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I. Introduction : the national context

I.1 Administrative-political structure

The French politico-administrative system is usually characterized by a strong centralized administrative system. However, the reform of decentralization which occurred between 1982 and 1987 has partially counter-balanced central government power to the benefit of local levels of government (i.e. regional, *départemental* and local). This is true in general as well as in the specific area of water management. Where water management is concerned, decentralized and centralized bodies (as well as their *départemental* and regional representatives) are involved.

At the local level, the mayors of about 36,000 communes are responsible for supplying drinking water to their inhabitants. They are also responsible for waste water collection and treatment. Generally, the communes amalgamate to form inter-communal bodies which deliver these services to several communes collectively. About 2,000 inter-communal services amalgamating approx. 20,000 communes are operating today. However, most communes and inter-communal bodies delegate their responsibilities to private companies (two of which supply more than 60% of the population with drinking water and collect the waste water of about 40% of the population). Where river maintenance is concerned, local authorities generally amalgamate within inter-communal bodies to finance water works.

The Regional (26) and *départemental* (100) councils are also involved in water policy. They usually subsidize local authorities to equip their territories with up-to-date treatment plants and to deliver good quality water, as well as to implement measures for protecting the population from floods or to set up hydraulic works for agricultural purpose. *Départemental* councils are also able to protect wetlands by using special taxes to purchase sensitive areas. They also provide local authorities with technical advice and financial means to improve the maintenance of river banks.

Central government and its representative bodies at regional and *départemental* levels hold regulatory power. At central level, water policy is mainly shared out among three main ministries: the Ministry of the Environment, the Ministry of Public Works and the Ministry of Agriculture. An inter-ministerial Committee, chaired by the Minister for the Environment is responsible for coordinating national water policy. Within the state administration a special organisation has been set up to implement the 1964 law: 6 special prefects have been appointed to coordinate the State water policy at the level of the 6 main water basins. They are assisted by 6 special administrative structures (water basin administration – DIREN de bassin).

At lower levels, coordination committees have also been created to coordinate state water policy at regional and *départemental* levels. Representatives of each regional and *départemental* service of the main ministries in charge of water management (especially environment, agriculture, public works) must then harmonize their own policy.

In addition to these general state administrative bodies, water policy involves specific administrative agencies, the main ones being the 6 water agencies created by the 1964 act. These agencies, whose committees are composed of people representing “water users”, decentralized government and state administration, are responsible for collecting taxes paid by water polluters and water consumers and distributing subsidies to those acting for the protection of water resources. Similarly the Coastal Preservation Agency (*Conservatoire du*

littoral) plays an active role in conservation by purchasing coastal land in order to protect it from urbanisation.

1.2 Water resources and uses

France is a country well-provided with water, with little dependence on water from neighbouring countries. Annual rainfall is 440 to 480 km³ (or billion m³). It is estimated that net annual river inflow from neighbouring countries (re-importation deducted) amounts to approximately 11 km³. Likewise, annual run-off to neighbouring countries (net exportation, with re-importation deducted) is approximately 18 km³. The net balance of resources from rainfall (excluding evaporation) is approximately 170 km³. Excluding evaporation and absorption by plants, the annual resource of surface water per person is 2,800 m³ (IFEN 2000), while the total potential resource (including groundwater) is estimated at 3,800 to 4,000 m³ per person per year (Valiron, 1990; Barraqué et al., 1992).

Natural flow of water on French territory per basin, in billions of m³ per year

	Rainfall	Internal run-off	Net importation from neighbouring countries	Total runoff	Net exportation to neighbouring countries	Natural stocks in lakes
Adour-Garonne	92	39	1	40	0	1.1
Artois-Picardie	14	4	0,3	4	2	0.03
Loire-Bretagne	105	35	0	35	0	0.3
Rhin-Meuse	29	12	2	14	14	0.05
Rhône-Méditerranée-Corse	125	62	8	70	2	41.88
Seine-Normandie	75	18		18	0	0.03
<i>Metropolitan France</i>	<i>440</i>	<i>170</i>	<i>11</i>	<i>181</i>	<i>18</i>	<i>43.4</i>

Source : Valiron (1990), Gestion de l'eau : principes, moyens , structures.

N.B. : Net importation and exportation from the Rhine-Meuse basin exclude the border area of the Rhine, and the natural stock of Rhône-Méditerranée-Corse includes the French part of Lake Léman (Geneva).

Most of the country's borders consist of coastal waters:

- 1) in the North, the English Channel, with the estuary of the Seine
- 2) in the West, the Atlantic Ocean, with estuaries of the Loire and the Garonne
- 3) in the South, the Mediterranean Sea, with the delta of the Rhone.

These coastal zones provide the foundation for various economic activities, including pisciculture (oyster and shellfish), salt marshes (Guérande), commercial shipping and pleasure boating, tourism, industry (ship-building, industrial complexes), etc. The coast (particularly the Mediterranean) is also subject to strong industrialization pressure, and Coastal Preservation organizations have been set up and play an active role in its conservation.

Standing water (with a stock of about 108 km³) in metropolitan France consists of: 680 natural lakes with storage of 95 km³ and a surface area of 772 km²; 528 dammed lakes

covering 796 km² with 11.8 km³ of water, and 7,500 ponds with a surface area of 1,800 km² and containing 1.3 km³ of water (IFEN 2000). The main lakes and bodies of water are: Lake Geneva, which is cross-border (582 km²); the Marne reservoir (48 km²), the Le Bourget lake (45 km²); the Grand-Lieu lake (37 km²), the Serre-Ponçon lake (30 km²), Lake Annecy (27 km²), the Seine reservoir (23 km²).

