in solving the arsenic issue in Bracciano were essentially due to systemic issues: water management weaknesses on the municipality’s side, and regulatory weaknesses on ASL/SIAN’s side. Additionally, the sector-wide framework at national level has relevant points of weakness, as regards both water sector governance and water sector regulation. Those weaknesses were partly reflected in the case study, even though many context-specific elements characterised the situation in

Bracciano. It can be said that the arsenic issue was not tackled promptly and systematically in Bracciano because the institutional stakeholders (municipality and ASL/SIAN) did not have adequate resources in terms of institutional structure, management capacity and organisational culture. On the other hand, the fact that the arsenic issue was eventually coped with and that solutions were found (even if at “last minute”) deserves to be recognised. In this sense, the merits of the municipality as water service provider and of ASL/SIAN as regulator should not be denied: they managed to achieve some results having limited means at their disposal.

Slightly different considerations need to be done about the customers of water services in Bracciano. On one hand it should be emphasised that customers do not have many instruments to exert accountability: no client power and no service charter. In addition they received inadequate information on the arsenic issue, and political factors interfered in the public debate. On the other hand it needs to be said that customers of water services in Bracciano, as all citizens in an advanced democracy, have the right of free speech and association, and have the right to vote according to their preferences when it comes to elections: in a word, they have “voice” (Section 3.3.2). Nevertheless, customers did not form any committee, did not exert pressure on the service provider / local government or on the regulator, and their role in the course of the events was essentially passive. They did not “raise their voice” and ended up being a largely silent and non-influential stakeholder.

Section 6.4 summarised such considerations by proposing the idea that the relationships among stakeholders need to have a certain level of reciprocity to be effective (Figure 6.2). A first level of interpretation (focusing exclusively on customers as right-bearers and on the statement of duties and rights of the various stakeholders) did not appear to provide a satisfactory picture of the case study. As a result, a second level of interpretation was delineated, which associated a “failure to require” to each “failure to provide”. In this sense the idea of reciprocity was proposed. That concerned the relationships among all stakeholders involved: between the municipality and ASL/SIAN, between customers and the municipality, and between customers and ASL/SIAN. It was suggested that the concept of reciprocity is essential to provide an account of the events studied. The view of customers as the main right-bearers was confirmed, but it was also suggested that an active role needs to be played by the customers themselves in order for those rights to be respected and enforced. It was suggested that when stakeholders failed to live up to some of their obligations it was also because the other stakeholders allowed that, and not only because the organisational structure was weak and the regulatory framework was unclear.

If the conceptual framework at the basis of this research is examined (Section 4.3), it appears that its representation of the “ideal” water service provision setting did not incorporate such sense of reciprocity of the relationships among stakeholders. Such “ideal” representation (reproduced for clarity in Figure 7.1 below) delineated a relatively straightforward framework, in which simple arrows represent the relationships among stakeholders, and each stakeholder has its own duties and rights in terms of service provision, accountability and regulation. It can be said that such framework well describes what Section 6.4 defined as the “first level of interpretation”, but not the suggested “second level of interpretation”.

As a result, it can be said that the initial conceptual framework was partially challenged by the research findings, insofar as it did not incorporate the idea of reciprocity of relationships among stakeholders. Therefore, the initial conceptual framework needs to be slightly modified

on account of the “second level of interpretation” delineated in Section 6.4. In other terms, it needs to incorporate reciprocity.

Such modification is represented graphically by Figure 7.2, in which the relationships among stakeholders are symbolised by double arrows instead of simple arrows. That emphasises that any relationship between two stakeholders, to be effective, requires both stakeholders to play an active role. In other terms, if a stakeholder has certain duties vis-à-vis another stakeholder, not only the former is in charge of living up to such duties but also the latter is in charge of prompting the other to do so. That regards not only the customers, the service provider and the local government, but also the regulator. In the initial conceptual framework (Figure 7.1) the regulator was viewed as an isolated body ensuring that the relationships among the other stakeholders take place correctly. Figure 7.2 highlights that also the regulator needs to relate to the other stakeholders, and that it needs its role to be recognised and its actions to be prompted.

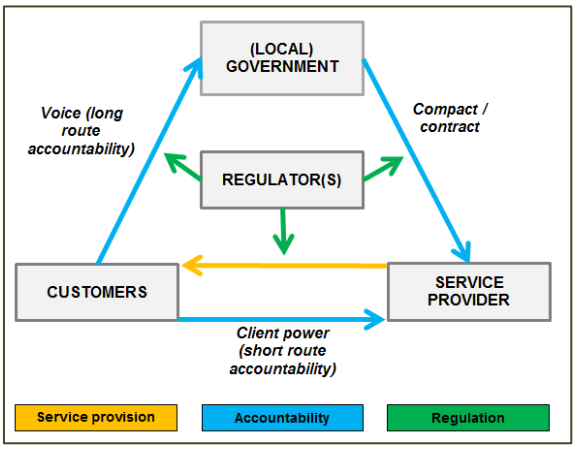

Figure 7.1 Conceptual framework

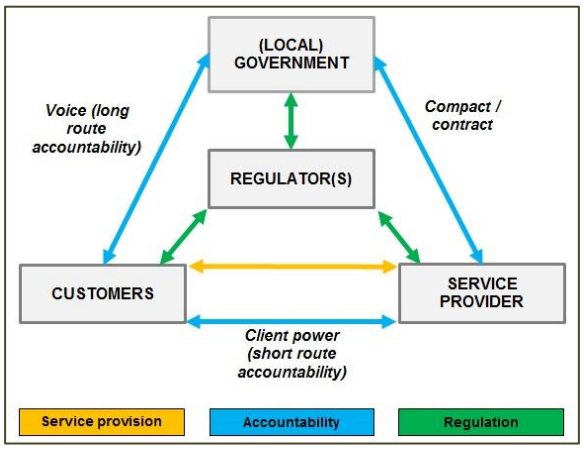

Figure 7.2 Conceptual framework emphasising reciprocity

Such kind of considerations suggests that relationships among stakeholders need to be reciprocal to be effective: it cannot be expected that customers’ rights are respected if customers in the first place do not prompt the relevant stakeholders to do so. As a result, it can be suggested that the success of any stakeholder in playing its own role depends not only on how well the governance system is structured and on how clearly rights and duties are formally stated. The success of a stakeholder also depends – and not to a negligible extent – on the actual capacity and willingness of the other stakeholders to exert pressure.

