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The Evolution of the National Water Regime in Italy

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* Overall this chapter reflects the work and common thoughts of both authors. The section on the evolution of water rights (Paragraph 2.2) is by N. Lugaresi; the other sections are by A. Goria.

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1. Research framework

1.1 Introduction

The aim of this chapter is to understand the evolution of the water regime in Italy over the last century, questioning whether the national water regime is moving towards an 'integrated regime' under the hypothesis that an 'integrated regime' should provide for a more sustainable use of water resources.
More specifically, the research project aims at understanding under which conditions and change factors water regimes evolve towards a higher level of integration, and towards a more sustainable use of water.
Water regimes are defined as the combination of property rights on water and water policies, withdrawing the analytical elements from economic and political theory.
The analysis of the evolution of water regimes from 'simple' to 'complex' and then 'integrated' regimes thus involves the analysis of the nature and distribution of water rights over time, as well as the analysis of the development of the water government system, addressing the water policy objectives, the strategies pursued and the instruments used, the main actors involved in the policy arena and their resources.
Integration occurs through the enhancement of two dimensions of the water regime: its extent and its coherence, respectively referring to the scope of goods and services covered by the water regime, and to the number and level of co-ordination of the actors involved in the regime.
The analysis of the evolution of the water regime in Italy covers more or less the history of the water government and water rights system over the last one hundred years, since the first water law following the Italian reunification was approved.
The structure of the paper is as follows.
First, a short descriptive evidence of water uses and water quality throughout the country is provided.
Secondly, the paper investigates the evolution of the water regime in Italy looking at the evolution of the water policy design and of the water rights system, based on an in-depth analysis of the Italian legislation on water. The proposed reading of the evolution of the water rights system in particular is rooted in a law perspective.
To follow, the paper identifies the different phases of the Italian water regime changes towards integration, addressing the sustainability dimension of water regime changes, the issue of co-ordination between water rights and public policies, and the analysis of the forces behind the water regime transitions.

1.2 The national context: water resources and uses

Water in Italy is relatively abundant, although its availability varies a lot across regions. Despite the high rainfall level, its seasonal and regional variability is extremely high, like in all Mediterranean countries, being influenced by natural as well as by technical factors.
The quantity of water which can be actually used depends on the available infrastructures and storage capacity, which vary according to the nature of the landscape. The mountainous nature of a large part of the Italian territory reduces the

scope and technical feasibility of internal water transfers, forcing many regions to rely on their own water resources due to the high costs of accessing water otherwise. In fact mountainous and hilly regions cover over 75% of the whole territory; furthermore the country shows an hydrographic grid essentially made of a high number of torrential streams with very short branches.

Table 1 provides recent estimates concerning water availability across Italian regions, illustrating total rainfall, water storage capacity and water availability by regions or water basin.
The figures show that the availability of water varies a lot across the country, and that its distribution by surface and underground availability, as well as by storage capacity and total rainfall, varies too across all regions.
The North- East and the Po Basin show the highest water availability: thanks to the Alps and to the natural storage capacity provided by glaciers and lakes, northern regions in fact can enjoy a regular and relatively abundant water endowment. On the contrary, southern regions show a considerably lower availability of water resources, characterised by an extremely high seasonal variability of run-offs.
A. Massarutto (1999) reports that while the outflow from the Alpine rivers is well distributed during the year (9%, 24%, 41% and 26% respectively for winter, spring, summer and autumn), in the rest of the country a share between 60 and 90% of total flow is concentrated in winter and spring (from Rusconi, 1995); furthermore, according to the National Hydrographic Service, a large part of the South suffers from consecutive periods of 100-150 days without rain.
The existent water system allows to use only a small fraction of the potential water outflow, and particularly in southern regions the technical constraints and inefficiencies can lead to an unsustainable use of water.

Table 1- Availability of water resources in Italy

Hydrologic area	Rainfall	Storage capacity	Surface water available	Underground water available	Total water available
Po Basin	71.800	2.194	16.118	4.468	20.586
North East	42.900	1.069	10.939	1.721	12.660
Liguria	6.400	29	372	307	679
Romagna-Marche	20.700	212	995	620	1.615
Toscana	20.900	141	543	440	983
Lazio-Umbria	24.100	452	1.399	1.126	2.525
Abruzzo-Molise	11.900	603	2.454	248	2.702
Puglia	13.200	397	523	325	848
Campania	23.200	77	1.237	929	2.166
Calabria- Lucania	24.000	1.131	2.514	595	3.109
Sicilia	18.800	718	738	1.151	1.889
Sardegna	18.800	1.403	1.841	217	2.058
Italy	296.700	8.426	39.673	12.147	51.820

Source: IRSA 1999 (values are expressed in thousands cubic metres)

Focusing on the qualitative aspects of Italian waters, the situation is again very differentiated throughout the country. It is possible to identify a number of cases which contribute to the general deterioration of the water quality. These critical cases mainly occur when medium or small streams drain areas with high urban and industrial concentrations. It is worth mentioning the case of the river Lambro, draining the area of

Milan, still poorly equipped in terms of sewage treatment capacity, the case of the Venice lagoon, the reaches of the rivers Po, Arno and Tevere, respectively downstream with respect to the cities of Turin, Florence and Rome.
The presence of industrial activities with heavy environmental impacts, such as the tanning and textile industry in the North, the food industry in the South, also represent an important source of severe water pollution.
Some areas are more vulnerable to nutrient pollution due to their geography: an example is provided by the large lakes in the North and the upper Adriatic Sea, which collect water inflows from the rivers draining the most densely populated and industrialised part of the country.
Despite the large efforts carried out since 1976, due to the new regulation addressing water pollution problems, around one third of the pollution load has not been treated yet.
Generally the biological and chemical quality of the largest rivers is extremely poor, and the number of polluted sites has increased, spreading even outside highly urbanised areas. High pollution in the North and the Centre is mostly due to industrial and agricultural activities. Nitrate concentrations over the acceptable threshold established by the European Directives (50mg/l) are recorded in several cases, particularly in the coastal plains, along the basin of the rivers Tevere and Po: unfortunately in this last region, which is highly populated and industrialised, the most vulnerable area is located in the upper reaches of the plain, where the table recharge occurs. Furthermore soil contamination, mostly due to landfills and abandoned industrial sites, but also to direct discharge and to the use of polluted fertilisers, determines water pollution from bacteria and heavy metals. In other regions, particularly in the southern part of Puglia, or in the coastal plains of Campania, Calabria and of the island of Sardinia, the main problem is salt intrusion. In these cases the over-abstraction can be attributed to private abstractions for agriculture and, at a local level, to public water supplies.