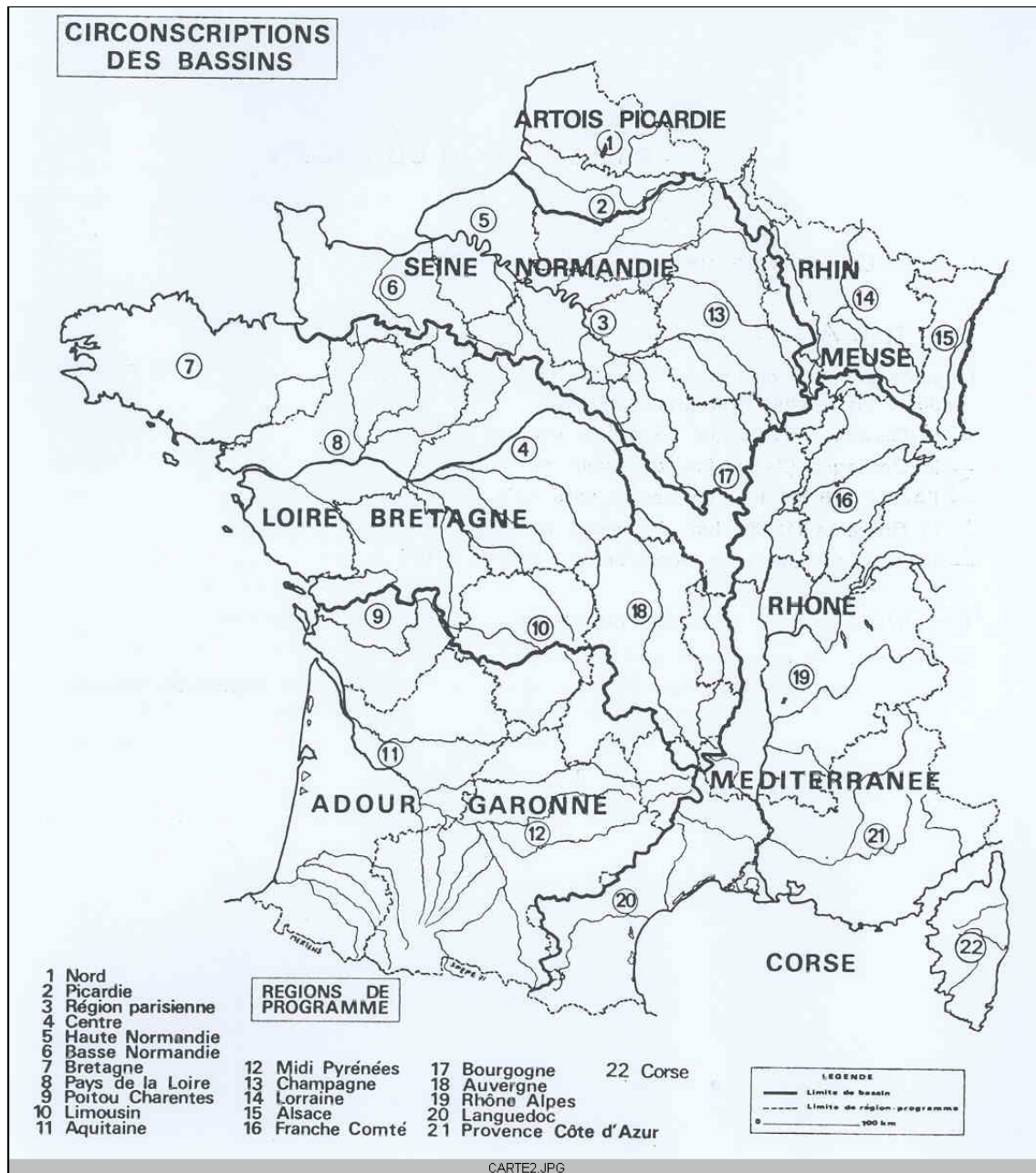
A multitude of watercourses flow through the country, including about 30 major rivers which are more than 200 km long, to which must be added the Rhine which for 190 km serves as a frontier in the East. These rivers include notably the Loire (1,020 km wholly in France); the Rhône (812 km long, of which 522 km in France); the Meuse (950 km long, flowing north and therefore cross-border); the Seine (776 km); the Garonne (650 km); the Moselle (cross-border, 550 km long); the Marne (525 km); the Lot (480 km); the Dordogne (472 km); the Doubs (430 km), etc.

Running surface water includes (IFEN 2000):

- 5,500 km of navigable rivers
- 6,300 km of other national waterways which are not navigable
- 110,000 km of private waterways more than one metre wide
- 150,000 km of private waterways which are between 50 cm and one metre wide
- several thousand kilometres of artificial canals of which 4,500 km are classified as navigable.

The importance of this network of waterways formed the basis of six agencies created under the law of 16 December 1964, which play a major role in the management of water in the main drainage basins: Adour-Garonne, Artois-Picardie, Loire-Brittany, Rhine-Meuse, Rhône-Mediterranean-Corsica and Seine-Normandie. Of these six basins, only two – Artois-Picardie and Rhine-Meuse – are organised round waterways which have a significant influence on cross-border issues, notably on account of industrial pollution.

With regard to ground-water, the main reserves are found in the sedimentary basins of Paris and Aquitaine, as well as in the alluvial plains of the large rivers. These alluvial sheets are generally not extensive, with the notable exception of the one in Alsace. Their great permeability makes them important pumping areas for high flow needs, and they are transition areas between the watercourses and other water-bearing areas. Reserves of ground water in France are estimated at 2,000 km³ (IFEN 2000), but only a small proportion are directly usable.



This overall situation does not take into account the differences in the distribution of water resources between regions, nor moreover the general problem of water quality, which is often poor. The difference between regions with most and least rainfall is from 1 to 4, while the four major rivers (the Seine, the Loire, the Rhône and the Garonne) account for 60 per cent of surface water resources. The general balance between resource and needs is therefore precarious in some places, the situation in some areas being critical. (Gazzaniga et al., 1998). Indeed, the intensification of certain uses has led to a deterioration of water quality, due particularly to industrial, household or agricultural pollution. At the same time, in addition to the demands of traditional uses, the development of new uses, notably those linked to leisure activities, requires quantitative and qualitative water management systems to be set up, which will gradually transform the way water resources are perceived and organized.

In 1995, the Minister of the Environment provided the following breakdown of distribution between different types of users, out of an annual volume of 40 billion cubic metres abstracted (i.e. approximately 24 per cent of the annual available supply), with an estimated net consumption of 5.6 billion cubic metres:

- 1) **Electricity production (EDF):** 25 billion cubic metres (of which only 0.4 are used), i.e. 62.5 per cent of withdrawals and 8 per cent of net consumption. While this use concerns the cooling systems of thermal and nuclear power stations and hydroelectricity production, the reservoirs managed by EDF have a major impact on the management of watercourse flow and therefore influence all downstream uses.
- 2) **Industry:** 4 billion cubic meters (of which 0.4 are used), i.e. 10 per cent of withdrawals and 7 per cent of consumption. Recycling, promoted in the law of 16 December 1964, helped stabilize and then reduce this water withdrawal by industry, particularly in areas with large demands, such as chemical works, metallurgy or paper pulp.
- 3) **Agriculture:** 5 billion cubic metres, of which 2.4 are used, i.e. 12.5 per cent of withdrawals and 43 per cent of consumption. This use is becoming more intensive with changes in agricultural practice, such as increased irrigation for maize production.
- 4) **Local authorities:** 6 billion cubic metres, of which 2.4 are used, i.e. 15 per cent of withdrawals and 42 per cent of consumption. However, precisely how this amount is used remains largely unknown: it includes household food and hygiene requirements, but also some industrial supply, while drinking water is also frequently used for watering public spaces, or even street cleaning.