In this sense, at least in a context like Bracciano, the right-bearer does not have any moral advantage on the duty-bearer: the latter will be able to live up to its obligations only if the former maximises its own influence. It can be said that duties and rights risk remaining void of content if each stakeholder does not acknowledge them, does not take charge of them, and does not prompt the other stakeholders to do the same.

7.4 Recommendations

Some recommendations can be made, both for the case study and for further research.

7.4.1 Recommendations for the case study

Having highlighted the structural limits of water service management in Bracciano, the main recommendation is to improve the local water service management structure.

Entering the debate on municipal vs. private management of water services would be beyond the scope of the research, so it can be assumed that water services are and will be managed by Bracciano Municipality. Under such assumption, it can be recommended that an autonomous water management structure is put in place. That could take the shape of a municipalised company owned by the municipality but operationally autonomous, with its own human resources, managing board, chairperson and budget. The company would manage not only the technical side but also the financial side of water services (connection contracts and billing), and would be accountable to the municipality through a contract or agreement. Alternatively, a water department could be created within the existing municipalised company in charge of solid waste management (Section 5.2.1).

Such strategy would have the advantage of unbinding water management from political cycles and would bring about the development of a management tier and of an organisational culture that are presently missing. As a result, historical records would be kept and followed up, and a clear reporting system would be implemented. Investments, infrastructure upgrading and adequate water resource management would be systematically planned and implemented, and would benefit in terms of efficiency and efficacy. Good practice and continuity would be fostered, and service level would be improved and guaranteed in the medium and long term. A customers' desk would need to be put in place, together with a service charter, so costumers would know their duties and rights and would be able to easily contact the service provider when needed. Reports would be regularly issued and made available to customers, and consultative mechanisms could be created (committees, assemblies, opinion polls) to involve customers in decision making.

All stakeholders would benefit from such reforms: the municipality would be relieved from the responsibility of managing water services, at the same time avoiding private sector involvement and keeping indirect control through the "contract-based" accountability route (Section 3.3.1). Customers would benefit from improved service provision, and would finally have "client power", much simpler to utilise than "voice". In addition customers, empowered with adequate instruments, could eventually feel more motivated to play an active role as stakeholders. Finally, ASL/SIAN would have a well-structured interlocutor in Bracciano, which would potentially improve the relationships between regulator and water service provider. Such an organisational structure would be likely to respond more promptly and systematically to changes in standards and regulations such as the ones delineated by the European Directive 98/83.

It needs to be said though that, as emphasised in Chapters five and six, the municipality does not seem to be keen to evolve in that direction (and the outcomes of the battle to keep water service management in-house are still uncertain), and customers do not seem willing to pressurise the municipality either. As things stand, no such reform is in the agenda.

7.4.2 Recommendations for further research

It can be recommended to conduct multisite comparative research on the response to the European Directive 98/83 on water quality in different locations in Italy as well as in different European countries. That could concern not only arsenic but also other critical water quality parameters. Such research would allow comparing the various approaches adopted and seeing to what extent they were successful. A conceptual framework focusing on the roles played by the stakeholders involved and on the relationships among them (Section 4.3) seems to be promising. Such research would also allow comparing various water service management and water sector governance models in relation to the implementation to Directive 98/83.

The case study showed that systemic issues had substantial weight on how the arsenic issue was dealt with. Therefore, it would be also recommended to conduct policy research on water service management and water sector governance models that would be appropriate in countries that share certain characteristics with Italy:

- A not very enterprising private sector, traditionally relying on governmental subsidies.
- Generalised distrust in private sector involvement in water services.
- NPM (New Public Management) not as part of mainstream political culture and public life vocabulary.
- Central or local governments directly participating in water service provision.
- Absence of a tradition of independent regulation authorities.
- A fragmented water management system.

The forced introduction of a NPM approach in countries with such profile would risk being opposed by groups of interest of various sorts, and would risk being unsuccessful in the long run, as the case of in Italy suggests (Sections 3.4.2 and 3.4.3). In such contexts, efficacy, efficiency and sustainability targets would need to be achieved through strategies that do not rule out in-house water management and substantial public participation in service provision and regulation, as well as systematic cross-subsidising and financing through taxation. Efforts in that direction were recently made in Ecuador and in Bolivia through constitutional reforms defining state management and community management as cornerstones of water sector governance (cited in De Marzo, 2009, p.145-146). Such model of governance and of development, which challenges international mainstream models (e.g. World Bank 2004 and 2006), would deserve attention. Its degree of efficacy, viability and exportability would need to be assessed. The challenge would be to design a “third way” between inefficient unreformed models and NPM-based models.

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ANNEXES

Annex 1. Research instruments

Documentary research

Prior to the fieldwork, most of the documentary research not relative to Literature review was based on documents available online, accessed from Loughborough through the search engine Google. Main sources of documents were:

Institutional websites	Non-institutional websites
Bracciano Municipality	Codacons (Coordination of the Associations for the Defence of Environment and of Customers' and Consumers' Rights) Other online newspapers
Lazio Region	L'Agone (online magazine by the association L'Agone Nuovo, covering Bracciano and surrounding areas)
Gazzetta Ufficiale (official journal of record of the Italian government)	Other online newspapers

During the fieldwork, additional documentation was made available by:

- Dr Carlo Cremisini, director of UTPRA (Environmental Characterisation and Remediation – Natural Disaster Preparedness Unit) at Enea (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), research centre La Casaccia. Journal articles on arsenic in water.
- Key informant from the municipality. Access to data records of arsenic concentrations in water in Bracciano.
- Key informant from ASL/SIAN. Access to data records of arsenic concentrations in water in Bracciano.

Observation

Observation played a limited role in the research. It took place in Bracciano. It included:

Observation target	Observer
Public standposts	The author alone
Recently completed arsenic removal plant	The author accompanied by the key informant from the municipality and by another informant from the municipality

Informant and key-informant interviews – Interview protocols:

Stakeholder	Informants	Interview objectives	Interview type
Service provider	A person in a managing position in water services in Bracciano Municipality (considered as a key informant)	Get the "official" version of the events	Unstructured
		Fill gaps in documentary research	
		Find out the reasons / rationale behind the choices the municipality has made	
		Understand the power dynamics and the relationships between the various stakeholders	
		Understand the relation between water provision and political power / consensus	
		Understand why Galli Law is not implemented in Bracciano	
		Gain access to further documentation	
		Get the key informant's personal point of view on the events	
		Triangulate other data sources	
	A person in a good position in water service operations in Bracciano Municipality (considered as an informant)	Understand how the water services are structured	Unstructured
		Understand how water resources are managed	
		Get the civil servant's personal point of view on the events	
		Triangulate other data sources	

Stakeholder	Informants	Interview questions / objectives	Interview type
Customers	Seven informally chosen customers living in the town area where the arsenic concentrations were the highest and where public standposts were installed. Four of them were interviewed individually; three of them were interviewed in group.	Did you use the public standposts?	Semi-structured
		Why did / didn't you use the public standposts?	
		When and how were you informed about the arsenic issue?	
		What was your reaction when you received the information?	
		Are you globally satisfied with the measures implemented by the municipality?	
		Would you have preferred a different approach by the municipality?	