Looking at the patterns of water use[†], it is worth mentioning that *Northern regions account for about 67% of overall water consumption in Italy, vs. about 15% of water consumed in the South, and about 8% of water consumed in the Islands*.
With regard to the distribution of water consumption by use, *agriculture accounts for almost 50% of water consumption*; in the South and in the Islands this figure is even more striking, and agriculture accounts respectively for 56,3 % and 63,6 % of total water consumption.
Agriculture seems to catalyse water use in all regions, with the exception of central Italy, where civil use of water captures the major consumption (39,1%).
All uses tend to concentrate in the North: the North- West catalyses civil use, industrial use and the use of water for irrigation, whereas the North- East catalyses the use of water for energy production.
Data on water consumption however is highly heterogeneous and should be read carefully.

Also the patterns of access to water vary across the country and according to the water use.

[†] *IRSA, 1999*

Civil uses of water essentially rely on underground water. This applies particularly to the North, where underground and springs account for 90% of household water supply. On the other side in Southern Italy and especially in the Islands water supplies are obtained for 15-25% from the surface, reservoirs and transfers.
Surface waters in the North are used essentially for irrigation purposes, generally in association with an intensive development of river basins for hydropower generation nearby the mountains.
The hydropower network, consisting of some hundreds of reservoirs, inter-basin transfers and by-passes, later transfers the water to downstream reservoirs intensely used to supply the irrigation system.
A further 10-25% of water for irrigation however is derived from the underground, small streams, small rainwater storage systems. In the North, this occurs particularly in mountain and hilly regions during the winter, in order to prevent damage from hard-frost; in the South and the Islands, on the contrary, underground water is used intensively during the summer, either inland or along the coastal plains.

The different water use patterns across the country relate to a different structure of supply between the North and the South.
In the North water supply is highly segmented. Public supplies are operated at the local level under municipal or inter-municipal organisations. Irrigation is managed collectively through farmers' associations. Industrial facilities are almost always self-supplied, and when they are not, they rely on dedicated networks. Therefore, water systems in the North are highly segmented and separated, showing very little interrelations or interactions among each other.
On the contrary, in the South different uses are highly interdependent, since they often rely on the same infrastructures, mainly large water storage and transfer schemes essentially operated by State-owned organisations. Of course there are as well cases of local collection of water, whereby water is allocated to various uses through its own adduction system.

This evidence shows the overall vulnerability of the Italian water system, mainly characterised by a high variance of water availability and water quality, as well as by a highly heterogeneous structure of water supply across the country, often leading to unsustainable patterns of water use.
The high population density, the agricultural tradition in the Italian economy, and the recent fast development path pursued, are all elements exercising pressure on water resources, affecting both water availability and water quality.
In addition, floods, landslides and mudslides, as well as aggressive town planning, lack of monitoring, and controversial land management practices have lead to a chronic dangerous situation in many areas of the country. Other water-related phenomena, such as the subsidence caused by intensive water drainage, are hard to reverse. Most often aquatic ecosystems have not been conserved properly and biodiversity has been distorted in many natural streams due to excessive exploitation.
In some way all these problems have been exacerbated by cultural faults: lack of water culture, lack of attention and lack of awareness. Water has constantly been perceived as an infinite, non-exhaustible resource, which is not, to be made available at a very low price. Wasteful behaviours have therefore been not only common, but also accepted.

The economic approach has not been satisfactory, and water fees policies have not been able to support investments in the water sector. Over time, the management and utilisation patterns of water resources appeared to be unsustainable.

Looking more in details at the structure of water prices in Italy, table 2 shows the evolution of water tariffs for different water uses between 1933 and 1994. Although prices over time are not fully comparable, the data show that water fees for agricultural uses didn't adjust to the increased cost of living, both in relation to the volumes of water withdrawn and to the measure of irrigated land. In both cases the 1994 water fees amounted to almost ¼ of the 1933 one. On the contrary, water fees for hydroelectric use increased faster than inflation and fees for drinking water even increased by 12 times in real terms between 1933 and 1994.

Table 2. Evolution of water tariffs for different water uses (1933-1994)

Destination	*Measurement unit*	*Price 1933 (it. £)*	*Price 1994 (it. £)*	*Price 1933 at 1994* values*
Agricultural uses	module	200	70.400	255.785
Agricultural uses	hectare	2	640	2.558
Civil consumption	module	200	3.000.000	255.785
Industrial uses **	module	n. a.	22.000.000	n. a.
Hydroelectric uses ***	nominal kw	12	20.467	15.347

* actualisation of 1933 prices based on the cost of life index (average consumption prices for workers' and employees' families)

** in 1994 the module for industrial uses is defined differently from the others

*** the 1933 rent refers to the nominal dynamic horse-power of motive power, whereas the rent of 1994 refers to the KW

Source: Ministry of Finance and IRS estimates based on data from CNR and Ministry of the Environment, in Malaman R., "Il costo dell'acqua: canoni e tariffe"

Water services until present have been paid by users through two different instruments: the water tariff for the aqueduct service, and the fee for sewerage/ purification. Traditionally their regulation occurred through different channels, and only recently has been unified. The water tariffs are anyway regulated by a price-ceiling, such that the allowed price increase is set up as a function of the initial price.

The aqueduct tariff, which now includes the sewerage and purification fees, consists of a fixed quota (which corresponds to the rent of the water meter), of a variable quota (which depends on water consumption, marginally increasing with consumption), and in most cases of a lump-sum payment corresponding to a minimum level of water consumption.

The fixed quota is still extremely low (a few Euro per family on average, since its value hasn't been adjusted since 1974), and in practical terms its role is invested by the lump-sum payment for a minimum consumption level, which in many municipalities is quite high, almost exhausting average real consumption. Given the existence of a price ceiling, this price dynamics does not enhance water saving.

