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# Keep Your Head Above Water: Management and Water Literacy in Italy

Rachel E. Huxhold
*College of Wooster*

## Preface

"Nothing is more useful than water: but it will purchase scarce anything; scarce any thing can be had in exchange for it. A diamond on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it." –Adam Smith

"If gold has been prized because it is the most inert element, changeless and incorruptible, water is prized for the opposite reason—its fluidity, mobility, changeability that make it a necessity and a metaphor for life itself. To value gold over water is to value economy over ecology, that which can be locked up over that which connects all things." –Rebecca Solnit

These quotes, one from a renowned economic philosopher and the other from a journalist and author, express the paradox of societal views toward water. Water is vital to all life, and must be shared by all. In the same sense, it is everyone's responsibility to care for and protect this common resource. Yet, in the "Golden Age" of water, as described by Charles Fishman (2011), individuals in the developed world have become accustomed to reliable, clean water—habitualized to believe access to it should be relatively free, and generally misinformed about the water systems that provide this way of life. Thus, people may take clean water for granted. As climate change and continuous development change the availability of water, we must be reminded of the true value of water, and work together to protect such a valuable resource. Developed or developing states, arid or humid regions, Northern or Southern Hemispheres—the whole world shares the same pot of water. And as global patterns are indicating, water accessibility will very likely pose large problems for areas all over the world—if our management practices are not readdressed. I research water issues to increase awareness for responsible water management, and to contribute to viable water solutions for the future.

## Introduction

Climate change, population growth, and increased demand are all factors that change how water must be managed. These factors change the water conditions of various areas in different ways and to varying degrees. Italy presents a particularly intriguing case of how water management is changing. Climate change has contributed to rising sea levels along Italy's coastlines, increased precipitation and flooding in the northern regions, and decreased precipitation and water scarcity in the southern regions (Italy-EU; M. Maiero, personal communication, April 9, 2015). Additionally, contamination and pollution harm water supplies throughout various regions of the whole country. It is becoming ever more important to use water efficiently and to share the responsibility of maintaining water resources.

Italy serves as an example of how quickly water availability can change, and how drastically water issues can impact a state. Analyzing the levels of water literacy[1] present within the general population as well as the governing bodies and following the evolution of Italian water policy can shed light on important factors necessary for establishing sustainable water management. This paper argues that establishing a strong management of water resources is vital to the sustainable development and health of a state.

## Water Literacy

The average degree of knowledge that individuals have about the local water generally extends as far as the direct personal impact imposed upon them, or the consequences that would be inflicted on the individuals if they were to be ignorant of that information. For example, in Venice, the northern region of Italy that suffers from flooding, most individuals know not to

[1]*Water literacy*, as defined by the author for this paper, refers to the amount of knowledge one has about the water system; it encompasses knowledge ranging from the state of water system infrastructure, the availability of water in an area, the quality and cleanliness of the water, the types of treatment used, the environmental impact, and what source the water comes from and/or where water goes when the individual is finished using it.

come in contact with the floodwater because it can carry illnesses. They know that the drinking water comes from a different source than the polluted water in the canals, and it is safe to drink (M. Polido, personal communication, April 24, 2015). They know basic measures of how to interact with the water system so as not to get sick, but they generally are not aware of larger problems facing the water system, such as infrastructure leaks that waste huge percentages of extracted water, or the problems that come about during the planning and installation of the Moses flood gates system[2] (*BBC News*, 2013; Guarino, 2014). In this respect, water literacy, as defined in this study, is generally low to medium, and thus water availability is taken for granted.

This trend appears to hold true regardless of what water problem receives the most attention in the area, whether it be flooding, contamination, or scarcity. Individuals may know where water is (or used to be) available and approximately how clean it is, but they are not aware of the inefficiencies of in the water system that cause very large problems (or will cause problems in the future). Generally, individuals increase water literacy proportionally to the number of direct personal consequences they encounter.

