

Chapter 15

The Future of Water Management in Italy



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Abstract Different paradigms have characterized the evolution of water resources management in Italy. The paradigm changes are described, focusing on the main strengths and weaknesses of the current status of water infrastructure, legislation framework and governance of water services. Technical and management priorities are discussed, as key issues of an agenda for the future, relevant to protection and use of water resources, as well as to increase of resilience to hydrologic extremes. Priorities for the future of water policy take into account a large spectrum of actions, relevant to technical and institutional innovations, aiming at improving the expected living conditions of the country. The technological innovations are connected to the development of social and political issues in an improved ethical perspective which requests proper information and qualified education in coping with water resources problems.

15.1 Paradigm Evolution

Italy has a wide tradition in water uses, pollution control and flood risk mitigation. The governments after the country unification (1861) played an important role in the design and construction of water infrastructures necessary to provide municipal water supply, sewer systems and irrigation, essential drivers to modernize the country. The improvement of urban centres, the reclamation and the enhancement of agriculture, as well as the increase of hydropower plants (the “white coal”) were essential elements of the economic development during the 1921–1940 period.

After the Second World War, the development of new hydropower schemes was one of the main objectives of the national policy aimed at assuring the energy necessary for recovering and improving the economic level of the country. At the same

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time, the establishment of the Southern Italy Development Fund allowed the construction of large multipurpose water systems for improving the conditions of the southern regions, including the islands of Sicily and Sardinia.

This long stage of the water commitment, named “hydraulic mission” by Allan (2003), coincides with the “industrial modernity” and is characterized by the adoption of an engineering and economic approach to water resources exploitation (as discussed in Chap. 2). With the support of universities and research institutions, renowned designers and advisors such as engineers, geologists and experts in soil mechanics and hygiene contributed to the outstanding activities of many firms, which worked also in several foreign countries, especially for the construction of dams and for the development of hydropower schemes.

The paradigm changed when new needs arose in order to reduce pollution in rivers, lakes, aquifers and coastal water and to face water-related disasters (flooding and landslides) as well as severe droughts and beginning of desertification. The increasing awareness for environment, supported by a sensitive and strong public opinion, founded the basic guidelines in the directives about the quality of water bodies issued by the European Union (EU 2000). The occurrence of frequent dramatic flooding, such as that of Florence in 1966, boosted politic and scientific institutions to pay growing attention to the identification and mitigation of hydraulic and geological risks.

More recently (EC 2015), a comprehensive approach, aimed at achieving an integrated, sustainable and equitable management, is becoming the new paradigm for the water and soil management. Last orientations to apply successfully this comprehensive approach claim not only the triple consolidated dimension of economic, environmental and social sustainability but also the key role of the governance dimension. Today, this is perceived as an essential basic condition to maximize welfare in a socially equitable way, without compromising the natural systems.

15.2 Strengths of Italian Water Development

As the previous chapters discuss, the water resources management in Italy shows several strengths. They are recalled in this paragraph.

(a) *Almost all water resources are inland resources.*

A very propitious geographic feature of Italy is that almost all water resources are entirely located in the national territory, while the limited number of catchments shared with neighbouring countries has been the object of agreements for common utilization, mostly in the case of hydropower schemes or conjunctive management of pre-alpine lakes.

(b) *A large set of water infrastructures exists in all the Italian regions.*

A rich heritage is in the municipal aqueducts, in some large water supply schemes, as well in the networks of channels and pipelines to meet irrigations demand. Several dams in rivers can increase the surface water availability for various purposes, and innumerable wells assure the exploitation of groundwater.

(c) *The modernization process of municipal water services is in progress.*

The establishment of municipal services proposed by the Galli Law (36/1994), aiming at unifying water supply, sewerage and wastewater treatment, as well as at enlarging the size of the territorial unit to include several municipalities, has produced significant improvement in the quality of urban services throughout the country, with only a few exceptions in some regions.