The recent empirical evidence available however suggests that in the last decade water tariffs in Italy tended to increase: it is estimated that between 1992 and 1998 water prices increased by 40% in nominal terms, and by 2% in real terms (OECD 1999).

Water prices in Italy now amount to around 0,75 Euro/mc, approaching water prices in France, Germany and the U.K.. Italian prices are not anymore the lowest in Europe, as it was the case in the '80s.
1992 data show that the average yearly expenditure for drinking water for the average Italian family (made of a nucleus of three persons) amounted to 180 Euro, of which 65% referring to water supply, 10% to water sewerage, and 24% to water purification. The incidence of such water consumption expenditure for domestic use on the average yearly family income level (estimated around 22.000 Euro) thus proxies 0.8%, to be compared with 1,1% in the U.K. (of which 50% referring to water supply, and 50% to sewerage and purification), 1% in Germany, and 0,7% in France.

The analysis which follows makes an attempt to understand if a more sustainable pattern of water regulation, management and use in Italy is under way.

2. The evolution of the national water regime

2.1 Evolution of water policies

The evolution of water policies in Italy over the last century is mirrored by the evolution of the legislation on water, which has been highly fragmented throughout most of the century, addressing along different paths the issues of water exploitation, civil protection, environmental and water quality, and showing some attempts to integrate only in the most recent decades.
Water policies in the regimes of concessions for water use and of civil protection from water in fact run parallel until the early '70s, when the water policy regime started to evolve towards *a higher degree of complexity*, characterised by broader and multiple policy objectives (addressing quantitative and qualitative issues, and relating water to its environmental and health dimension), and towards *a higher degree of decentralisation*, characterised by an increasing number of actors involved in the regime.
Since the early '90s the higher degree of complexity and decentralisation achieved has been leading to some conflicting attempts to integrate the water policy regimes.
Tentative efforts to integrate occur at two separate and conflicting levels: at the water basins level, through the creation of the Water Basin Authorities (henceforth AdBs), entitled to water planning in the water basins under their authority, and at the local level, through the creation of the Optimal Territorial Areas (henceforth ATOs), entitled to administer locally the *integrated water service*.
The evolution of water policies reflects the process of change occurring at the institutional level in the country.
Italy in fact is facing a gradual process of institutional decentralisation which started with the creation of the Regions ('72, '78), and which evolved towards the progressive empowerment of the Regions and of the local Authorities (L. n. 112/99).
This process of decentralisation however did not occur without difficulties or contradictions.
Major obstacles were given by the fact that the process of institutional change did not match with a parallel process of political renewal; this mismatch affected in particular

the regional reform, which took some time to take off. The Regional Authorities played the weakest role in the process of institutional reform of the State, and after a few years of institutional immobilism only since 1995 they started to invest effectively their new role.
This slow and difficult process of institutional reform of the State has influenced the evolution of water policies, being partly responsible for the contradictions that we observe in the tentative process of integration of water policies.
The more detailed analysis of the recent evolution of water policies in Italy which follows will help to understand the nature of the policy changes and of the contradictions emerging in the new water policy regime.

Table 3 provides a first reading of the evolution of water policies, looking separately at the evolution of the water policy regimes of concessions for water use, of civil protection from water and hydraulic works, and of water and environmental quality.

Table 3. Evolution of water policy regimes

Regime of concessions for water use	**Regime of protection from water/ hydraulic works**	**Regime of water quality and the environment**
L. n.2248/1865: definition of a regime to authorise water use	**L. n.2248/1865**: definition of a regime of water police, regulating hydraulic works and soil protection	Water quality issues are dealt with by sanitary laws
R.D. n.1775/1933: organic revision of the previous regime	**R.D. n.1775/1933**: organic revision of the previous regime	
	L. n.129/1963: design of the General Regulatory Plan of Aqueducts, as a first organic attempt to plan in the water sector	
1972: reform of the State with the transfer of State functions to the Regions, and a redistribution of roles and competence to authorise concessions for water use (through L. n.616/1977)	**1972**: reform of the State with the transfer of State functions to the Regions; minor hydraulic works are under the new responsibilities of the Regions Through L. n.616/1977, all functions regarding the aqueducts sector are explicitly transferred to the Regions	
		L. n.319/1976: this law mainly addresses the protection of water from pollution, focusing on waste water and on the planning of water use and protection. The law develops to adjust to the EU regulation, although its formulation is still rooted in health principles
	L. n.183/1989: first attempt to develop a structured water policy	**L. n.183/1989**: this law covers water quality issues and addresses water

	within a disciplinary action aimed at soil protection, through the introduction of the River Basin as the optimal area of intervention	and environmental protection. First attempt to integrate water quality, water use and soil protection
L. n.36/1994: definition of a new regime, through the creation of the *integrated water service*, administered by the ATOs [not yet fully implemented]		

D. lgs. n. 152/1999: this law aims at the integration of environmental/ health/ economic and productive policies in the perspective of a global policy of water resources management. The law has been designed to integrate and implement EC directives on the subject.

Starting from the most recent one, we shortly illustrate the main features of the water laws which did contribute to the recent evolution of water policies highlighted in the previous table:

- ⇨ *D.lgs. n.152/1999*: this law aims at the integration of environmental/ health/ economic and productive policies towards a global policy of water resources management. The law has been designed to integrate and implement the following EC directives: the directive 91/271, which regards the treatment of water refluents, and the directive 91/676, which regards the protection of water from pollution caused by nitrates from agriculture. This law gets over the 'discharge standard' as a unique criterion to evaluate an effluent compatibility. The law in fact introduces the concept of the quality objective of a water body, in line with the orientation of the future European Directive on water. According to this new approach the Regions, in accordance with the Basin Authority, will approve some 'protection plans' which aim at defining for each water body a quality objective, at defining the admissible charges, compatible with the self-purifying capacity of the water body, and, on this basis, at defining the discharge limits. Until the approval of the protection plans, the discharge limits are set by the text of the law, and for the urban refluent water, they are differentiated according to the dimensions of the populated areas supplied: these limits are more restrictive than those set out by the law Merli (L. n. 319/1976).
- ⇨ *L. n. 36/1994 (L. Galli):* law which deals with water services, uses and management, containing general principles. Its main features are:
  - the law clarifies the public ownership of all water resources (with the only exception of the rain water storage)
  - the public ownership of water resources is assessed based on sustainability principles; to apply these principles, the law foresees several measures aimed at water saving, and at the re-utilisation of refluent waters, through the improvement of water services,
  - the law sets a hierarchy between various uses of water, giving priority to human consumption, and preserving water quality for human consumption
  - in operational terms the law foresees the creation of an Integrated Water Service, which should provide extraction, adduction and distribution services for water supply, sewerage and purification
  - the law requires the definition of the ATOs to manage the Integrated Water Services, jointly with the identification of their respective managing bodies.