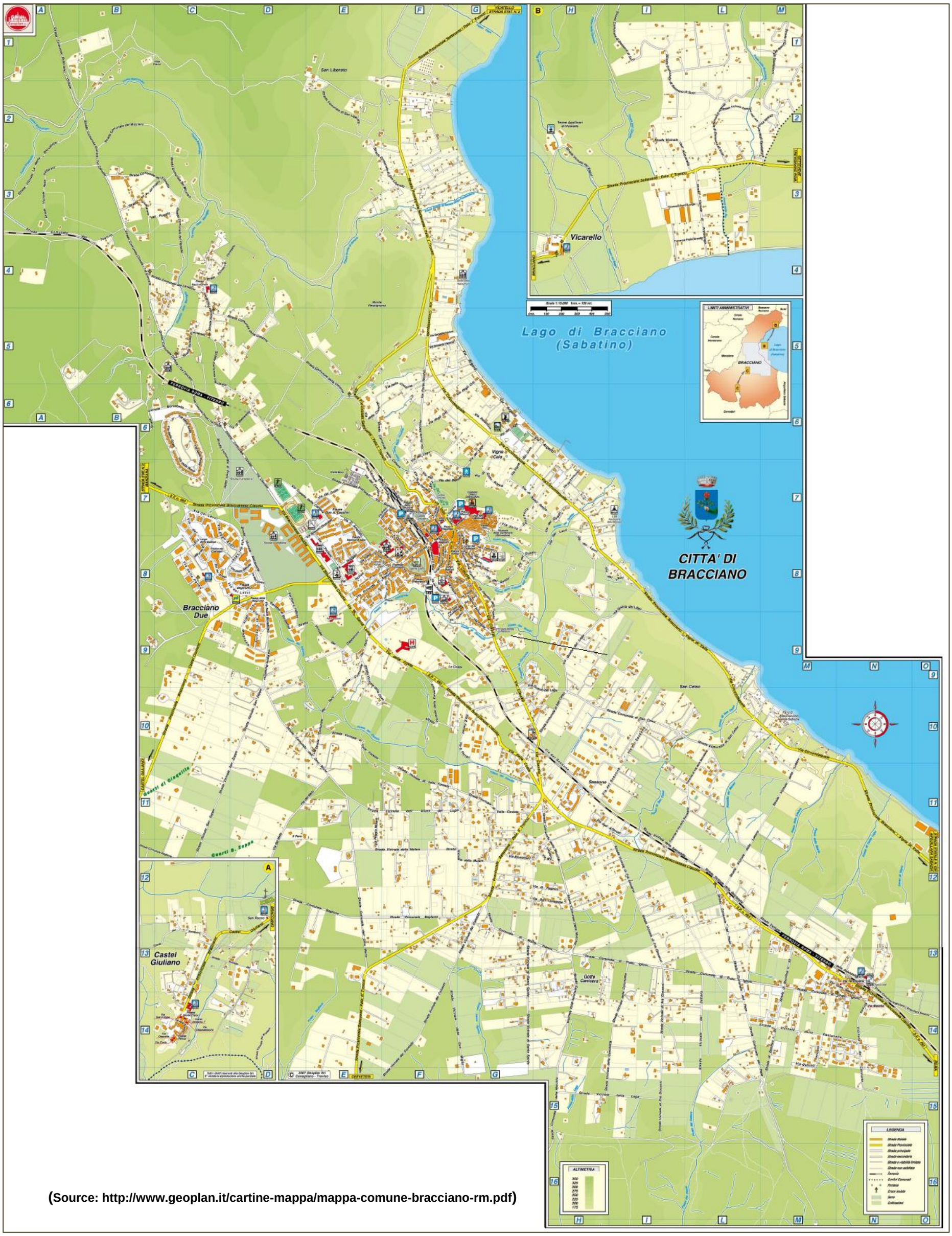
Stakeholder	Informants	Interview questions / objectives	Interview type
Customers	A representative of a civil society association based in a nearby village.	Understand to what extent the association was involved in the arsenic issue	Unstructured
		Understand what the association did	
		Understand if people challenged the association on the arsenic issue	
		Understand the weight of local politics in the arsenic issue	
		Understand the informant's point of view on the issue	

Stakeholder	Informants	Interview objectives	Interview type
Regulator	A person in a managing position in ASL Rome F – Hygiene, Food and Nutrition Service (ASL/SIAN). (considered as a key informant)	Get his/her reconstruction of the events	Unstructured
		Understand how the regulating system works	
		Understand what powers the regulator has vis-à-vis the service provider and the local government	
		Understand the role played by the regulator in the events	
		Understand how the key informant sees the events (critical/uncritical point of view)	
		Gain access to further documentation	
		Triangulate other data sources	

The key informants were identified during the deskwork phase prior to fieldwork, based on the information provisionally available to the author. They were contacted by telephone and/or by e-mail from Loughborough in order to verify their availability to participate in the research. The informants were identified and contacted in Bracciano. Customers were identified and contacted in Bracciano.