Italian citizens' information on water comes from four main sources: the governing body, the supplier (government or private company responsible for providing the services), the media, and non-governmental organizations (NGOs). The information provided by each party and how each party conveys that information strongly impact public reception. Governmental information usually covers emergency situations, such as contamination leaks or drought warnings, as well as well-being initiatives such as the health benefits of drinking water (Cure, Lucie, Ferretti, Natalicchio, & Vegni, 2010; M. Maiero, personal communication, April 9, 2015). If the water

[2] The Moses floodgate system is a series of large barriers that can be erected in the lagoon surrounding Venice in order to block large waves and reduce flooding. Problems with this project include higher costs than originally projected, unforeseeable project management adjustments, and prolonged installation due to technical, political, and climate condition issues. While newspaper reports and other media outlets have relayed some of these issues, the state of the project is not necessarily well-known (*BBC News*, 2013; Guarino, 2014).

monitoring systems detect unsafe conditions, the authorities alert the public via radio, television bursts, and newspaper announcements. Generally, such information is relayed clearly and effectively.

Supplier organizations may also support the quick, increased dispersion of information during crisis situations, but they convey information in everyday settings as well. In Venice, the water management company Veritas[3] does not market its supply services, as it is well known throughout the area anyway. However, Veritas does market "to enhance citizen awareness… concentrat[ing] on our efforts to make the system work and to tell citizens what we really do" (M. Polido, personal communication, April 9, 2015). In this light, Veritas advertises to improve public image and increase awareness of its activity outside of supplying water services and wastewater treatment. For example, Veritas has participated in campaigns for increasing recycling to reduce pollution, encouraging individuals to drink tap water instead of bottled water in order to reduce plastic waste, and promoting smarter water and energy use (M. Polido, personal communication, April 24, 2015). Campaign materials include poster advertisements such as those pictured below[4].


[3] Veritas, although a separate company, is owned by the government. Therefore, the government heavily influences decision-making and finances, and Veritas handles the day-to-day management (M. Polido, personal communication, April 24, 2015).
[4] Images obtained through M. Polido, personal communication, April 24, 2015.

It is difficult to determine the immediate effectiveness of such campaigns alone, as their impact cannot be isolated from other events within society that also impact citizens' awareness of environmental concerns. Yet over the years, pollution has been showing a slight decrease in the area (Trono, 2010), although it still remains a highly prevalent issue.

In regard to the actual state of the water system, Veritas produces an integrated social environmental report and balance sheet that is available to the public. It specifically outlines the operations, environmental impacts, and budget (Veritas, 2008). However, while it is available to the public, an individual must intentionally seek this document out. Moreover, the document is lengthy—216 pages for the 2008 issue (Veritas, 2008). The text is not extremely difficult to read, but it does include technical terms and graphs that may require some education to comprehend fully. The report needs to be thorough and scientifically accurate, and in this respect, the documents currently produced meet expected standards. However, the general public does not easily absorb such information—or could more easily absorb it if presented in clearer, more succinct terms (N. Salim, personal communication, April 30, 2015). While historically, everyday citizens did not necessarily need to know or understand such information as that provided by the social environmental reports, the increased prevalence of water issues and growing common responsibility are making such water literacy ever more important. Understanding the basic characteristics of the water system helps to put emerging issues into perspective, and fosters increased value for water.

The media is arguably the most utilized source of public information, and it assists governments, private companies, and NGOs in relaying their messages to citizens. However, the media tends to skew information to be as attractive as possible, and in this sense, it can sometimes distort the message. By using suggestive language, media can lead people to believe

that a situation is better or worse than it actually is, or focus attention on a tangential situation that may be more appealing. For example, the headline "Naples waste crisis: Italy may use army against the mafia" draws attention to corruption, and away from actual environmental impact and how citizens themselves should respond (*BBC News,* 2014). On the other hand, the media relays information in brief, easily understood terms: information that the public can easily absorb.

NGO campaigns also tend to be reader-friendly. Messages are brief, and delivered on the streets directly to individuals through posters, pamphlets, stickers, and newsletters (Forum Italiano Dei Movementi Per L'Acqua, 2015). The sheer mass of information NGO campaigns tend to produce helps ensure the message makes an impact. The commotion that NGO campaigns stir up can also lead people to transfer information by word of mouth. Coming from coworkers, neighbors, family members, or friends, such information can be more easily absorbed and trusted. Additionally, as the majority of NGO campaigns begin at the local level, their messages are tailored to local issues—thus, because of the direct personal impact, they resonate more easily with individuals. Information given by NGOs generally focuses on their mission; in the case of the Italian Water Movement, such information included current legislation, international consensus on water rights, water as a human right, and suggested actions (Bieler, 2014; Forum Italiano Dei Movementi Per L'Acqua, 2015). NGOs and the facilitation of public mobilization foster informal education, as people absorb the campaign messages and become motivated to seek out information themselves.