Withdrawal and consumption of water by category of user in 1995 (in billion cubic meters)

	Withdrawal of surface water	Withdrawal of ground water	Total withdrawals	% of withdrawals	Total of net consumption	% of net consumption
Local authorities (distribution of drinking water)	2.5	3.5	6.0	15.0%	2.4	42%
Industry	2.3	1.7	4.0	10.0%	0.4	7%
Agriculture	4.0	1.0	5.0	12.5%	2.4	43%
Electricity production	25.0	0.0	25.0	62.5%	0.4	8%
Total	33.8	6.2	40.0	100%	5.6	100%

Sources : Ministry for Regional Development and the Environment, Water Agencies , in : Economic data for the Environment (IFEN, 2000).

Current water management in France, is thus characterized by specific regional situations: in some regions, the balance between resource and needs is critical (mostly in the south west), in others the main problem is linked to an overuse of surface water (main estuaries) or with diffuse pollution stemming from agricultural activities (Brittany, Parisian basin). Most rivers have been “artificialized”: large ones (for hydro-electricity or cooling purposes) as well as small ones (for irrigation or drainage purposes). But thanks to the 1992 law and to the growing attention given to environmental issues, the last decade has seen a gradual change in the organisation of river and water management. The European Framework directive will reinforce this trend.

II. Property rights on water (PR)

II.1 Evolution of property rights

➤ *Phase 1: a water regime driven by local customs*

In the Classical era, **Roman law** made a distinction between the specific status of the large, navigable rivers (excluded from private ownership) on the one hand, and streams or smaller rivers and standing water on the other. Ownership of the latter was based on the bed it occupied or demarcated. However, easements were possible to facilitate certain user rights.

Under **feudal law**, established during the Middle Ages, the existence of private water rights was generally recognized, particularly for the aristocracy. However, in practice it was more a question of user than ownership rights strictly speaking. In fact, local customs and various community management procedures limited the scope of the nobles' ownership on watercourses. This feudal law was characterized by its great diversity, adaptable to local uses. However, it should be noted that it was during the Middle Ages, in 1291, that Philippe le Bel created the Forest and Water Inspectorate (*Maitrise des Eaux et Forêts*).

Royal law was based on the rise and strengthening of centralised monarchic power. The authority of the Crown was asserted on navigable and major rivers. This new situation distinguished between navigable waterways and non-navigable watercourses, a distinction which is still used albeit to a lesser extent. The texts promulgated within this framework often concerned specific regulations for certain activities such as fishing or navigation, and formed the basis of a true legal system for water in France. The following ordinances or edicts can be mentioned:

- 1) March 1515, hunting, forests, usage rights, rivers and fisheries;
- 2) May 1520, promulgated by Francois I, creating an easement for supplying firewood to Paris. This edict was not repealed until the law of 3 January 1992.
- 3) February 1554, water and forests
- 4) February 1566, (edict of Moulins) for the union and preservation of the royal domain, establishing its inalienability, and making provision for a system of concessions on rivers. This is still used as a reference for determining rights based on title;
- 5) August 1669, edict of Louis XIV, concerning general regulations for water and forests, and which is the first true expression of a general water law. It seems to have been primarily motivated by the need to transport wood to the royal ship-yards for building and maintaining a naval fleet.

To sum up, prior to the general regulations initiated from the 16th century, including the 1566 (Moulins) and 1669 edicts which concerned the royal domain, the water regime was essentially governed by local customs and uses. There was no general unified regime for water management applied to France as a whole. Following the regulation concerning the royal domain, the major navigable and floatable rivers have been subject to a unique status, while other surface water has been managed according to feudal principles, closely linked to regional uses and customs.

➤ *Phase 2: a water regime differentiating between state-owned rivers and other rivers*

Intermediate Law (revolutionary, linked to the abolition of feudal rights) transferred to the state the control of watercourses, navigable and floatable rivers i.e. the old royal domain. It created a relative legal vacuum with regard to watercourses which did not previously belong to the royal domain (non-navigable or floatable waterways). In general, the Revolution

brought in an essential break by introducing the principal of property as an inviolable and absolute right (ADEF, 1991). It weakened the previous principles of common management and collective ownership (joint possession), but had difficulty in finding adequate alternative solutions with regard to waterways.

The Civil Code of 1804, which had little concern for water rights, confirmed the state ownership of navigable and floatable waterways. With regard to the rights of private persons in this area, the Civil Code essentially dealt with easements (such as that for natural drainage, in article 640), alluvium rights and ownership of islands. For detailed water regulations, the text referred to a forthcoming rural code.

In the context of the Civil Code, public authorities were also concerned to drain a number of ponds and to sell or partition riverbanks reclaimed under special laws to avoid forced joint possession. It then became necessary for the tribunals to deal with the inadequacies of the law, resolving disputes arising from conflicts between ownership and use. Within the rural context of France at that time, this situation created enormous problems, and the question of the ownership of streams was the subject of major doctrinal debates between legal experts. Disputes arose particularly over the issue of the rights of the first occupant of a watercourse, or the consequences of total property rights of spring water. In this way the provisions of the Civil Code were specified, modified or completed by numerous texts. The main idea behind all these texts seems to be the desire to introduce a certain coherence in the law on water. These texts refer essentially to agricultural use (irrigation):

- the law of 15 April 1829 on river fishing;
- the law of 29 April 1845 on aqueduct easements;
- the law of 10 June 1854 on the free flow of drainage waters;
- the law of 17 July 1856 concerning drainage.

The floods of 1856 provided the incentive for promulgating a law for carrying out flood-protection work for towns (law of 29 May 1858).

With the development of France in the second half of the 19th century (increasing urbanisation and industrialisation), the water management was expressed in different terms: sanitation facilities in urban areas (provision of drinking water and sewage disposal), the amount of water required by industry, etc. A major reform of the water law was proposed in this context, and a bill was introduced in the Senate in 1883, but the act was only passed 15 years later.

Until the completion of this reform, the water management regime since perhaps the 16th century (1566) can be considered to have been "simple". Principal uses concerned navigation (and the State was the main owner of waterways having this use), agriculture, and gradually collective water supply of communes in urban areas. There were no major conflicts between these uses and the activities were regulated separately on a non-conflictual basis.