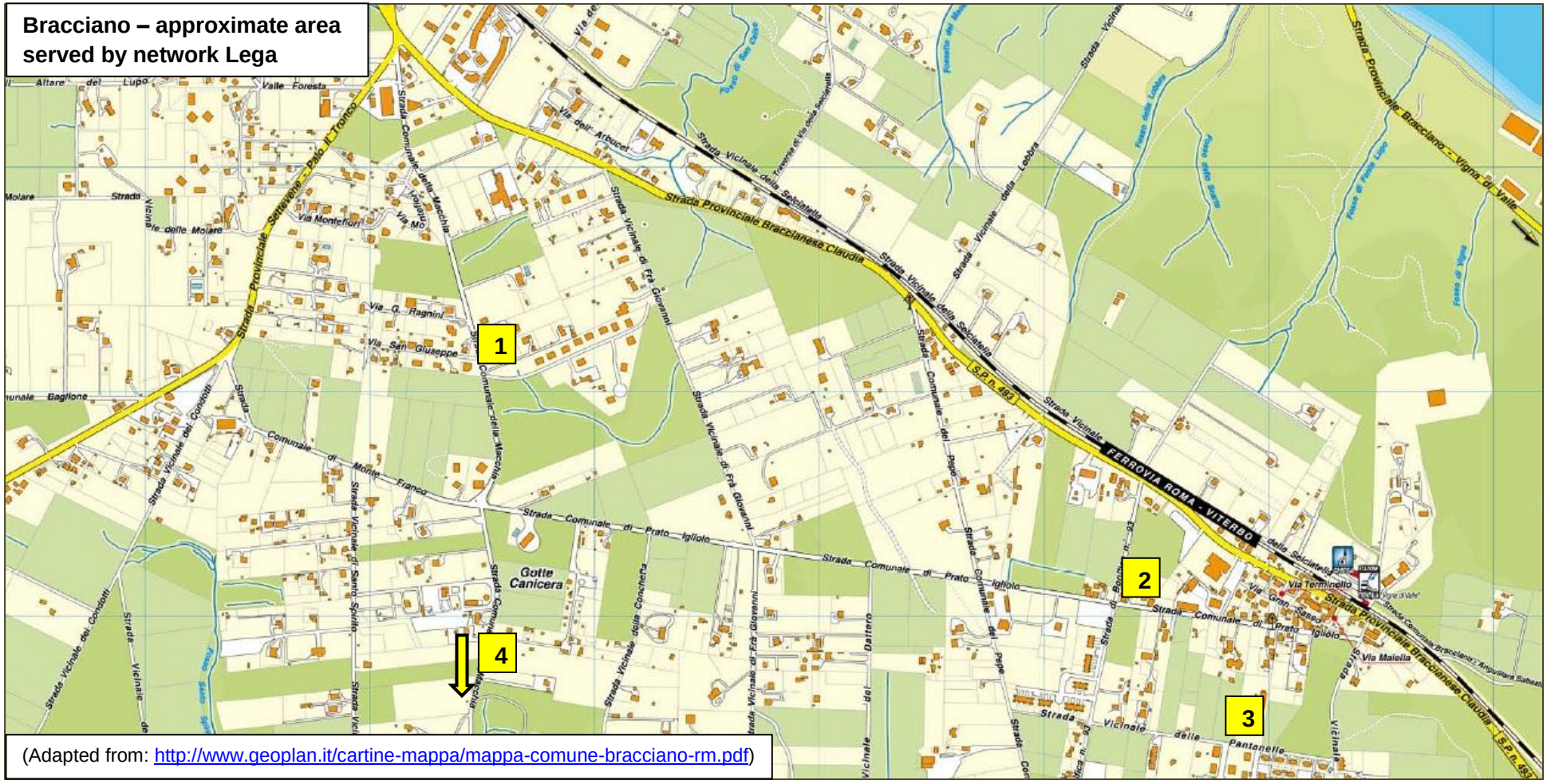
Annex 2

Bracciano – Complete map of the territory



(Source: http://www.geoplan.it/cartine-mappa/mappa-comune-bracciano-rm.pdf)

Annex 3



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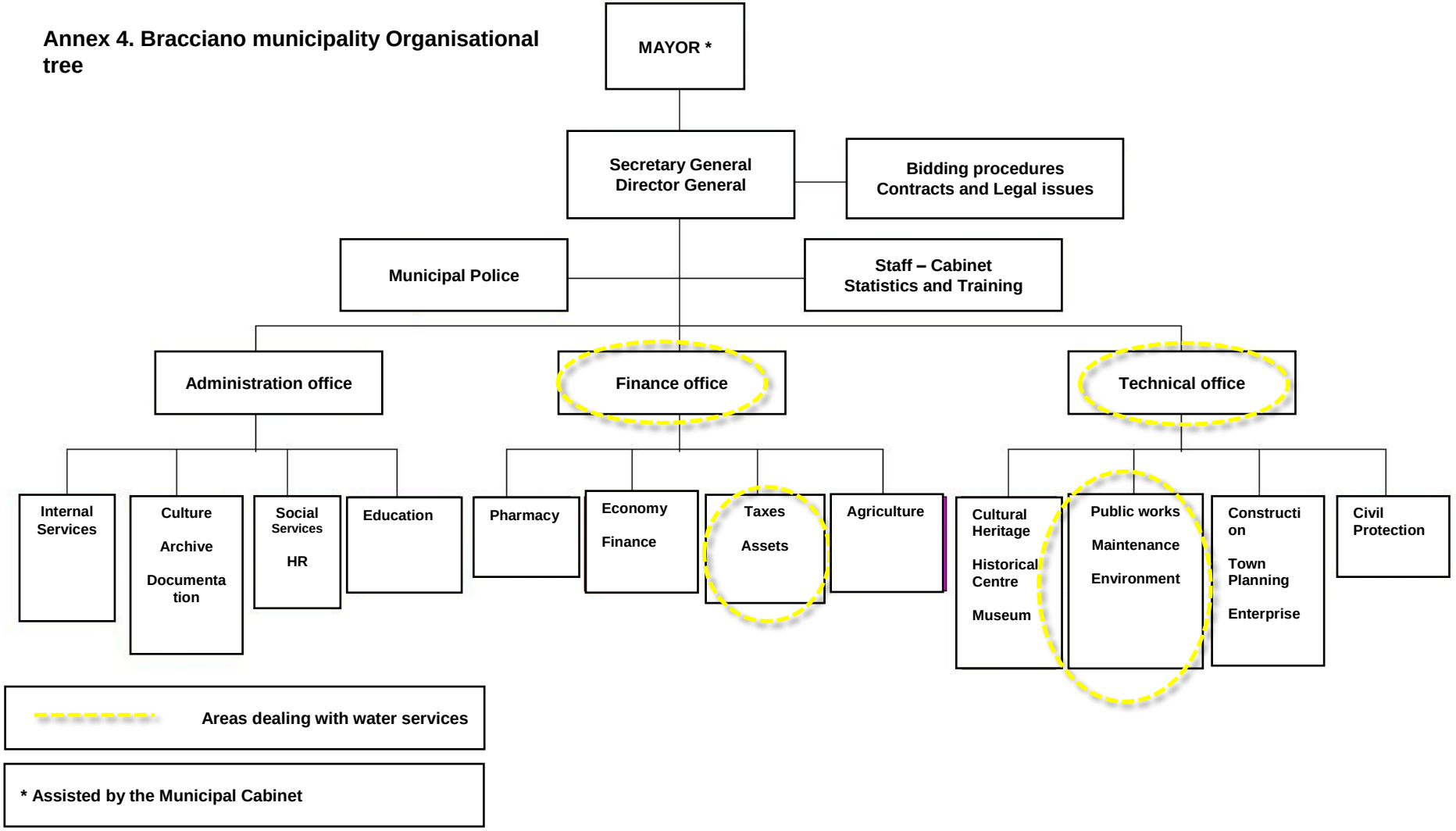