**Historical Water Policy**

Prior to 1994, each municipality was responsible for operating and maintaining its respective water system, leading to much fractionalization and a lack of coordination (Armeni, 2008; Asquer, 2008). Because each municipality was run differently, many areas were poorly

managed and were unaware of best practices; over time, these inefficiencies compounded one another, leading to large leaks, miscommunication, and unnecessary water waste (Armeni, 2008; Massarutto, Paccagnan & Linare, 2008; Guerrini & Romano, 2014). Frequently, the water systems did not generate enough funds to be self-sustaining, but the budget was offset by total city budgets (Armeni, 2008). Climate change also exacerbated water issues; rising sea levels and coastal flooding induced damage to coastlines and infrastructure and disrupted piping processes (M. Polido, personal communication, April 24, 2015), while changing rainfall patterns contributed to flooding as well as drought[5] (Italy-EU; M. Maiero, personal communication; April 9, 2015). After decades of deterioration, mismanagement, and increasing debt, as well as increased stressors from climate change, population growth, and increased demand, the Italian government recognized the need for reform. Seeing water management problems approaching fast, the Italian national government proceeded with reforms to correct the state of the water system.

The Italian government recognized the importance of integrated and multidisciplinary coordination in Italian water management. In 1994, Law 36—a water system reformation—aimed to reorganize the water system to make its management more economical, efficient, and comprehensive (Armeni, 2008). Here, human consumption was declared first priority for water use[6], and all other water use activity could only occur if sufficient resources remained. Furthermore, additional uses could only occur if the practice was not considered harmful to the environment (ICID-Italy, p. 2; Guerrini & Romano, 2014). Law 36 also aimed to save water by updating leaking or out-of-date infrastructure, coordinating distribution systems, improving

[5] See http://www.climateadaptation.eu/italy/climate-change/ for more information about how climate change has caused increased precipitation as well as drought in Italy.
[6] The original level designated for human consumption in 1994 was 150 liters per person per day, but was raised to 200-280 liters per person per day in 2005 (Armeni, 2005).

urban wastewater treatment, and establishing water-saving techniques across urban, rural, and industrial sectors (ICID-Italy). However, Law 36 received criticism for being too ambitious for the resources available to carry it out, and it faced many obstacles during implementation (Asquer, 2008). Although the water systems budget is supposed to be reassessed periodically and adjusted accordingly (ICID-Italy), resources are limited, and coordination between levels of government does not always run smoothly.

Although each municipality throughout Italy is in charge of its own water system, and each area requires different levels of intervention, coordination between municipalities is essential. Furthermore, watersheds themselves run across boundary lines, and this forces coordination between all parties that tap into that resource (ICID-Italy; Italy-EU; N. Salim, personal communication, April 30, 2015). The difficulty of coordination is exacerbated by variance between municipalities; local governments have different levels of knowledge existing within management, and each area has different needs. Political strategy and personal agenda make trust between municipalities difficult, as neither party wants to compromise and change its behavior if it can get the other party to do so (Armeni, 2008; Asquer, 2008; Golden & Picci, 2008). For example, communication issues caused availability problems between an upstream hydropower plant and downstream irrigators[7] (Anghileri, Castelletti, Pianosi, Soncini-Sessa, & Weber, 2013), in which both parties were reluctant to change their behavior.

While Law 36 establishes national regulations, implementation looks different in each municipality. Because each region faces different challenges, national regulations are easier or harder to comply with based on the area one is in. The state of local infrastructure varies

[7] This incident occurs along the Lake Como water system in the northern region of Italy. Parties utilizing this watershed would draw water resources at their whim, and not share any water use information with other parties. As demand increased, the downstream farmers received less water with which to irrigate their fields, and conflict developed with the upstream hydropower plants (Anghileri, Castelletti, Pianosi, Soncini-Sessa, & Weber, 2013).

depending on any natural disaster damage to the area, localized deterioration, and how well it was previously managed. In this respect, implementation of Law 36 requires tailored responses and varying levels of intervention (N. Salim, personal communication, April 30, 2015). As a lack of communication and corruption were problems blocking the water system before, these issues were also detrimental to the Law 36 agenda (Armeni, 2008; Asquer, 2008). Water management was dealt with in one of the following ways: continued governmental management, privatization, or various degrees of public-private partnerships (Asquer, 2008). A push for privatization occurred as a result of the inability to fund the maintenance of a sector that does not generate revenue, especially after years of debt have accumulated.