For agriculture and water management in an essentially rural society, it was the status of non-navigable and floatable waterways that posed a problem with regard to regulating use. While the law passed on 8th April 1898 provided a solution for this category of stream, emerging urbanisation, industrialisation and modernisation however brought about a diversification of uses and consequently a gradual increase in the impact of this situation in terms of water management. The law of 1898 introduced a phase of diversification or "complexification" of the water law: the increase in uses required sectorial regulations, up to the major reform which was formalized by the law of 16th December 1964. Under the terms of this law, water became the subject of an inclusive public policy which took into account resources and uses as a whole.

➤ *Phase 3: a legal regime of water*

The law of 8 April 1898 on the water regime dealt only with streams and was passed after numerous consultations and comparison with other countries such as Italy. Its inspiration was essentially rural and agricultural, and it did not take into account the major changes taking place with industrialisation and urbanisation. The interests of the agricultural sector did in fact significantly limit the initial concerns of the bill which were to create favourable conditions for industrial development. The general idea of this law consisted of maintaining the principle of ownership of the waterway, while limiting its scope to allow different uses to be carried out. Its 53 articles regulated both the ownership and the use of waterways, the rights and obligations of private people and the State, the flow, management and use of waterways. This law modified many articles in the Civil Code.

It has been observed (Gazzaniga et al., 1998) that the law of 8 April 1898 “remained, after many reforms, the basic text concerning the legal regime of water (...) and would dictate all developments in water law, centred round a single idea: to reduce ownership without calling it into question”. Indeed, under this law:

- 1) ownership was recognized for rainwater, spring water, ponds and canals, with a particularly leaning towards right of disposal. Moreover, in the case of spring water, this was subject to numerous exceptions which seriously restricted the general principle of ownership;
- 2) uses of navigable and floatable rivers (under public ownership) were subject to compulsory authorisation;
- 3) for non-navigable waterways, the law introduced a crucial and original innovation: the dissociation of the bed and the water flowing over it. From thenceforward the bed belongs to the riparian owner, but the water on it belongs to nobody and can only be subject to user rights, according to article 644 of the Civil Code.

The consequences of this latter situation, establishing the riparian resident as effective owner, at least in the minds of many people, led to the gradual increase of administrative rules and checks in order to limit the scope of the principle arising from this regime of non-navigable watercourses. In this way, water rights became increasingly complex and intractable, with a multitude of texts which were supposed to meet a variety of situations covering both the water regime and uses. In fact, socio-economic and technical developments transformed water use, adding to the traditional needs of navigation and agriculture an increase in household consumption (with improvements in sanitation brought about by urbanisation), and increasing abstraction by industry.

However, it was the emergence of hydro-power at the end of the 19th and beginning of the 20th centuries that marked the beginning of diversification to take new uses into consideration. Some years after the 1898 law was passed, a bill was introduced to take into account the situation created by hydro-electricity production, but its finalization was delayed by the 1st World War, and the law was not passed until 1919. Before the law was enacted, harnessing waterfalls for electricity production, notably on non-navigable or floatable watercourses, gave rise to intense land speculation practices aimed at riverside resident rights, in order to carry out river deviations before building hydro-electric plants.

The law of 16 October 1919 concerning hydro-power use, compared to the previous almost anarchic system, constituted the first attempt at (sectorial) unification of the legal regime of watercourses, because it did away with the distinction between state and non-state waterways in this area. Thanks to this law, nobody can use watercourse power without first obtaining a concession to operate and authorization to withdraw water. It therefore removed the right to use water power from residents on non-state watercourses and created a system of operational concessions: the concession imposes restrictions aimed at protecting both other users and consumers of the power produced. The law of 16th October 1919 on hydro-

electricity regulated in general the use of this power, and focused on the rights of the State on behalf of the industry.

The concession principle applied generally to a private person or to a specialized company, but a national company created by law for a water resource development project could also benefit from it. Thus, the general revival of water enhancement projects by public authorities following the lead of the USA after the crisis of 1929, led to the creation of the Compagnie Nationale du Rhône (CNR) in 1933. This national company obtained the general concession for developing this river in 1934, and within this framework it set up the industrial dam at Génissiat. This operation continued after the war, with the control of the Rhône for navigation and through the production of hydro-electricity.

This new tendency towards state control of water management, demonstrated in the law of 1919, was strengthened as more and more uses evolved, with conflicts arising over the quantitative needs of these different uses. The legislature had notably to fill the legal loophole with regard to ground water: conventionally, the owner of the river bed was granted ownership of this water, but between the wars there were a number of abuses in some critical areas (generally highly industrialised areas) such as the North and the Paris area. An **executive enactment of 8 August 1935 concerning the protection of groundwater** was thus applied in several *départements* of the Paris area, its provisions (which made boreholes of more than 80 metres subject to prior authorisation by the *préfet*) being gradually extended with increasing conflicts between surface water use and demand for ground water.

Many specific measures in relation to water were also taken in connection with mines, navigation, fishing or public health, in addition to the **executive enactment of 30 October 1935 concerning cleaning waterways and the decree of the same date concerning flood-risk areas**.

The situation was therefore characterized by a profusion of legal texts concerning water management, raising the problem of the coherence of legislation on water as a whole. This was the situation which existed between the wars, and by the end of the fifties, the main conflicts (particularly between the needs of industry and providing water for urban areas) on the one hand, and the need for the public authorities to do something about the rapidly deteriorating quality of surface water on the other, highlighted the need for an overall, in-depth reform.

Until the beginning of the sixties however, the legislature continued to bring in a number of texts aimed at managing uses separately, notably:

- 1) **the decree of 16 April 1955** creating a “Rural Code” which brought together legislative texts concerning agriculture, and those which came outside the Civil Code concerning:
 - i) riverside residents’ rights to private waterways for irrigation;
 - ii) easements aimed to facilitate exercising water rights (easements);
 - iii) harmful water and draining marshland.
- 2) **The decree of 13 October 1956** instituted the navigable waterway and internal navigation Code (with the law of 1964, this became the national river and internal navigation Code). In particular, this Code brought together certain provisions which had remained outside the Civil Code dealing with:
 - i) national waterways;
 - ii) the prerogative rights of private persons on national waterways;
 - iii) the easements and obligations imposed on properties and on private persons with regard to access to waterways;
- 3) **The ordinance of 20 December 1958** integrated certain texts concerning drinking water and mineral water into the public health code.

- 4) Other provisions concerning water were codified in the state domain code (sea waters or publicly-owned streams and rivers), or in the general Code of territorial authorities (such as police or mayoral powers);
- 5) **The decree of 16 September 1958**T, modified by the decree of 14 August 1981, provided a list of navigable or floatable rivers;
- 6) **The decree of 7 January 1959** concerning rights of way on the banks of private water-courses;
- 7) **The laws of 2 August 1960 and 4 August 1962** which completed or modified the laws on irrigation and drainage;
- 8) **The law of 4 August 1962** concerning the easement for laying drains for public water on private land.