(Adapted from: http://www.comune.bracciano.rm.it/flex/cm/se/search.php/L/IT/ST/1?frmSearchText=organigramma&x=0&y=0)

Annex 5. Public communication poster, 2009
(Comune di Bracciano, 2009g)

(Logo of Bracciano municipality)

Bracciano municipality
Province of Rome

NO DANGERS BUT ONLY CAUTION IN WATER USE

Lazio Region and ASL Rome F have found arsenic and fluoride concentrations exceeding the parameters defined by the European Directive 98/83 in networks Fiora and Lega, presently under examination by the technical office.

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Anyhow, we wish to underline that there are no significant reasons of danger to population's health due to domestic water use.

We count on re-establishing soon full compliance with the parameters.

Italy has become one of the first victims of the global financial crisis started in 2008, partially due to its extremely high public debt. As a consequence, Italy is presently undergoing a series of austerity measures, including tax increases and cuts in public expenditure. The decline of the Italian industry - due to the challenges of globalisation as well as to structural factors - together with the lowest birth rates in Europe, represents a reason of concern for Italy's economy in the medium and long term (BBC, 2012). Italy is ranked 24th in the UNDP Human Development Index – 12th among the EU countries (UNDP, 2011).

Despite the high degree of development in the country, public life in Italy has been affected for decades by "political paralysis, massive government debt, extensive corruption, and organized crime's considerable influence" (U.S. department of State, 2012), with relevant differences between northern and southern regions (CIA, undated). Italy is ranked 69th in Transparency International's Corruption Perception Index – only 27th among the EU and Western Europe countries (Transparency International, 2012). According to Transparency International Italia (2012, p.6), in recent years "the tension and the conflict between (and among) state powers and parts of civil society has reached remarkable levels".

As regards the water sector, water resources management was subdivided into ninety-one "Optimal Water Districts" (ATOs, "Ambito Territoriale Ottimale") by a sector-wide reform dating 1994 (Galli Law) (Euromarket, 2004, p.219). For full details about Galli Law and about recent developments in water sector, see Section 3.4. Nearly 80% of potable water in Italy is supplied by groundwater sources, one of the highest percentages in Europe (KWR, 2011, p.6-7).

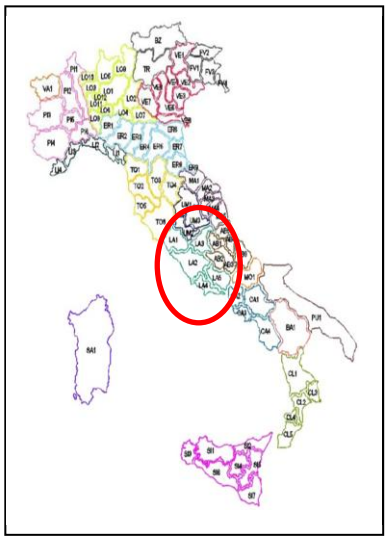

Figure 2.4 Map of ATOs
(Source: Euromarket, 2004, p.219)

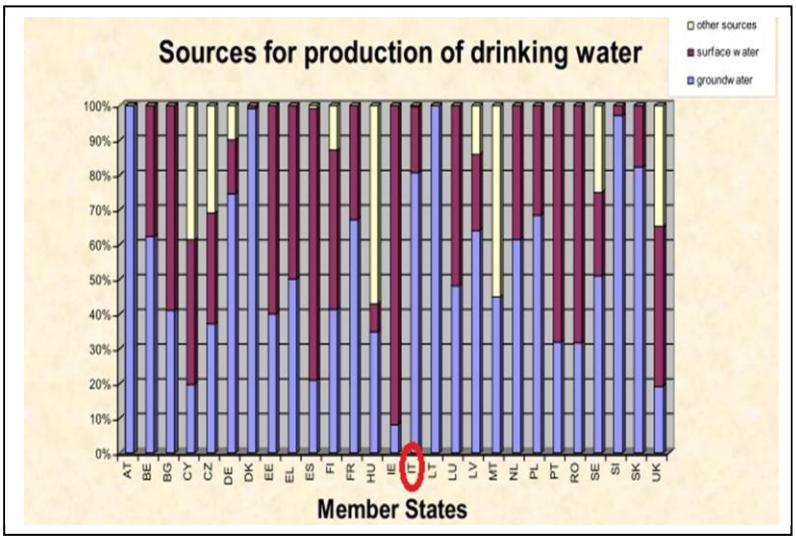

Figure 2.3 Water resources in Italy
(Source: KWR, 2011, p.7)

2.1.2 Bracciano

Bracciano is the setting of the case study conducted in this research. Bracciano is a town (municipality) in Lazio.

Lazio is the second Region in Italy in terms of population, with 5.728.688 inhabitants mostly concentrated in the regional capital Rome. Lazio is divided into five Provinces (Viterbo, Rieti, Rome, Frosinone and Latina) and 378 municipalities (Comuni Italiani, undated(b)). Water

Table 5.5 and Figures 5.1 and 5.2 summarise the data regarding the ten boreholes supplying network Fiora. Data are displayed in two separate graphs for visual clarity.