(d) *The water supply to agricultural and industrial users is fair.*

A large part of the irrigation systems operate in “consortium”, an administrative institution that contributes to achieve minor water consumption and reduced costs. Likewise, the aggregated complexes of industrial plants have developed several common opportunities for suitable water supply and disposal of wastewater and sludge.

(e) *The innovations in electric power generation plants are successful.*

Thanks to the worldwide acknowledged pioneer expertise, most Italian hydro-power schemes are transformed in order to play a new role after the growth of the renewable energy sources, as well as to comply with the constraints imposed by environment preservation. Significant improvement concerns the adoption of pumped storage generation plants, besides more efficient machinery. Several mini- and microgeneration plants contribute to meet the local energy demand. The largest thermoelectric schemes have been located preferably in coastal areas, where they can use seawater for cooling, thus saving precious freshwater for other important purposes.

(f) *An improved cooperation between productive and research sectors is showing promising results.*

The increased ties between the productive sectors and the scientific community contribute to tackle and solve the most complex water problems in an efficient way.

(g) *The European Directives have a positive impact on water planning.*

The European Directives 2000/60/EC and 2007/60/EC have fostered the planning process in the whole country for improving the water quality in natural bodies and mitigating the flood risk. In several cases, the organizational delays in the start-up of the new interventions are disappearing, and the mandatory deadlines to comply with the European Directives are fulfilled.

(h) *The growing role of national organisms improves the performance of subnational bodies.*

Although many commitments in water field have been transferred to the regions, in accordance to a general reform of Italian administration, some new organisms established at central level help to give homogeneity to the working rules of several subnational authorities, regional agencies and local companies for service management. A significant example is the Institute for Environmental Protection and Research (ISPRA), which coordinates the monitoring of hydrometeorological data

and defines the criteria for surveying the status of rivers, lakes and aquifers, now committed to the District Authorities. Similarly, the Authority for Regulation of Energy, Networks and Environment (ARERA) provides homogeneous guidelines to the Integrated Water Service for computation of tariffs and for monitoring the quality of service for customer satisfaction.

(i) *Emphasis on sustainable criteria and social goals.*

Notwithstanding some difficulties, the sustainability paradigm begins to pass from a mere principle declaration to the practical application. A growing number of water management companies are now publishing the sustainability report as an annex to their economic budget, in accordance to the European Directive 95/2014. Ethical principles are explicitly declared in Law 221/2015, which draws the access to drinking water up to customers in uneasy economic conditions. The adoption of ethical principles by several utility companies demonstrates the growing awareness on these requirements.

15.3 Weaknesses of the Italian Experience

Along with the strengths that have been mentioned above, several weaknesses characterize the water sector in Italy. The main cases are discussed below.

a') *Sectorial approach to the water issues.*

The sectorial approach still affects the development of some water infrastructures and the implementation of the legislation and institutional commitments for water system management. A coordinated planning of water resources and soil defense is delayed, in spite of the comprehensive approach declared in many acts. In many cases, the competition among various ministries at central level and different authorities at regional level contributes to increase delays and ineffectiveness of the actions for achieving the prospected reforms.

b') *Controversies between the different levels of governance.*

Some persisting controversies among the institutions at national, regional and local levels have an impact on the new administration lines on water governance. Very often, this is the case of municipal water services, the protection environment and the defense from water-related disasters. In spite of the reform of municipal water service, based on a territory larger than the municipal area, several municipalities continue to operate water supply, sewerage and wastewater treatment in an autonomous way.

c') *Shortcomings in the maintenance of hydraulic facilities.*

A persistent lack of maintenance hinders the efficient running of several existing plants. Even though leakages and wastes exist in all water uses, municipal supply mains and distribution networks show big losses in the relevant water systems. For the whole country, a loss of 2.7 km³/year is estimated, equivalent to the 40% of the

total withdrawal in 2015. A consequence of this is also an annual energy waste for the induced increase in running of power plants.

d') *Slow advances in the achievement of the objectives of the water-related planning tool.*