The ATOs will be defined based on both hydrographic and political-administrative criteria. According to the L. n. the Regions are responsible for the definition of the Optimal Areas to re-organise the integrated water service (within the national water basins, the Regions will have to identify the ATOs consulting the relevant Basin Authorities. The re-organisation of the water services within the ATOs implies a revision of water tariffs (water tariffs should guarantee a 'full cost' recovery, i.e. operational and investment cost recovery).

Based on this law the revision of the traditional water services thus implies the implementation of the ATOs, the definition of a unique water tariff, the identification of a unique body managing water services in each ATO. Within each ATO water services must extend besides the municipal level. The Regions must identify the most effective form of co-operation; besides the most conventional forms of co-operation, mainly between Provinces and Local Municipalities, all the other forms foreseen by the L. n.142/1990 are allowed, contemplating consortia, mountain communities, urban cities. The creation of the ATOs implies a growing competitiveness of water, traditionally seen as a natural monopoly.

⇨ *L. n.183/1989:* law which deals with the protection of the watershed and the water resources, the safeguarding of the water heritage, and the uses and management of water. This law can be considered innovative under three main profiles:

- the definition of the River Basin as an optimal area of intervention for an integrated policy of soil protection and water management
- the creation of the Basin Authorities, which involve the participation of both the State and the Regions, autonomous and endowed with technical skills and financial means
- the design of a Basin Plan, as a planning instrument within the River Basin, which involves cognitive, normative and technical components.

The law addresses as well a new principle of environmental protection: art. 3 states that the basin plan must ensure a rational use of surface and underground water resources, with the *guarantee that water withdrawals will not compromise the water minimum constant vital flow.*

This law provides the ground for the L. n.36/1994, previously illustrated, since it makes reference to the need for an effective water pricing policy, to the integration of water services within a specific territorial area, to the redefinition of the territorial reference units, independently from the administrative divisions.

In addition the law foresees activities to improve the current knowledge of the hydrological system, through data gathering, elaboration and diffusion, research experiments, thematic maps, the evaluation of the effects of the implementation of new regulatory acts.

According to the law, the whole Italian territory is divided in: 11 National Basins, managed by 6 Basin Authorities/ 18 Inter-Regional Basins, controlled by the Regions involved which have to find agreements on the administration of hydraulic works/ Regional Basins, where the administrative functions on water resources are delegated to the competent Regions.

Parallel to this administrative rationalisation process, the law strengthens the state functions at a central level through the creation of the Ministerial Committee for National Technical Services and Soil Defence Interventions at the Council Presidency, and the creation of the National Committee for Soil Defence and of the Inspection Committee for the Use of Water Resources at the Ministry of Public Works, thus

enhancing a sectoral centralisation process which substantively constrains regional autonomies. A minor role is invested by local administrations, which according to art. 11.1. may participate in interventions of soil defence regulated by the Regions

- ⇨ *L. n.319/1976:* this law explicitly addresses the protection of water from pollution, and draws a breaking point with respect to the traditional policy where water was considered essentially as a resource to be exploited. This law addresses for the first time a culture of sustainability. It focuses on two main elements:
  1) water waste/discharge regulation,
  2) planning of water use and protection

This law represents the basis of the regulation of water pollution; its main flow is perhaps given by its focus on sanitary rather than environmental regulatory aspects, which didn't facilitate its merge with the more recent regulation adapting to the European Community law.

Setting the need for both specific administrative measures and broader administrative programmes, this law provides the scope for a multi-level governance system. In fact it foresees the re-organisation of the public administration both at the centre and at the periphery, through an administrative grid represented by all territorial bodies and their consortia.

Through a first reading of the evolution of water policies in Italy, we can identify the sequence of three main periods characterised by the predominance of different interests:

1. the first one focuses on the protection of land and population from water; it evolves between 1865 and 1933, ending with the promulgation of the 1933 Water Code (R.D. n.1775/1933). Its main focus on land protection, and the lack of reference to potential conflicts, at various levels, on different water uses seem to characterise this first phase as a simple water policy regime
2. the second one focuses on the regulation of alternative uses of water, i.e. for navigation, irrigation, productive or civil uses, etc., which occurs through fragmented and separate laws. This regime, which develops from 1933 until 1976, can be interpreted as a simple policy regime evolving towards complexity, given the perception of the need to deal with alternative uses of water covered by fragmented and separated regulations
3. the third one, more recent, focuses on the protection of water resources, both from a qualitative and a quantitative perspective, and develops from 1976 onwards, showing an increasing degree of complexity. During its first stage the main focus is on water quality (L. n.319/1976); the L. n. 183/1989 indeed shifts the main focus on water uses, although it covers as well the environmental protection and water quality aspects. The subsequent most relevant laws, respectively the L. n.36/1994 and the D.lgs. n.152/1999, show some conflicting attempts to integrate water use, quality and protection, although, as previously anticipated, they haven't achieved a fully integrated regime.

Focusing on the increasingly broader dimension of the network of actors involved in the evolution of the water policy regime, the following considerations can be made.

- ⇨ The Ministry of Public Works has played a leading role in the system of governance of water resources since the first public water regime, expressing the State position on water management and administration. The Ministry of Public Works is still entitled with the main State responsibilities on water administration, playing a major role in the Institutional Committees of the National Basin Authorities, although,

according to the L. n.300/1999, it should be now replaced by the Ministry of the Environment and Soil Protection.