**Privatization and its Effects**

As water privatization began spreading throughout various Italian municipalities and the controlling party changed, prices in these areas began to rise. One principle that played a role in the price spike is full-cost recovery: full-cost recovery refers to earning back the amount necessary to provide the product initially (European Environmental Agency, 2013; Massarutto, Paccagnan, & Linare, 2008). This entails covering the costs of pipeline installation, maintenance, and energy consumption needed to run purification plants and transport water. When the water systems were publically owned, the rest of the city's budget was able to buffer any financial deficit that came about because full cost recovery was not obtained (Armeni, 2008). As this gap increased over time and was exacerbated by national mandate to update infrastructure, some public entities felt they could not handle the burden, and privatized (Massarutto et al., 2008). However, through private operations, turning a profit on top of ensuring full-cost recovery—while maintaining low prices—is seemingly impossible (F. Properzi, personal communication, April 24, 2015; Massarutto et al., 2008). The revenue alone struggled to offset the operational

costs. Thus, in areas that resorted to privatizing their water sector, higher prices were induced to support the costs of updating infrastructure and adapting to market-regulated pricing.

Not all public-private partnerships resulted in huge price spikes and grievances from the general public. Some municipalities in Italy established government-owned, yet privately managed water systems (Asquer, 2008; M. Polido, personal communication, April 24, 2015). A smoother transition occurred when communication flowed frequently and effectively between the government and private company, and when the government could heavily influence ownership and decision-making. Such partnerships also allowed for the benefits of privatization to be capitalized upon: privatization introduced increased expertise, incentives to perform efficiently, and outside funding, which helped improve management (Foo, 2015; F. Properzi, personal communication, April 24, 2015; N. Salim, personal communication, April 30, 2015; Massarutto et al., 2008). Because this style communicates with and leaves decision-making power with a government body, it helps to bridge the gap between stakeholders. Privatization could be monitored and implemented without causing outrageous price spikes. Additionally, as time passed and the success of such partnerships spread, more municipalities adapted this model of publically owned and privately managed water systems.

The inconsistencies across municipalities caused relative deprivation between individuals who suffered large price spikes and those who did not. For example, the price of water in Arezzo reached four times that of Milano—a city that still manages its water system publically (Bieler, 2014). In Sicily, water scarcity combined with outsourced water services to cause a sharp spike in prices. Hostels and services dependent on tourism suffered economically because they could barely afford basic amounts of water but were expected to provide a plentiful supply to their guests (Giglioli & Swyngedouw, 2008, p. 4). The high prices limited many

people's ability to afford water on the rare occasion it was available. This led to protests and the mobilization of thousands of Sicilian citizens into the streets (Giglioi & Swyngedouw, 2008, p. 4). Similar situations occurred in other southern municipalities, and the strain that cost problems imposed onto citizens ultimately harmed their well-being.

In regions that privatized the water system more rapidly, the price spikes caught the attention of citizens, as the spikes impacted them directly. In this instance, water was being treated as a commodity—regulated by market pricing—rather than a common entitlement. Citizens became unhappy and began to mobilize (Bieler, 2014; Forum Italiano Dei Movementi Per L'Acqua, 2015). As citizens in various areas assembled and organized, and nongovernmental organizations formed to support de-privatization, a pattern, or movement, emerged throughout Italy. The Italian Water Movement came about as a coalition of various smaller organizations that started in response to water privatization. Small groups of individuals formed localized committees and over time, began working together with other new organizations as well as existing political parties to spread information and rally around the grievances caused from water privatization (Bieler, 2014). Action within the Italian Water Movement ranged from street protests and flyer distribution to attending public forums and submitting petitions for referendums.