This phase has been described as “management by use” or “sectorial management” of water. Direct state intervention was mainly concerned with navigation or flood-prevention, and in general the allocation for different uses (provision of drinking water, agriculture, industry, navigation, leisure activities) did not produce any major conflict at the national level. On the whole, the interaction between the impact of different uses did not hinder the various activities from being carried out. Conflicts of use were dealt with on an ad hoc basis, case by case, and not through any general ruling for coordinating different uses.

The administrative organisation of water management reflected this situation in which there was no formal coordination, responsibilities being divided between the Ministries of Agriculture, Industry and Mines, Public Works, the Interior (needs of regional authorities) and Public Health, with financial control by the Ministry of Finance.

Coordination between these different departments was sometimes necessary to resolve disputes between the departments of these ministries respecting the different uses, and was organised at the level of the ‘département’, within the framework of inter-departmental commissions. These commissions proved less and less effective in the case of real conflicts of use, because the water users themselves were not directly involved. These users included in particular: the communes, whose needs were met by the public sector (state-controlled) or private sector (delegation: concession or tenant farming), farmers, industrialists, union associations of owners or land-owner associations, concession holders particularly for hydro-electricity.

After 1945, the formalisation of property rights was followed by the drawing up of public policies which tried to coordinate the needs of different uses. For example, the major reforms introduced by the 1964 law were based on the notion of “global management”. This was superseded by the 1992 law which was based on the idea of “balanced management”. Evidence for the increasing influence of community legislation, introduced in the 1992 law, can be seen in a reform project under discussion. These aspects will be discussed in more detail later, in the presentation of public policies.

The main stages of a legal regime for water in France can be summarized as follows, bearing in mind that since 1945 the water regime has been characterised by adapting the provisions of the law of 1898 to the need to organise management round public policies for coordinating uses and protecting the resource:

- **Pre-16th century**: feudal law giving predominant rights to the nobility, but with wide regional variations respecting local usage and customs;
- **1566–1789**: royal law essentially linked to navigation on major waterways. Feudal rights continued to be exercised on other waterways and still water;
- **1789-1898**: assertion of public right to navigable waterways belonging to the public domain. However, the abolition of feudalism created a legal void regarding private watercourses;

- **1898-1945**: assertion of private right to private watercourses, spring water, and rain water; recognition of ownership of ground water, subject to a number of later restrictions (executive enactment of 1935). **The law of 1898 is till today the basis of the legal water regime in France.**
- **1945-1964**: particular importance of concession-holders (EDF, regional development bodies) in the management of water resources: concentration of a considerable proportion of surface water in the hands of a limited number of operators connected to the State; gradual extension of the 1935 restrictions on ground water; no modification of the 1898 regime;
- **1964-1992**: maintenance of the 1898 legal regime with the law of 16 December 1964, but with a progressive limitation of user rights under administrative control (declaration of industrial abstraction), introduction of the principle of a levy for water abstraction and incentives to treat polluting waste, within the framework of financial drainage basin agencies;
- **since 1992**: unchanged regime, but water is now declared “common national heritage” without legal translation; tighter control of uses, with a single system of declaring and authorising all non-domestic uses; move towards stricter application of the “polluter-pays principle”; scheduling water management at the drainage-basin level (compulsory) and catchment area (non-compulsory).

II.2 Characteristics of a legal water regime: ownership and user rights

Water, being fluid, does not obey classic principles of law based on controlling land ownership. The very principle of ownership is incompatible with a fluid. There is therefore a permanent opposition between the law and the natural element in the ownership of water. However, ownership of the land on which water emerges (springs), over which water runs (rain-water) or which covers it (ground or standing water, certain canals) etc. can have repercussions on the private ownership of water.

The legislature sought to encapsulate the strict principle of ownership of water, on the one hand by imposing various easements to facilitate certain uses or respect certain aspects of the natural water cycle; and on the other hand, by developing administrative law to the detriment of private right in matters of water management. For example, there was a rapid increase in systems of authorisation, such as the one introduced by the 1919 law on hydro-electricity. The law of 3 January 1992 is remarkable for generalising a single system for declaring and authorising all non-domestic withdrawals and discharges, and for all uses which could have an influence on the water system.

A) The right of ownership and its limitations

1. Rain Water

According to the Civil Code, every owner has the right to “use and dispose of” rain water which falls on his land (article 641). By virtue of this principle, rain water collected on the public highway belongs either to the *communes* or to the *départements* or to the State. In general, rain water can be seen as belonging to the category of *res nullius*: as such, it belongs to the first occupant. Until the law of 1992, the latter (the owner of the river bed) had extensive rights on the collected water. Since then, only domestic and personal use is free: if the volume of water collected on land is used for industrial or agricultural purposes, the owner is liable to the declaration or authorisation system. Moreover, the owner’s use of rain water which falls on his land is restricted by specific legislation when the owner plans to create a pond or other body of water.

The run-off easement (article 640 of the Civil Code), which is valid as long as human intervention does not aggravate the discharge situation in question, obliges the owner of lower land to receive rain water flowing onto his land from higher ground. This easement applies to all spring water, pond water or snow-melt run-off. However, it does not apply to owners wishing to protect themselves against over-flowing water-courses.

The easement for guttering (article 681 of the Civil Code) obliges the owner to collect the water from his roof in such a way that it only flows onto his land or onto the public highway. Rainwater from house roofs cannot therefore be drained directly onto a neighbour's land. On the other hand, the latter cannot oppose the drainage of this water, once it has been collected correctly, on the owner's land or the public highway.

2. Spring Water

The private appropriation of spring water is a right linked to land ownership. Article 642 of the Civil Code gives the person with a spring on his land the right to use this water freely, within the limits and for the needs of his inheritance. However, case law extends this user right to a right of disposal (Gazzaniga & al., 1998). This ownership is specific and fairly extensive, even if it is subject to police laws and regulations. However, this right contains significant restrictions, notably concerning the protection of common interests and preserving neighbours' rights.

Claims can be made for damage arising from the flow of this spring water on lower ground (article 641, paragraph 3 of the Civil Code). The owner's right of disposal of a spring cannot be applied if it is to the detriment of owners of lower ground, and the latter have a right acquired by prescription (more than 30 years' use on their land of water from the spring in question, via visible and permanent structures built by them on the land where the spring rises). The right of disposal cannot be effected to the detriment of the general interest, for example by removing any necessary and indispensable water from the inhabitants of a built-up area (article 642, paragraph 3 of the Civil Code). Finally, since the law of 1898, if the spring water gives rise to the formation of a significant stream (what constitutes a stream being left to the discretion of the judge in the event of a dispute), the owner can only claim user rights, his situation being similar to that of a riverside resident.