In several cases, the achievement of the water quality status recommended by the 2000/60/EC Directive is delayed, as well as that of flood risk reduction recommended by the 2007/60/EC Directive. Particularly inadequate is the control of groundwater quality. Several aquifers are overexploited, due to the lack of regular licenses and abstraction monitoring. Many urban centres, transportation structures and cultivated lands are still subject to a high risk of flooding.

e') *Emergency actions continue to prevail on prevention measures for coping with the hydrological extremes.*

Despite the priority declared for prevention approach in coping with floods and droughts, political and technical actions seem to favour an intervention during and after the disasters for people security. Therefore, interventions are mostly oriented to recovering the damaged structures, very often with unexpected costs. Limited financial resources contribute to an inadequate approach for increasing the resilience to flood risk and water shortage impact.

f') *Scarce preparation to the foreseeable impact of climate changes.*

Several proposals included in the National Plan for Climate Change Adaptation (2017), prepared by Ministry of Environment in accordance to European Guidelines, and describing a very detailed list of actions in several sectors (agriculture, health, energy, etc.), have a very limited implementation in the daily activity of many sectors of water resources management.

15.4 Key Issues of an Agenda for the Future

An attempt to define some essential points of an agenda for the future of Italian water resources requires a critical analysis of some strategies recently proposed at international level. In order to solve global and local water problems, the most recent guidelines address the challenge of a sustainable and equitable water management derived from the “2030 Agenda Sustainable Development Goals” of the United Nations (UN 2015; Giovannini 2018). The large spectrum of suggested actions should be implemented in order to achieve technical, institutional and social innovations, necessary for water management. Similar actions can also increase the cooperation between the institutions for water governance and improve the participation of responsible people.

From a technical and management point of view, an agenda for the future of Italian water resources should consider the following priorities, many of which have been claimed already two decades ago (IRSA 1997, 1999):

- Better knowledge of water availability, water demand and ecosystem requirements, to achieve through improved monitoring systems and more efficient surveys on water services performance
- Adoption of suitable pricing systems and adequate economic incentives for the users, necessary to enhance effective water saving
- Improved and up-to-date tools for the measurement of the meteorological, hydrologic and hydraulic data required for the management and protection of water resources
- Suitable criteria and tools for the evaluation of sediment transport in water bodies, including the siltation of reservoirs
- Efficient and reliable models for the hydrological events, the hydraulic aspects in the water body and the rational use of water, adopting the advanced tools of the information technology
- Improved procedures for seawater and brackish water desalination, in order to increase the resource for domestic and industrial use in the coastal areas
- Advanced technologies for treating and reusing wastewater and sludge disposal
- New technologies for the performance of water services, to reduce losses and waste in the withdrawal, conveyance and distribution systems
- Availability of drinking water 24 h a day and 7 days a week for all citizens, also in order to reduce the use of expensive bottled water
- Planned effort for a continuous maintenance of the water infrastructures, especially for the efficiency of the various uses and wastewater treatment
- Adaptation of the storage facilities to the increased variability of runoff and occurrence of drought events due to climate change
- More effective approach for reducing the flooding risk, through actions aimed at prevention, by imposing hydraulic invariance and respect of hydraulic risk constraints in the general land planning
- Water quality indicators in watercourses, able to better interpret the ecosystem health, taking into account watershed stress, physical habitat, chemical exposure and biological response
- Ecologically based classifications of physical habitat of rivers and the definition of their occurrence, for a better and more efficient river flow evaluation
- Groundwater protection from pollutant discharges and saline intrusion in coastal areas
- Wise application of the sustainability paradigm, avoiding the use of surface water above the rate of natural renewability and avoiding the overexploitation of groundwater
- Development of advanced information systems able to provide the amount of data necessary for the solution of the complex water problems
- Adoption of robust ecological, economic and social indicators, able to improve decision-making process when a compromise between human and environmental requirements is necessary

An agenda for the future in water resources requests also a scenario based on some priorities in water policy. In the last decades, the unlimited growth, the capitalism as the only model for economy and society and the human being as consumer

have been predominant (Soderbaum 2009). An expected scenario will deal also with ecology, human security needs and welfare status.