Table 5.5 Arsenic concentrations in boreholes Fiora 1 to Fiora 10

Borehole 1		Borehole 2		Borehole 3		Borehole 4		Borehole 5	
Date	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**
27/12/05	9.64	27/12/05	29.75	27/12/05	6.78	27/12/05	29.98	27/12/05	13.79
15/01/08	4.96	15/01/08	19.35	15/01/08	3.71	15/01/08	21.02	15/01/08	7.29
22/01/08	7.79	22/01/08	26.64	22/01/08	4.88	22/01/08	24.84	22/01/08	9.45
12/10/10	7.85	12/10/10	22.59	12/10/10	6.67	12/10/10	27.13	12/10/10	9.93
Borehole 6		**Borehole 7**		**Borehole 8**		**Borehole 9**		**Borehole 10**	
Date	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**	**Date**	**As (µg/l)**
15/01/2008	20.86	27/12/05	22.25	27/12/05	21.58	15/01/08	50.7	15/01/08	21.37
22/01/2008	28.68	22/01/08	23.55	15/01/08	14.53	15/01/08	68.61	22/01/08	23.62
				22/01/08	18.11				
				12/10/10	19.89				

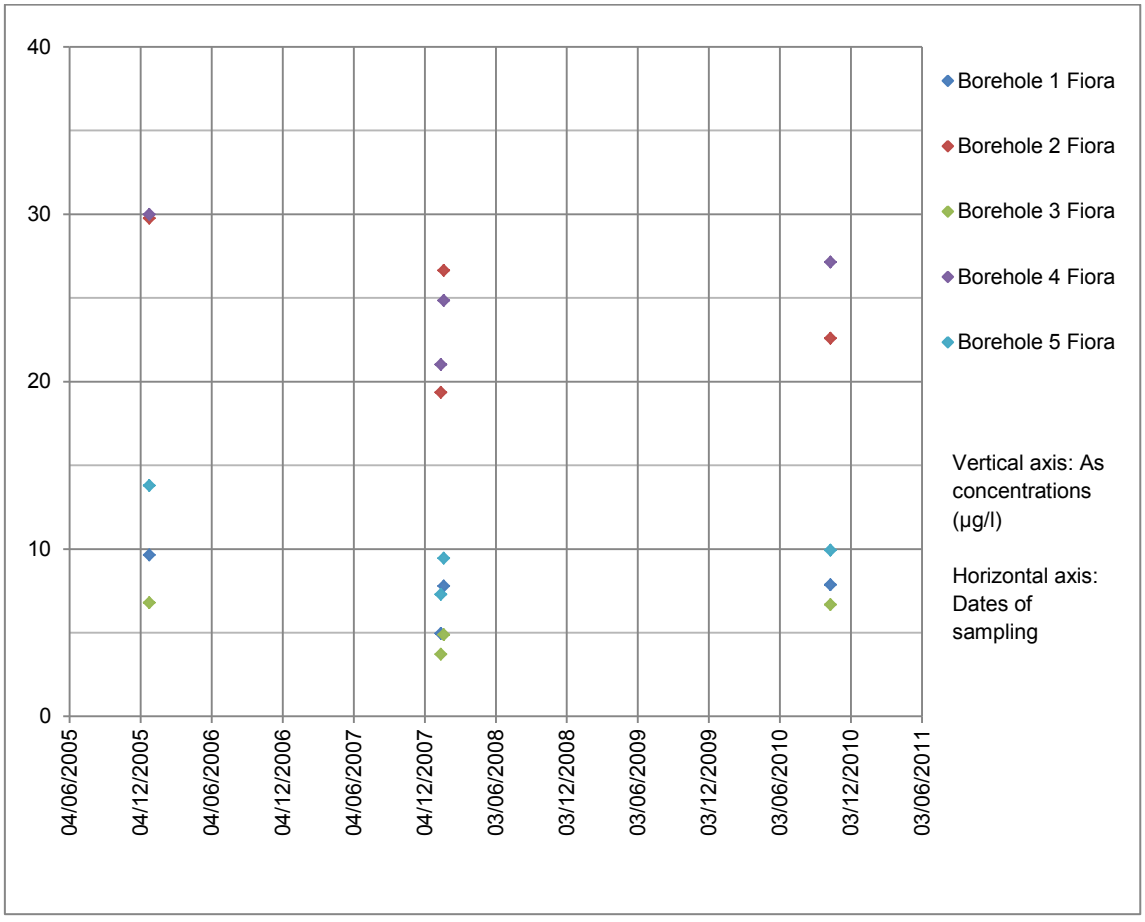

Figure 5.1 Arsenic concentrations in boreholes Fiora 1 to Fiora 5

on account of the “second level of interpretation” delineated in Section 6.4. In other terms, it needs to incorporate reciprocity.

Such modification is represented graphically by Figure 7.2, in which the relationships among stakeholders are symbolised by double arrows instead of simple arrows. That emphasises that any relationship between two stakeholders, to be effective, requires both stakeholders to play an active role. In other terms, if a stakeholder has certain duties vis-à-vis another stakeholder, not only the former is in charge of living up to such duties but also the latter is in charge of prompting the other to do so. That regards not only the customers, the service provider and the local government, but also the regulator. In the initial conceptual framework (Figure 7.1) the regulator was viewed as an isolated body ensuring that the relationships among the other stakeholders take place correctly. Figure 7.2 highlights that also the regulator needs to relate to the other stakeholders, and that it needs its role to be recognised and its actions to be prompted.

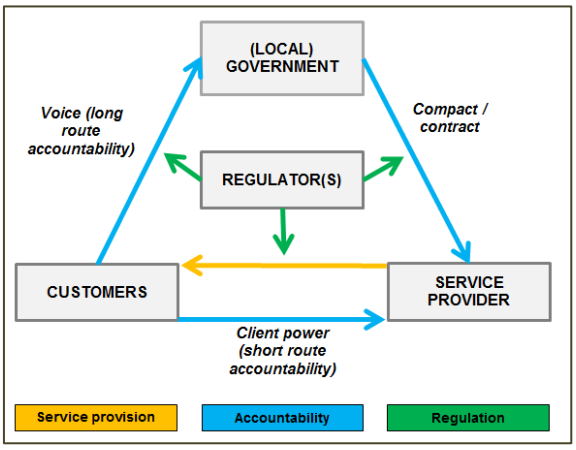

Figure 7.1 Conceptual framework

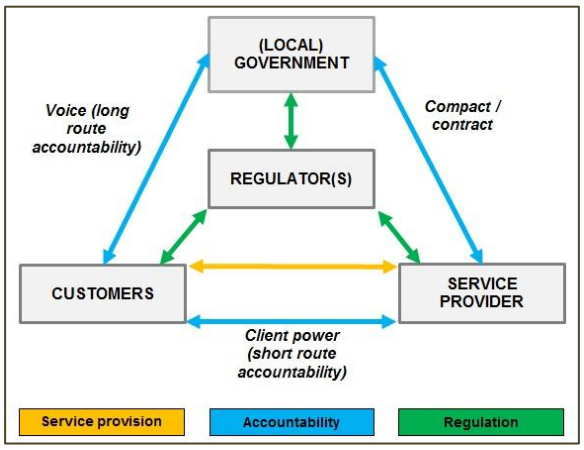

Figure 7.2 Conceptual framework emphasising reciprocity

Such kind of considerations suggests that relationships among stakeholders need to be reciprocal to be effective: it cannot be expected that customers’ rights are respected if customers in the first place do not prompt the relevant stakeholders to do so. As a result, it can be suggested that the success of any stakeholder in playing its own role depends not only on how well the governance system is structured and on how clearly rights and duties are formally stated. The success of a stakeholder also depends – and not to a negligible extent – on the actual capacity and willingness of the other stakeholders to exert pressure.