The situation regarding mineral and thermal water

The owner of the land on which mineral or thermal water rises can exercise his right of ownership on this water. However, the rules governing private use of this water, respect for the rights of third parties and easements for operation are applicable. Due to the medical importance of this water, special rules are imposed on the land-owner or the person operating the spring. Managing this water requires particular care: the quality has to be carefully examined, its use and availability to the public monitored.

The regulatory control of this water concerns on the one hand its protection (declaration of public interest and the demarcation of a protected area), and on the other controlling how it is managed (this is subject to obtaining administrative authorisation issued by the Ministry of Health). This regulatory control began in the 17th century (the edict of 1604 created superintendents responsible for monitoring mineral and thermal water), and was progressively improved during the 18th and 19th centuries. For example, an order of the Royal Council of 5 May 1781 dealt with inspecting mineral and thermal water. The main points of this order provided the framework of legislation passed during the Revolutionary and Imperial periods. However, it was during the 19th century (ordinance of 1823, law of 14 July 1856 and decree of 8 September 1856) that the control of mineral and thermal water was regulated according to the procedures which still apply today. Currently, the protection of mineral water is governed by the Public Health Code (articles L.735 to L.752); surveillance

and exploitation are dealt with by the decree of 28 March 1957 (abrogating the one of 30th April 1930) concerning public administration rules for policing mineral water. This 1957 decree was clarified by the one of 6 June 1989 which brought French legislation into line with the European directive of 15 July 1980 (80/777/CEE) dealing with the exploitation and commercialisation of natural mineral water. All these provisions were reinforced by the law of 3 January 1992, which made provision for the possibility of regulating and even banning activities, warehousing or industrial plants liable to harm the quality of water abstracted within the protected zone. Outside the protected zone, concern for preserving the quality of the water could lead to the suspension of certain enterprises.

3. Ground water

Ground water is liable to private ownership, according to the general principle of the Civil Code which states that "ownership of the land overrides ownership of what is above and below the ground" (article 552). The regulatory control of uses involving ground water dates from the 20th century: it was not included in the law of 1898, and it was the intensification of abstraction linked to urbanisation, industrialisation and modernisation of agriculture (irrigation) that provided the incentive to impose restrictions on the right of ownership of this water. This right is limited by the need to exercise it without deliberately harming other people, and the water must not be spoilt to the extent of making it unfit for use. Moreover, specific easements can restrict the right to ownership of ground water. The executive enactment of 9 August 1935, the law of 1964 and the decree of 23 February 1973 imposed strict limitations to the principle of ownership of ground water. Since the law of 1992, most abstraction of ground water is subject to authorisation and declaration.

4. Standing water

Only standing water formed by rain water, infiltration, run-off and spring-water has private status: large lakes (Geneva, Nantua, Annecy, Le Bourget) are under public ownership, while ponds and lakes through which a water course flows have the same legal status as the water course. In a case where private status is established, the owner of the land can use and dispose of the water, both for his own personal and domestic use and for agriculture or industry. He also has a right of drawing water and fishing. It is also possible to obtain a concession to have a specific user right which separates ownership of the land and rights on the impounded water. On the other hand, possession of the land takes precedence over that of the water.

A pond can be subject to easements. However, administrative control and more particularly legislation dealing with the removal of insalubrious ponds constitute the main limitation to the right of ownership of standing water. Certain ponds (such as that of Dombes and la Bresse) have a specific status and are subject to particular regulations.

Catchment ponds have been managed by private people or union associations since the 1950s, with the aim of retaining and storing rain water or run-off over a large area for irrigation purposes. The status of these ponds is similar to that of other ponds and lakes, with considerable scope for creativity. Drainage of this retained water can be subject to the aqueduct easement (article L.152-14 of the Rural Code). It does not come under the policing of privately-owned water, to the extent that it comes from rain water. However, certain rules dealing with health and purification can apply (articles 21 to 23 of the law of 21 June 1898). Finally, catchment ponds, depending on their nature, can come under certain headings of the "water" classification of 1993, and are subject to the authorisations provided in the Town Planning Code.

While the draining of marshes has existed for a long time, both for purposes of agriculture and ensuring public health, these environments have gradually become recognized as zones

to be protected for their fauna and flora and for the environmental role that they play. Since the Ramsar Convention on the Conservation of Wetlands (2 February 1971), wetlands of special importance designated by France include the Camargue, la Brenne, the banks of Lake Léman (Geneva) and the Cotentin marsh. This concern is incorporated into the 1992 water law, high on its list of objectives being “the preservation of wetlands”. Preservation of these sites allows farming activities to be carried out. As such, drainage, surface sealing or filling works on wetlands can be subject to prior declaration or authorisation (article 10 of the 1992 water law). The draining of marshes continues to be governed by the law of 16 September 1807, completed and amended by the laws of 21 June 1865 and 22 December 1888.

5. Canals

Only canals created by an owner on his own land, either for navigation or for irrigation, come into the framework of private ownership. These constructions and the water flowing through them belong to the person who built them. As such, and like standing water, the owner has total right of possession. In the case of a private canal, the riparian residents can claim no user rights to the water.

Shipping canals built on the initiative of public authorities are state-owned (article 1 of the national rivers and inland navigation code). However, they can be built or managed by franchisees, but dedicated to the public navigation service. Franchisees can only submit the appurtenances of such canals to easements which are compatible with the public nature of these constructions. In fact, the public ownership of a canal belonging to the State extends to all its accessories (tow-path, freeboard, weirs, embankments, lock-keepers' houses, etc.)

B) Watercourses and riparian rights

Watercourses are classified in two types, initially based on a criterion of navigability (since at least the royal ordinance of 1669, amended by the law of 8 April 1898), nowadays according to purely administrative criteria. Thus, prior to the law of 1964 a difference was made between navigable and floatable watercourses (now classified as state-owned watercourses) and non-navigable or floatable watercourses (now classified as privately-owned watercourses). While this law of 16 December 1964 anticipated the creation of a new and original category between these two types (mixed-ownership watercourses), this never happened, and the new law of 1992 purely and simply suppressed it.

Within this general framework, state-owned watercourses are fairly precisely defined, which is not the case of privately-owned watercourses. For example, a privately-owned watercourse loses this status from the point it joins a state-owned watercourse. The distinction is essentially established on the rights which the State and private individuals exercise on these watercourses. Riparian rights are therefore linked to the specific situation of the owner whose land is bordered or crossed by a watercourse. It concerns principally user rights which are more or less under regulatory control, even if in the case of privately-owned watercourses the riparian owner has not been dispossessed of all ownership rights. Moreover, for all watercourses, riparian landowners own the banks.