- ⇨ A first picture, until the '70s, shows a system of actors where the public intervention in the water sector occurs through the Ministry of Public Works, which interacts directly with the land reclamation consortia, as well as with the municipalities. Only in the '70s the policy communities involved in the water regime tend to expand: the Ministry of Health, the Local Health Units and Labs[‡] and subsequently the Regions and Provinces (following the State Reform), the European Union and the Ministry of the Environment, start to play a relevant role in the context of the new water regime. The Ministry of the Environment intervenes with the support of the National/ Regional Environmental Agencies (ANPA/ ARPAs)
- ⇨ A growing complexity emerges first with the involvement of the Basin Authority Secretariat in the system of water management and administration (L. n.183/1989), secondly with the creation of the ATO (L. n.36/1994), which however until now have been implemented only in a few cases.

The following table shows the main actors involved throughout the evolution of the water legislative framework. The table shows that the number of actors involved in water policies increases over time. However it should be pointed out that the table essentially reflects the main actors involved in water policies according to the evolution of the legislative framework, which has not always been effectively implemented. For instance the ARPAs and the ATOs, foreseen by the law since the early '90s, in most cases have become effective only since the late '90s. In several cases the ATOs haven't even been implemented yet.

Table 4. Main actors involved throughout the evolution of the water legislative framework

Actors	*R.D. n.1775/1933*	*L. n. 319/1976*	*L. n. 183/198*	*L. n. 36/1994*	*D.lgs. n. 152/1999*
Ministry of Public Works	X	X	X	X	X
Municipalities	X	X	X	X	X
Consortia for Land Reclamation	X	X	X	X	X
Ministry of Health		X	X	X	X
Local Health Units and Labs (LPIP-USL/PMZ)		X	X		
Regions		X	X	X	X
Provinces		X	X	X	X
UE		X	X	X	X
Ministry of the Environment		X	X	X	X
Basin Authorities			X	X	X
ANPA				X	X

[‡] The Local Health Units and Labs will then be transformed into Regional Units and will be transferred from the Ministry of Health under the Ministry of the Environment

ARPAs				X	X
ATOs				X	X

Focusing indeed on the extent dimension of the water policy regime, as shown in table 5, it can be noticed that throughout the evolution of the water regime new uses have been regulated by law.
In particular only with the L. n.183/1989 water use to support the living environment, as well as water use for recreational and leisure activities, gain a new status, being covered by the law.

Table 5. Regulation of the various uses of water in the Italian law

Goods and services	**Uses**	**R.D. n. 1775/1933**	**L. n. 183/1989**	**L. n. 36/1994**	**D. Lgs. n. 152/1999**
Living environment	Food/ reproduction		X	X	X
Protected living environment	ecosystem conservation		X	X	X
Production	Industrial water	X	X		X
Production	Irrigation/ agricultural use	X	X	X	X
Production	Drainage	X	X	X	X
Production	Production of mineral water				X
Production/ recreation	Infrastructures for tourism and leisure:		X		
Consumption	Drinking water	X		X	X
Consumption	Private gardening and horticulture	X			
Consumption	Cattle raising	X			
Consumption	Pisciculture/ molluskculture				X
Energy	Hydropower production	X	X	X	X
Energy	Geo-thermic use		X		

It should be noticed that the most recent D.lgs. n.152/1999, which places emphasis on water quality, fails to integrate recreational uses of water, as well as medical uses, geo-thermic use and protection against natural hazards. The latter one was previously covered in depth by the L. n.183/1989 and L. n.36/1994, aiming respectively at soil protection and at an integrated water management.

Recreational and medical uses of water indeed have never been integrated under an 'umbrella' water law: the use of water for water cures in particular is still regulated by specific laws, as explicitly stated in the L.n. 36/1994.
Uses of water for consumption and production have been generally covered by the Italian legislation, with the exception of water consumption for private gardening and horticulture and cattle raising, originally regulated by the 1933 Consolidation Act and never mentioned in the subsequent laws.

2.2 Evolution of water rights: a juridical perspective

The reading of the evolution of water rights in Italy follows an approach which is rooted in a law perspective. The need to support the reading of water policy evolution with a view which is internal to the Italian law is essentially motivated by the specificity of the Italian law, applying as well to water rights.
Differently from the general framework suggested within the EUWARENESS project's approach, where the analysis of property rights mainly refers to economic theory (distinguishing between property rights, rights of disposition and use rights, thus involving the issues of property distribution and of procedural regulations, such as the exclusion of non-owners and access/ use control), the perspective provided in this paper indeed reflects a juridical approach to water rights, strictly rooted in the Italian law, which draws a main distinction between private and public water rights.
Water has a complex legal status and, besides the overlapping and incoherent array of the Italian legislation, it is water itself that is often ill defined, making things harder for defining private and public rights. In fact water is a natural element, and as such it involves ethical issues. It is a limited public commodity, and as such it must be properly managed. It is a means of transport, and as such its regular flow must be guaranteed. It is a means of production, and as such it must be conveniently exploited. It is an economic asset, and as such it can be traded. It is an environmental good, and as such it must be protected. It is a social resource, and as such it must be made available for basic needs. It is part of our environmental heritage, and as such it must be conserved for future generations.
The complexity reflects the variety of relations between water and the legal system and between water and interests, both public and private. Traditional legal entries can not be used, as something will be inevitably lost, during the definition process. Mainly, it is not easy to decide what water is from a legal and economic point of view, particularly whether it is an excludable private commodity or a non-excludable public good, as no single traditional legal criteria alone can define it. Besides, questions that relate to the ownership of water, and whether property rights rest with the public powers or with individuals, carry great economic and legal liability implications.
Looking at the evolution of the Italian legislation on water it can be assessed that, when the fundamental rules about water were set in the Italian legal system, water rights were considered as a main criterion, and *private ownership acknowledged as a natural implementation of general legal principles*.
Even if the first fundamental problem about water was to point out the most rational discipline and the more suitable legal instruments to ensure the protection of the population from the damaging effects water could cause, which explains the focus of the first laws on public hydraulic works, water was considered as a good, which called for regulations concerning water property and other water rights.