A scenario based on “business as usual” will include more compulsory concepts, like the increasing population, urbanization, economic growth and energy generation, under the new risk of climate change and the constraint of an improved environment protection. A scenario based on “social-ethical change” will take into account the limits of an uncontrolled growth, the shift from one-dimensional monetary thinking to multidimensional impacts and the evolution of environmental and social attitudes in the political concern.

Whichever will be the future scenario, an improved management of Italian water resources should include at least the following list of policy priorities:

- An updated legislation to simplify the water-related plans
- Better rules for regulating withdrawal from surface water bodies, which may include revising permits in order to assure ecological flow, and to avoid overexploitation of groundwater
- A reform of the responsible institutions, necessary for improving the coordination among the different bodies of the public administration, at central and regional level
- A better governance of municipal water services
- Transparent information to the water services customers, also for activating a responsible public participation
- Implementation of the principle of hydraulic and hydrological invariance in the urban and land planning, in order to avoid the increase of peak flow and flood volume due to the growth of impervious areas
- A better coordination in the warning and alert/alarm procedures of flood risk, particularly between municipalities and civil protection systems
- A plan for mitigating the risk of drought and water shortage at each water supply level
- A primary effort for maintaining the existing hydraulic structures and for realizing the new works needed for the future management of water resources

The preliminary conditions for the specific measures to adopt include two conceptual aspects. The first is a multidisciplinary approach to face the water issues complexity that is expected to increase in the future. The second aspect concerns the utmost importance of recognizing an ethical responsibility for water (Selborne 2000; Falkenmark and Folke 2002; Rossi Paradiso 2011).

Unfortunately, today the most common approaches to water problems are far from any ethical perspective. Often a “cynic view” is prevalent, based on the belief that the true driving forces behind water governance and management are always an economic and political power, with the conviction that any attempt at change could not be successful. Another perspective focuses the lack of equity in water allocation as a pretext to fight all the economic systems. Finally, a persistent “utopian idealism”, stressing the importance of the principle declarations and “right charts”, and considering them as a “panacea”, is not sufficient for guiding the hard and long process of achieving better water resources protection and safety from water-related disasters (Rossi 2015).

15.5 Concluding Remarks

The analysis of paradigm change in water resources exploitation and the attempt to identify strengths and weaknesses of current situation confirm that the increasing complexity of water resources management requires enlarged perspectives in the definition of an agenda for the future. In terms of water problems to face, an integrated water management, including issues of water supply, water quality and water-related risk, has to take into account also the links with food security and energy development. Besides the consolidated approach, based on engineering, economic and environmental sciences, a multidisciplinary approach is required, including social, political and ethical dimensions.

Integrated, sustainable and equitable water management requests a planning activity formulated on thorough evaluations of several assessments connected to the water, which is conceived a natural resource to be better recognized, protected and used. Such an activity requires collecting reliable data and their use by means of the best available expertise.

A comprehensive view of the problems of water quantity, water quality and water excess at river basin scale is the basic premise of planning tools. A wise balance between human needs and ecosystem protection is fundamental for the design of the water infrastructures, while an adequate regulation of institutional aspects is essential for the coordination of different levels of government with an improved public participation in decision-making process. The utmost goal is an efficient and effective operation of water systems with satisfaction of users and environment protection.

A great ethical challenge is expected for all the persons involved in water concerns, at any level of responsibility, in scientific and practical sectors.

This encourages looking to the future with the hope that the water resources will play always their fundamental role for the development of Italy and its people, with the opportunity of transferring technological, management and cultural innovations to other countries in order to contribute to the economic, social and vital development.

It is worthwhile to remember how water has been the main reason of life for centuries, starting from the ancient Italian civilization that gave it divine attribute. The conclusion of this book can be therefore a sentence borrowed from the “Canticle of the Creatures”, historically one of the first documents written in Italian language, due to Saint Francis of Assisi. At the beginning of the thirteenth century, expressing his gratitude to God, he wrote a sentence that in modern English sounds: “Praised be you, my Lord, for Sister Water, so very useful, and humble and precious, and chaste”.

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