NGOs held street protests and gathered petition signatures to spread awareness and rally support for de-privatization. They sent letters to the stakeholders of ACEA,[8] protesting the expansion of the company to additional regions. In these letters, leaders of the Italian Water Movement cited specific examples of UN and EU[9] statements that the protesters felt the company was violating (Forum Italiano Dei Movementi Per L'Acqua, 2015). Additionally,

[8] a Comunale Energia e Ambiente: Italy's largest water company, located in central Italy
[9] UN stands for United Nations, and EU stands for European Union.

protesters attended a public meeting of the Italian Forum of Water Movements and discussed "the quality of service and investment, protection of water resources and the environment, the guarantee of the right to water violated daily by the tariff increases and detachments" (Forum Italiano Dei Movementi Per L'Acqua, 2015). Through such mobilization, protesters increase their knowledge of the water system by researching the current regulations, examining the budgets, and following international news related to water management.

**Challenges and Obstacles Facing the Water System**

Even with policy changes and increased levels of water literacy, some challenges and obstacles still hinder the implementation of good water management. Institutional accountability, fragmentation of responsibility, miscommunication, or altogether lack of knowledge hinders the water systems' ability to provide its services. Watersheds extend across political boundary lines, and thus require communication between all who access the specific watershed. Such communication ensures that the correct level of water to uphold the health of the ecosystem remains and that neither party is at a significant disadvantage. Slow or incompetent communication from one party to the others halts the progress of all (Armeni, 2008,; Guerrini & Romano, 2014; Anghileri, et al., 2013). Additionally, upstream-downstream problems exist when two parties that utilize the same river fail to communicate, and the actions of the upstream party detrimentally impact those further downstream. Separate managements fail to commit to the common goal and pass off commonly-held responsibilities; with a central water authority, these problems did not previously exist (Golden & Picci, 2008; Guerrini & Romano, 2014). Again, inconsistencies throughout the country cause relative deprivation when citizens in one area receive better conditions than those in another area, and such unequal conditions raise grievances throughout the population. Such issues highlight the importance of establishing a high

value for water and strong management system proactively—rather than after water issues come to light. In Italy, people resisted such retroactive change because they were accustomed to a certain level of water access, and thus a lack of compromise and behavioral change hindered the overall goal.

**Current Situation**

The battle between public ownership and efficient, effective water management is still under construction throughout Italy. In 2006, the national government reformed the national water policy again, attempting to better dictate responsibility and manage watersheds holistically. Law 152 declared that a regulating authority should define the national framework and monitor that all areas comply: a local authority is responsible for monitoring the local service provider, and the designated utility company is responsible for service delivery and implementing necessary infrastructure (Guerrini & Romano, 2014). Additional reforms were established to address equal access to clean water and quality services; efficiency of the system; a transparent, fair tariff system; and implementation of full-cost recovery (Guerrini & Romano 2014, p. 11). These reforms have brought definite progress to the Italian water system, but they are still not fully implemented. Since reforms have been made, more municipalities have established affordable, effective public-private partnerships or have ensured sufficient water services publicly. However, discrepancies still remain.

While the government pushes for better management and coordination between public-private partnerships, dissent for privately-owned water systems grows among a large portion of the population. In hopes of increasing coordination and working out problems between parties that share a common reserve, the 2008 reforms amended Law 152 to state that only one company or authority must govern a given watershed. However, this encouraged larger, private companies

to take over service for the entire watershed and thus absorb management for additional municipalities (Guerrini & Romano, 2014). Unhappy citizens protested the expansion of private ownership. While a small group supports effective public-private partnerships, the majority of Italian citizens vocalize their discontent with private ownership, stating that water is a human right that should not be used for profit (Bieler, 2014; Forum Italiano Dei Movementi Per L'Acqua, 2015). Moreover, the 2009 reforms of Law 152 stated that a private company must hold at least 40 percent of shares in every managing body (Guerrini & Romano, 2014, p. 10), which the public strongly apposed in the 2011 public referendum.

Education is also seen as having greater importance. Environmental Education Centers existed previously, providing local education projects and environmental dialogues (Rolle, 2004), but such efforts did not reach the majority of the population. In 2002, Italy began producing "kid-friendly" versions of their environmental reports to be used in schools, and has increased training programs for educators to teach environmental subjects (Rolle, 2004, p. 2). Environmental education still occurs through programs and multidisciplinary facets, rather than a formal class setting.