In this sense, at least in a context like Bracciano, the right-bearer does not have any moral advantage on the duty-bearer: the latter will be able to live up to its obligations only if the former maximises its own influence. It can be said that duties and rights risk remaining void of content if each stakeholder does not acknowledge them, does not take charge of them, and does not prompt the other stakeholders to do the same.

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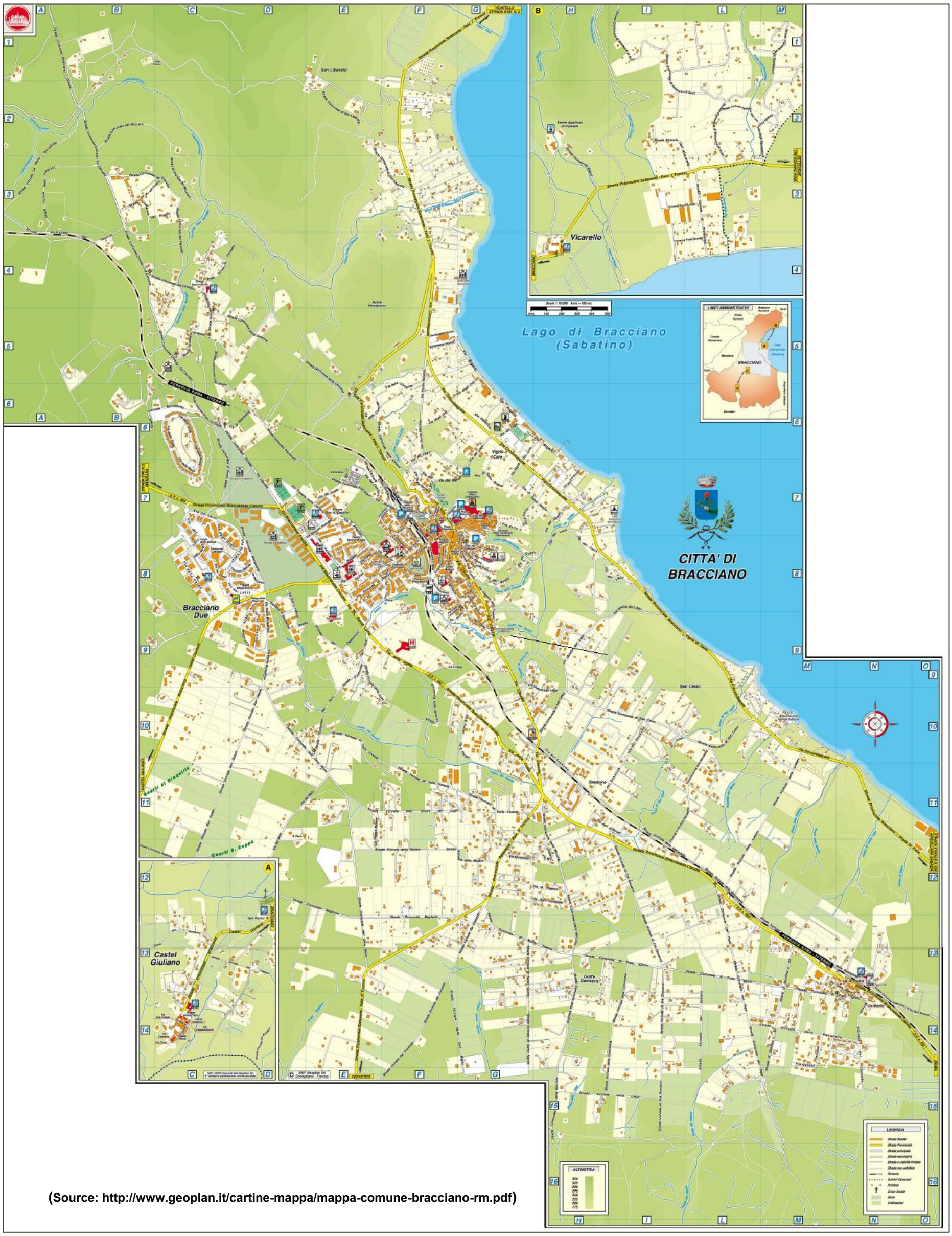