The greater part of surface water, notably that contained in rivers and streams (both state and privately-owned), belongs to the class of “*res communis*”, i.e. ownerless or public goods.

1. Privately-owned watercourses

Residents whose land borders these watercourses have both ownership rights (of the bed, the alluvium, relict land and islands formed in the watercourse) and user rights.

a. Ownership rights

In return for these ownership rights, the owners who are directly concerned are responsible for ensuring protection against the natural action of the water (erosion of the banks, flooding) (Rural Code, article L.151). These owners can form union associations for this purpose, and since the 1992 law they are entitled to aid from regional authorities. Owners are also responsible for cleaning out the river, maintaining the banks, removing debris etc.: multi-year plans must be submitted to the *Préfet* for this purpose.

River bed ownership: Ownership rights of riparian residents include the river bed (article 3 of the law of 8 April 1898, which thereby makes a distinction between the bed and the water flowing over it), within the limits of the rights acquired. This ownership right involves notably the possibility of enclosing the land (article 647 of the Civil Code), hindering or even prohibiting navigation by third parties. This possibility was not available to the riparian owner prior to the 1898 law. Article 25 of the 1964 water law allows state representatives to forbid the use of motor boats on privately-owned land. However, the 1992 law tends towards a freedom of navigation on all watercourses, as long as water policing rules and regulations are respected. The Barnier law of 2 February 1995 allows state representatives to intervene in order to regulate these navigation and leisure activities, as well as the riparian owner's responsibilities in this respect.

In return for this ownership right on the river bed, the owner is responsible for cleaning out the river, and is forbidden from modifying the water flow by extracting material, for example.

Ownership rights to alluvium, relict land, islands and islets: The riparian owner's right of ownership to alluvium and relict land is specified in articles 556 and 557 of the Civil Code. The same code draws up the ownership rights to islands and river terraces of privately-owned rivers (article 561 and 562).

b. User rights

The Civil Code grants a strictly defined preferential right to the riparian owner. This preferential user right originated in the 18th century (bill of the Paris Parliament of 12 July 1787), and was founded in return for the inconvenience or danger which riverside properties could suffer. This user right is prescriptible and assignable. It deals with the personal and domestic use of water, free movement on the river and fishing rights. Moreover, article 644 of the Civil Code defines the riverside owner's right to irrigate his land. Restrictions on these rights are designed so as not to penalise use by down-stream properties: any water used must be returned to its natural course. Furthermore, the 1984 law on fishing declares that the preservation of the water environment and the protection of the piscicultural heritage are of general interest, and that the water which has been withdrawn must be returned. Finally, according to the 1992 law, water is a common good to which all have right of use: essentially therefore, public use has priority over private use. User rights are therefore restricted by easements aimed at ensuring the flow of water in general, as well as by the policing powers of mayors, préfets and ministerial departments responsible for policing water (the Minister of Agriculture for privately-owned watercourses).

2. State-owned watercourses

Article 29 of the law of 16 December 1964, which constitutes article 1 of the Public River Property Code, defines state-ownership of watercourses. In particular, it is constituted by: 1) navigable and floatable waterways, from the point where they become navigable or floatable to their mouth; 2) river arms, even if not navigable or floatable, if they rise below the point where these waterways become navigable or floatable. In defining Public River Property, the finance law of 8 April 1910 (article 128) replaced the criterion of navigability in the 1898 law

by the classification principle which was confirmed by the executive enactment of 28 December 1926. An administrative procedure (article 2 of the Public River Property Code) defines the classification procedure. Likewise, decree no. 69-51 of 10 January 1969 defines the reclassification procedure for watercourses which are the public property of the State.

For these watercourses, ownership and user rights accrue to the State, but the riparian owners have certain rights and obligations. For state-owned watercourses, the State owns the river bed and user rights of the water (article 560 of the Civil Code). The rights of riparian owners of private watercourses regarding the property are virtually transferred to the State, within the framework of state-owned watercourses. Moreover, deposits of earth and relict land resulting from works carried out by the Public Authorities are incorporated into the public property of the State (article 13 of the Public River Property Code).

Riparian owners of state-owned watercourses own the banks, alluvium and relict land of these watercourses. However, these rights are subject to easements. Thus, the riverside owner of a state-owned watercourse can use the alluvium, but on condition that he leaves the footpath and/or towpath (if the river is navigable), according to the regulations. The footpath and tow path easements were established for the needs of navigation (in the 15th century). The principle is that the owners of the land bordering navigable and floatable waterways leave space for horses and men to pass freely in order to board, load and unload boats. While the tow-path easement disappears when the river is no longer navigable, the foot-path easement remains. Moreover, the riverside owner is obliged to maintain the easement for anglers: a width of between 1.5 and 3.25 metres along the watercourse must be left accessible to them. Finally, the easement for depositing wood, established in the 16th century, is defined in article 17 of the Public River Property Code. However, owners are entitled to compensation for the inconvenience caused by these deposits.

II.3 A complex property rights structure

The legal regime of water in France varies considerably as a result of the superimposing of various laws throughout history. In general:

- Running water cannot be owned (publicly or privately); only the bed has a clearly defined status. For riverside owners who also own the river beds, privately-owned watercourses are merely subject to user rights. For state-owned watercourses, these user rights belong to the State, and they are defined in the Public River Property Code;
- The state has predominant rights to the beds of state-owned watercourses, state-built canals, and lakes through which state-owned watercourses flow;
- There is recognition of private property rights related to ownership of the land for spring water, rain water, privately-owned river beds, most canals, some ponds, ground-water;
- There is a problematic status as regards ground water: the principle of private possession by the land-owner exists in the Civil Code, but the physical reality of the water table and the competitive use of the resource by different types of users requires collective management organisation. Its non-domestic use has thus been subject to particular restrictions since the middle of the 20th century.

User rights, which provide the balance and even appear to be the predominant component of water ownership, are characterised by the existence of numerous easements. These can ensure the application of specific rights to water or facilitate their application, just as they can be laid down to improve water management. Thus, distinctions can be made between private and public easements, those which are linked to a specific function, etc. Moreover, easements designed to allow the use of water rights in specific areas are to be found in

special enactments. By way of example, the law of 16 October 1919 on hydro-power allows a licensed undertaking to encumber private properties with easements for aqueducts, support, submersion and temporary occupation. These provisions, whose application is linked to compensation to the owner after due enquiry, authorise the occupation of private property within a boundary defined by the concession for setting up such works as are necessary for taking and retaining water, or for building canals for supplying and discharging water. These same easements allow the submersion of banks to create an artificial lake, and even sometimes authorise the extraction of material from the land concerned.