**Conclusion and Recommendations**

Relatively recently, Italy, as is the case in many countries, has acknowledged the growing problems associated with water and recognized that the obstacles will only be exacerbated in the future. The central government has passed legislation and followed international regulations and recommendations in order to address such water accessibility issues. However, implementation of national water standards poses gross problems of its own.

As time has shown, implementation proves to be very difficult and requires much coordination. Additionally, coordination requires stakeholders and influential actors to commit to

the greater picture, and requires trust in the overall plan as well as the other actors involved. Stakeholders must act in the interest of the common good, and agree that, because water is a shared resource, all must share the responsibility as well. While some regions throughout Italy have good water management systems in place and have created solutions to maximize the benefits of private-public partnerships in the water system, discrepancies between regions still exist. Corruption and poor management still exists within some regions, holding them back from making improvements to the water system. While corruption and poor leadership can be found throughout virtually every country, this issue is particularly noteworthy in the case of the Italian water system. As water problems become worse due to climate change and increased demand, poor management can lead to serious health risks and strong grievances throughout the population. Therefore, reducing these discrepancies and bringing the entire country to similar standards would decrease relative deprivation between citizens and uphold the same standards of living for everyone.

Suggestions to help Italy fully implement its water management goals include establishing a stronger central management authority, increased transparency, and increased education within the authorities and general population as well. A stronger central authority for the water system[10] can provide guidelines for the municipalities as a reference, act as a support system, aid municipalities as needed, and establish a method to increase accountability. However, implementation of water services must still be carried out at the local level, as each region has its own unique needs and requires flexibility to adapt the guidelines. Increased

[10] While the 2006 reform improved upon this, some regions still lack adequate services. The central authority's duties to hold local branches accountable, facilitate coordination, and support action toward common standards still need to be enforced in totality; while improvements have definitely been made, the inequalities need to be flushed out.

transparency also helps to improve the accountability of each municipality, builds trust between stakeholders, and facilitates coordination between actors.[11]

Increased education and higher water literacy in both the governing bodies and the general public will be incredibly important to the success of effective water management. Higher water literacy among the water authorities ensures the best management practices are being used everywhere and supports capacity-building measures. For the general population, water literacy helps individuals to understand the importance of water conservation efforts and good management practices, and allows them to understand why certain action is necessary. This is important in order to reduce public dissent, protests, and collective. However, individuals do not necessarily need to know and understand the complexities of the water cycle. Effective water education for the general public would involve higher quality information given efficiently: distributing basic but necessary information and presenting it clearly in order to create value for water. In this respect, individuals do not need to know complicated technical information about the pumping systems, or the exact locations of leaks that cause huge inefficiencies. This information can be cumbersome and unnecessary for the general public, but should be understood well by the water authority. By communicating openly and clearly, the authority and public are able to build trust and cooperate towards a solution. Transparency and understandable information help to transfer facts about the water system into value and appreciation for the water system.

Increased education also builds understanding of what it means for water to be a human right[12] and builds up personal value of water, which contributes to smarter water use.

[11] Transparency could improve coordination between the national and local authority, two different local authorities, the government and the general population, and the international community.

[12] Water as a human right can sometimes be misconstrued to mean that *all* water (not just water needed to fulfill basic standards of living) should be accessible financially. However, international law and Italian national law only

If individuals feel water is worth more, they are less likely to waste it. In order to increase water literacy and personal value of water, information should be delivered to the public in a clear, succinct, tangible manor. Individuals should be given suggestions for direct actions that can participate in, and how such action impacts the overall picture. This way, individuals are able to absorb valuable material, and apply the information to their everyday lives. Water availability and water issues affect all people, and therefore it remains all people's responsibility to manage it effectively.

recognize the human right to the amount of water necessary to fulfill basic needs, and therefore "extraneous" water is not included. The government's responsibility is to protect, respect, and fulfill water as a human right—but this does not guarantee it is free (F. Properzi, personal communication, April 24, 2015). Clarifying this differentiation is very important to minimize grievances in the population, and shape how individuals value water.

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