The L.n.2248/1865 (annex F), devoted to public works, was aimed at protecting citizens from floods and landslides. As for boundaries between the public and the private sphere, the L. n.2248/1865, annex F, clashed in a way with the civil code of 1865 about the definition of public waters. As regards use rights, the public powers acted neutrally, as a sort of arbitrators. That did not rule out an invasive power of control that government reserved to itself: public ownership was primarily, and has been since then, a means of appropriation of decisions, more than a means of appropriation of a good, or of a right on a commodity.
The L.n. 2644/1884, enacted to facilitate the permit granting procedure, represented the first specific legal regulation about water, no more exclusively linked to public works. The public interest coming out was exploitation, and the government gradually lost its neutral role, intervening more and more deeply.
Property issues, although considered, remained in the background. The reform, promoted by the D. Lgt. n.1664/1916 and by the D.L. n.2161/1919, did not differ from the trend. While the relevance of public property was borne out, and a definition of public waters was eventually set, the provisions concerned mostly the permit system again.
When the change in society sped up, and new needs to exploitation strengthened, law accordingly changed. Permanent agricultural necessities, new industrial processes and the political situation required to make resources more and more public on one hand, and further stimulate private exploitation on the other hand.
The R.D. n.1775/1933, substantially devoted to the permit system as well, opened with the legal concept of public waters, which included spring waters, flowing waters and lake waters, even if artificially abstracted from the ground, having or acquiring aptitude to general public interest uses (art.1). This legal concept was subsequently acknowledged by the civil code of 1942, whose art.822 stated that rivers, streams, lakes, and the others waters defined as public by the sectoral laws belonged to public property.
The distinction between public waters and private waters drawn by the R.D. n.1775/1933 lasted for more than sixty years. A further enlargement of the legal concept of public waters was due to a different evaluation of the relevance of water resources for economic development. Public interest, as interpreted by case law, was, from then to the L. n.36/1994, the criterion of reference, and case law, combining necessarily judicial and administrative functions, gradually defined the boundaries between private rights and public rights.
The certainty of the law was sacrificed in order to acquire greater adaptability and flexibility, allowing in any case a progressive expansion of public waters. Besides, the law did not require a current destination to public interest uses, but just a mere suitability, which, in the abstract, allowed to consider all the waters as public, and make private waters residual.
In these terms, the survival of private waters, even before the L. n.36/1994, had been questioned. The real problem was that private waters existed, but it was not clear how to distinguish them from public waters, as the teleological criterion, adopted by both the R.D. n.1775/1933 and the civil code of 1942, did not provide unambiguous solutions, letting courts decide what were the public general interests and when they were so strong as to sacrifice private rights.
Over the decades, and over different laws on water, water property has been a relevant issue. Being traditionally faced with private law criteria (from the civil code of 1865 to the civil code of 1942), it had been considered as a matter of border definition,

countering public rights and private expectations. When the criteria changed, shifting to public law criteria, it has been considered as a matter of co-ordination, trying to embed those private expectations into those public interests.
Since then, different water rights have arisen, and the existing water rights underwent a long process of adjustment, in order to meet the new needs. Property rights on water (water as a tradable commodity) slowly came to an end, as they were inconsistent with public interests. Use rights on water (water as a exploitable resource) were transformed through provisions setting stricter limits and burdens, in order to strengthen public policies. Community rights on water (water as an environmental value) were created, as there was the awareness that the rights on water should not have been just the individual ones, which exclude others, but also the collective ones, which allow communities to enjoy the different values (economical, environmental, social) of the resource.
In these terms, water rights not only have constantly been affected by public choices, but they have always represented a further legal instrument public powers may use to pursue their goals. Not surprisingly, though, the Italian legal process has been slow, uneven and sometimes contradictory.
At last, it was only recently that the Italian law recognised that water is a resource that must be safeguarded for future generations (L. n.36/1994), implementing the sustainable development principle into water laws. Such a principle is inconsistent with the assumption that water resources are a private property. Consequently, public ownership as an inviolable principle has been eventually acknowledged, as the law clearly stated that all the waters, surface water and groundwater, even if not abstracted from the ground, were public.
Even before this statement, though, water ownership was not the main aspect of water discipline. Regulatory powers, community's accessibility to the water resources, use and protection of freshwater and groundwater were the relevant issues in the legislative arena. Public ownership of water resources is in fact a form of community ownership if not a form of sovereignty, different from other types of ownership.
Stating the public ownership of waters did not mean that they were not a commodity, but simply that they were a peculiar type of commodity, with a strong functional role reserved to public powers. The co-ordination between public regulation and free market starts from the acknowledgement that what is traded is not water itself, but water services, not the commodity, but its uses.
Law strictly determines public powers on water and the relationship between the good and the owner. Ownership is outlined taking into account the protection and the use of the resource: the public owner acts as a functional regulator. In these terms public ownership is strictly connected with another general principle, that is solidarity. All the waters represent a resource, which must be protected and used in accordance with such a basic principle (L. n.36/1994).
The definition of water as a resource shows the peculiarity of water itself that can not be treated by the law as an economic good like others. Water is a community resource, which can not be exploited by individuals unless public evaluations and assessment on public interests are made, in order to obtain the highest and widest advantage for the population.
The fact is that private property and public property, when related to water, lose their common characters. Private property of waters, till when it existed, was mainly a private property of public interest, tolerated more than granted, subject to limits, gradually eroded. Public property, on the other hand, is not linked to the enjoyment of a