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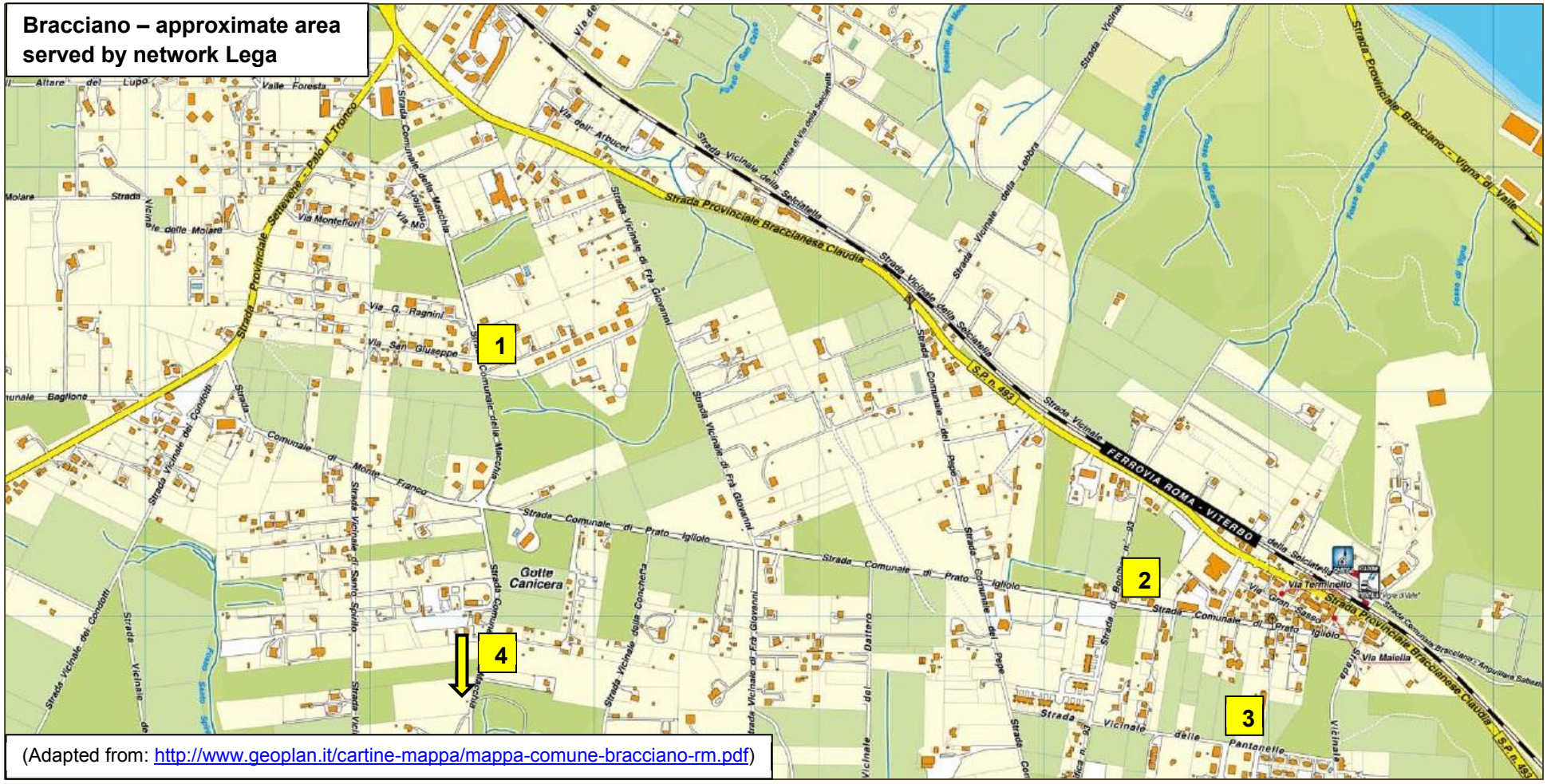
Annex 3



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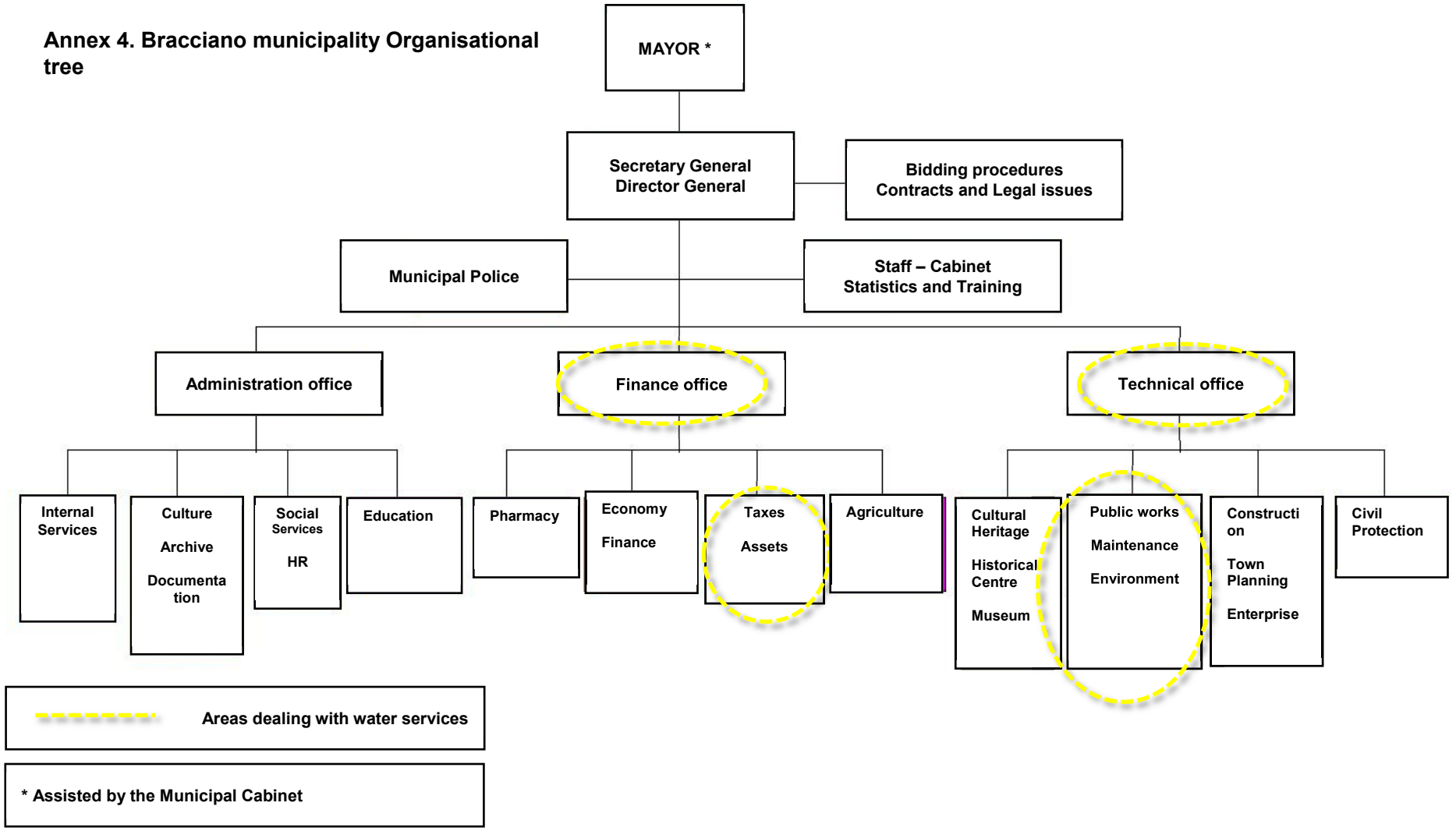

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