right, but to the public function administered by the government, and to the ontological essence of the good.
The legal discipline is not a matter of static definition of an ownership relationship, but a dynamic adjustment of the relationship between interests and uses, and what is really relevant is the chance given to public powers to guarantee a coherent system of protection, exploitation, and conservation, that is the sustainability of the resource, through regulation and management (not through ownership and rights).
Property on water has been defined as a floating right, and public property as a "floating" property, which shows, even when private property was allowed, the peculiarity of static rights on water.
Understanding the value and the limitation of the resource is the basis for sustainable development, and it means, first of all, understanding which private rights are consistent with the common interest, to what extent, and under what circumstances. In these terms, *private rights may be divided into three categories*: *property rights,* allocating commodities and regulating the relationship among individuals, more than between individuals and government; *use rights*, allowing individuals to exploit resources, under public control; *community rights,* defending, protecting and conserving a social, more than an economic, good.
Public rights, on the other hand, are both property rights, establishing a public ownership over waters, *and regulatory rights,* that is the power to choose what water resources serve for and how they can be treated (exploited, protected, allocated, supplied; in a word: managed).
While, at first, private rights were countered with public rights, in a mere property debate, then they were countered with public interests in a different, broader and more complex debate. Private property rights, as seen, were recently abolished as deemed inconsistent with public interests, use rights have been gradually defined and limited, community rights have been more and more increased.
The comparison between water rights and water related public interests explains it. The objects of water law in Italy coincide with the different objects of the main four laws on water: water resources uses and exploitation (R.D. n.1775/1933), soil protection (L. n.183/1989), water services management (L. n.36/1994), water resources protection (D.Lgs. n.152/1999).
The general objects of the legislation concerning water include therefore civil protection issues, environmental issues, quality issues and exploitation issues. Each of them takes for granted community rights. None of them requires property rights. All of them may be consistent with use rights, as far as these rights are made subject to public needs.
On the other hand, private expectations do not necessarily need property rights to be effective. Property rights on water represented the static side of water rights. They were inconsistent not only with the economic needs, but also with the nature itself of water. More reasonably, private appropriative expectations can rely on well defined and protected use rights, acknowledged under conditions, providing their respect of public interests.
The history of water law is the history of public interests on law. Sustainability is, at present, considered as the main general criterion to regulate water uses, and therefore water rights: once cancelled property rights, and while limiting use rights, it is community rights that, reflecting sustainability, are going to spread.
In these terms, interpreting water regulations as mere property issues would be more and more misleading, as ownership of water is nothing but a limited aspect of water

law. Protection and management of water resources constitute the primary public interests, while water rights have been constantly used as legal instruments to pursue those interests.
That explains two relevant features of water rights as regulated by law.
The first one is that rights on water, both public and private, are not homogenous, but they are divided into very different categories, whose links with common interests vary substantially.
The second one is that the birth and the modification of public needs affect the contents of water rights, usually through the attempt to make them functional to the needs of the community.
Being sustainability the fairly new legal indicator and policy cornerstone about water, it follows that water rights are (and have constantly been) under a constant process of adaptation in order to ensure a new kind of sustainable development. This process affects, mostly, principles, which are consequently infused into regulations and provisions.
The change in name, from water to water resources, that can be detected in laws, is not just a formal or outward change, but it is a change in status, conceptually meaningful, and definitely a sign of the different approach legislation has recently adopted.

3.Identification of regime changes towards integration

3.1 Identifications of the phases of change

The evolution of the water regime in Italy is driven by changes in water policy.
As the analysis of the evolution of water rights shows, throughout the last century water rights in Italy evolved in the direction of creating new rights categories for new subjects, being essentially driven by water policies. New categories of water rights emerged in the form of 'community rights' and new subjects, such as the local municipalities, were invested by this new category of water rights.
These changes were essentially triggered by water policies, coinciding with the phase of their evolution in the direction of increasing complexity and tentative integration.

The analysis of the evolution of water policies and water rights thus suggests that three main phases of regime change can be identified:

1) since the 1865 water law, and its organic revision in the 1933 water code, no major changes in the water regime have occurred until the '70s. This period can be identified with the first phase of the water regime evolution, which can be characterised as a simple regime
2) only since the beginning of the '70s the water regime starts to change, essentially due to the EU pressure to adopt and implement water quality standards, and to the Italian State reform leading to a transfer of relevant functions from the State to the Regions. An increasing degree of complexity (through broader and multiple water policy objectives), and a higher degree of decentralisation (through an increasing number of actors in the water policy arena, although not always acting consistently), are the main elements which characterise this second phase. This phase thus characterises a complex water regime

3) since the end of the ’80s a third phase has started, characterised by the attempt to integrate at two levels: at the level of the water basin, through the creation of the AdB (L. n.183/89), and at the local level, through the creation of the ATO (L. n.36/94) for the implementation of the integrated water service, although until now only a few ATOs have been created. This effort towards integration is however conflictual, since it reflects the tensions between the empowerment of the Regions and of the local municipalities which are intrinsic to the process of the Italian State reform. The EU may play a potential role in redefining this tentative process of integration. This phase characterises a complex regime evolving towards integration.

The main elements which seem to characterise this process of change in water regimes can be identified with:

- ⇨ a less and less central role of water quantity regulation, and a major emphasis on water quality, water services and soil protection. Although the bodies entitled to authorise concessions for water use may have changed, the criteria to release concessions haven’t changed
- ⇨ a new perception of water quality, which, after being traditionally regulated by sanitary laws, is integrated in the water regime
- ⇨ a growing environmental concern, although still quite weak within the country
- ⇨ a major focus on the administrative aspects of water regimes within the legislation, with the key administrative roles played by the different national departments, Regional or local authorities.
- ⇨ a gradual shift from the centre to the periphery, although not fully effective yet, since the current legislative and administrative framework at the periphery still shows a lack of integration between water use, water quality and protection, and conflicts with regard to institutional responsibilities for water management and planning still exist
- ⇨ the existence of conflictual levels of integration. Water regime change in fact occurs at two different levels: a more ‘institutional’ integration process is realised through the creation of the Basin Authorities, at the level of the River Basin, which is defined as the optimal area of intervention for an integrated policy of soil protection and water management (L. n.183/89); a more ‘water industry’ based integration process is realised indeed at the municipal level, through the design of the ATOs to implement the integrated water service. Rivalries at these two levels reflect the traditional conflict between regions and local authorities, which represents a major obstacle to the achievement of an effective process of integration.

3.2 Sustainability dimension of regime changes

The sustainability dimension started being incorporated in the Italian water regime since the late ’70s, when EU water quality standards were adopted by the legislation (L. n.319/1976). For the first time water quality issues, traditionally regulated by sanitary laws, were integrated in the water regulatory system.
Further steps in the direction of a higher sustainability of water regimes can be identified, from a water policy perspective, with the need to guarantee a minimum constant vital flow in the river basins (L. n./1989), and with the attempt to integrate environmental/health and economic policy elements in the perspective of a global

policy of water resource management under the D.lgs. n.152/1999. Policy instruments in the direction of sustainability can be certainly identified with the maintenance of a river's minimum constant vital flow, and with the integration of the planning instruments foreseen by the most recent legislation, such as the integration among the basin plan, the plan for the hydrological lay-out of the water basin, and the water protection plan.
From a water rights perspective, sustainability was fully incorporated in the water regime when property rights on water were cancelled by the L. n.36/1994, and community rights started playing a more relevant role: environmental and sustainability considerations were explicitly addressed.
The design of a new category of water rights in the form of community rights underlines a dimension of sustainability which is both ecological and social, since it pursues community and social interests related to natural resources outside of a strict property rights concept.
Elements of a higher social sustainability of water regimes can be acknowledged as well in the process of decentralisation of the water regime, through the involvement of an increasing number of actors sharing multiple objectives in the water policy arena.
The main forces in the direction of sustainability were given by the EU pressure, and by the increasing importance played by the environmentalists, although their presence in Italy is still quite weak In addition, it should be noticed that these forces started to act at a time when increasing variability in the hydrological cycle occurred, pushing towards actions in favour of a more rational use of scarce resources.

3.3 Co-ordination between water rights and water policies

As it has already been stressed, the water regime evolution in Italy was mainly driven by changes in water policies.
The juridical reading on the evolution of water rights provided to support the water policy reading, deeply motivated by the specificity of the Italian law, suggests that water rights changes were triggered by water policy changes, and that parallel phases in their evolution can be identified.
After a relatively static period of time, coinciding with a simple water regime, where water rights were dominated by property and use rights, a new phase started with the emergence of community rights, following the L. n.319/1976. Private and public property rights became gradually irrelevant. This phase coincides with the second phase of the water regime change identified, when water policies evolved towards a higher degree of complexity and decentralisation.
A third phase can be identified when a new category of water rights emerged following the L. n.36/94. At this stage the redefinition of the water policy and regulation requires that a new juridical category be created: only community rights and public regulatory rights start to play a relevant role in the water rights regime. This phase almost coincides with the third phase identified in the evolution of water policies (which started indeed with the L. n./1989, and saw the creation of the AdBs and of the ATOs).
Under this juridical reading perspective the increasing relevance of community rights, supporting environmental and sustainability concerns, is helping the process of integration in the Italian water regime.

3.4 Forces behind regime transitions

The forces behind the transition in water regimes can be identified with *forces of institutional, social and economic nature.*
Institutional forces are essentially represented by the empowerment of the Regions and by the leading role played by the European Union.
The Regions start to play a new legislative and administrative role even in water policies: what was traditionally decided by the State, has now to be agreed by the State and by the Regions.
Regional water policies mainly act in two directions: the protection of soil and the protection of drinking water. The law L. n.183/1989 and the laws L. n.319/1976, L. n.36/1994, D.lgs. n.152/1999 exemplify the sources of regional attempts to address respectively soil protection and the protection of water quality and drinking water.
EU water policies act specularly on one side in the direction of environmental protection, on the other side in the direction of promoting a more efficient management of the utilities. The EU plays an important role as well in facilitating the opening of local and regional markets, allowing for a better communication and co-ordination among all relevant actors.
Social triggers of water regime transition can be identified with the increasing awareness concerning the environment, water quality and its impact on human health, and the strengthening of environmental movements. These social forces are certainly enhanced by global and regional movements, which are gradually developing at the national and local level. The most recent water policies certainly reflect the need to address issues of water quality and environmental protection, since they are becoming increasingly sensitive social issues.
Economic triggers essentially lay in the expansion of a real 'water-industry', pushed by the creation of the Integrated Water Service at the level of the ATOs, according to the L. n.36/1994. This new legislation attempts to address the need for integration even with regard to what was previously hardly considered at all, i.e. the public service of water provision, which was mostly managed at the local level in the North and at the State level in the South. The implementation of the law however hasn't been effective yet, since only a few ATOs have been identified and have started to be operational over the country.

4. Conclusions

The analysis of the evolution of water regimes in Italy shows that transitions in water regimes have been mainly driven by water policies.
The water regime in Italy in the course of the last century evolved from a simple regime to a regime characterised by an increasing degree of complexity, aiming at broader and multiple water policy objectives, and by an increasing degree of decentralisation, through the involvement of an increasing number of actors. In the last decade regime complexity has been evolving towards some forms of integration, not without conflicts. Attempts to integrate in fact occur at two different and conflictual levels: at the water basins level, through the creation of the Water Basin Authorities entitled to water planning in the water basins under their authority, and at the local level, through the design of the Optimal Territorial Areas entitled to administer locally the *integrated*

water service. Contradictions between these two levels of integration reflect the major obstacles intrinsic to the process of the Italian State Reform, which sees a contrast between the empowerment of the Regions and of the Local Authorities. The current delays in the effective creation of the ATOs all over the country may be indicative of this conflict.

Water rights evolved creating new rights categories for new subjects, such as the local municipalities, being essentially driven by water policies. The need to create new judicial categories for water rights testifies the fact that the water regime evolution was mainly triggered by water policies. New categories of water rights emerged in the form of 'community rights', which took over any proprietary form of water rights, explicitly addressing issues of sustainability.

The main forces behind this evolution in water policy and water rights were of an institutional, social and economic nature, being triggered by the empowerment of the Regions and by the increasingly relevant role played by the EU, by the growing environmental awareness, and by the newly born 'water industry'.

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The EUWARENESS-project has focused on sustainable use of water resources by means of integrated water management. It aims to contribute to the implementation of the EU Water Framework Directive. A better understanding is needed of the dynamic relationships between various conflicting uses of water resources, the regimes under which these uses of water resources are managed, and conditions generating regime shifts towards sustainability. The EUWARENESS-project studied the long term evolution of 6 national regimes, and also - more in depth - the specific regime transitions of 12 water basins across Europe during the last decades. Important issues are the participation of users, redistribution of property rights among users, the coherence between water rights and water policies.

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