Private easements are imposed on one riparian property for the benefit of another. They include in particular:

- the easement for the natural flow of water,
- easements for roof drainage
- the easement for support

Public easements are imposed on owners in the public interest (article 649, 650 of the Civil Code); as such, they come under administrative law rather than civil law. Public easements are governed by specific administrative laws and regulations, and rarely give the right to compensation. These obligations are justified by the public interest involving the needs of certain public services, for security or public health purposes. Where water is concerned, their number has gradually increased, limiting significantly the extent of private ownership. They include:

- rights of way on private land, public water pipes for drinking water or sewage
- tow-path and foot-path easements
- easements resulting from the existence of services:
- easements for temporary occupation for public works, for equipment storage by mine and hydro-power licensees;
- rights of way: the town planning code (article L 160 para. 1) imposes a 3-metre-wide pedestrian right of way on riparian owners of public maritime property.

Hybrid easement: use of spring water by a community of inhabitants (article 642 of the Civil Code). This easement, which is very restrictive on the beneficiaries, was established to ensure the essential needs of small communities. It assumes in particular that there is no other supply of water than the spring concerned. It can be applied to all sources from which running water flows. The easement must reconcile the spring owner's rights with the needs of the beneficiary community. It entitles the owner to compensation (determined by agreement or by expert assessment) paid by the beneficiaries, according to the damage incurred. It should also be noted that a *commune* has the right to expropriate a spring in the general interest in order to provide full use to its inhabitants.

Other easements:

- Aqueduct easement
- Run-off easement
- Easements for laying private waste water ducts for irrigation
- Easement for the passage and depositing of equipment for cleaning out, maintaining, widening, regulating stream-flow or straightening the channel of privately-owned watercourses
- Easement for the passage of mechanical appliances and depositing equipment for irrigation channel maintenance.
- The right of way for fishermen on public property

The legal regime of water in France is characterised by its great stability since the law of 8 April 1898. The latter recognized the private ownership of certain categories of water, but lay down certain restrictions to allow access to water by a maximum number of people. This general idea has been upheld in subsequent legal texts dealing with water. The principle of ownership exists within the framework of public law, and the emergence of a water policy with the law of 16 December 1964 reinforces this trend. In fact, at the end of the 2nd World War, the management policy for water regulation was based on previously established ownership rights as well as respecting current laws and regulations. Water policy consisted of organising a structure and procedures for coordinating uses in order to maintain the availability of the resource.

Thus, the regime arising from the 1898 law has changed little, even if it has subject to certain amendments. For example, as it dealt only with running water, subsequent regulations were brought in to deal with the management of ground water (executive enactment of 8 August 1935, laws of 1964 and 1992, the latter repealing the 1935 act). The question remains to what extent such a regime, reflecting a period when the law was concerned particularly with issues of ownership, still applies to the management of a resource, which, since the 1992 water law, is seen as the “common heritage of the nation”. While the need for upkeep, improvement and transmission implied in the notion of heritage finds legal expression in the various policing and management measures entrusted to the public authorities, water as heritage also implies a sense of collective responsibility. It is not clear how this type of responsibility can be expressed legally. However, the 1992 law marks a notable development in considering water as a unique resource and legal entity which must be protected for its intrinsic value both in quantity and quality. This law therefore heralds the fundamental elements of a more integral water policy in terms of management, but the situation continues to be characterized by relatively dispersed powers and sector-based regulations. A new reform project for water legislation, taking into account the new EEC outline directive on water, is under discussion, and should set water management on a more integrated path.

III. Public policies on water

III.1 Evolution of public policies

The development of public policies relating to water in France can be summed up in three main periods circumscribed by major legislation:

- From the 1898 Act up to the middle of the 20th century, a series of particular regulations (navigation, hydroelectricity, public health, etc.) led to what can be considered sectorial management of water.
- After World War II, the strengthening of State intervention and an awareness of water as an important issue in managing economic development led to the initiation of a system of global management of water resources (distribution and anti-pollution measures) with the Water Act of 16 December 1964. A notable innovation of this Act was to set up water agencies and basin committees.
- The gradual emergence of new concerns since the 1970s (the creation of the Ministry of the Environment, the Nature Protection Act of 1976, the Fishing Act of 1984) has given a higher profile to the protection of the natural environment in matters of water management. The 1992 Water Act promoted the idea of balanced management (integrated management), based notably of the creation of new planning and negotiation tools (SDAGE and SAGE¹). This new law brought to light problems concerning the integrated management of water at basin level.

¹ SDAGE: Master plans for water development and management (*Schéma Directeur d'Aménagement et de Gestion des Eaux*); SAGE: Local plan for water development and management (*Schéma d'Aménagement et de Gestion des Eaux*)

A. Sectorial management of water

The Act of 8 April 1898 constitutes the basis of the legal system concerning water in France (Gazzaniga, 1997). From then onwards, the development of the law on water has centred round the idea of correcting the effects of appropriation of water resources, without bringing into question the fundamental principle of ownership. After debating the issue for 15 years, the law was already out of step with the social situation in France when it was eventually adopted: it was a largely rural law, while the country was moving towards industrialization. The general structure of the text consisted of “maintaining the principle of ownership, while limiting, in order to preserve, use.” (Gazzaniga, 1997). Its major concern was to deal with quantitative problems. Policing powers were entrusted to the *Préfets* of the *Départements*. Generally speaking, the situation was satisfactory, with a few exceptions (e.g. the Paris area) where major work was required for transferring water. Water needs were compatible with resources which were available or easily transferable. The allocation of water for different uses caused no significant conflicting problems. Management was therefore organised according to use, with responsibility shared between different ministries (Agriculture, Industry, National Development, Interior, Public Health, etc.). The intervention of departments of these different sectors (notably in the case of allocating possible subsidies for investment) was under the control of the Ministry of Finance. Possible conflict between different uses (e.g. maintaining the flow for down-stream use or for fish life) was resolved at inter-departmental meetings, generally at *Département* level (Valiron & al., 1990).

The Act of 8 April 1898 laid down very favourable rights for owners. These rights could however be modified by specific laws and regulations (e.g. groundwater, mines, police laws and regulations). Its contents concerned essentially:

- recognition of ownership for rain-water, spring-water, ponds and canals;
- an increase in the number of exceptions regarding ownership of springs;
- the principle of authorising uses on navigable and floatable (national) waterways;
- a new provision for private rivers, making a distinction between the river bed (considered to be the property of the riverside resident) and the water flowing over it, which could not be owned.

The major consequence of the last element of the law was the proliferation of regulating sectorial measures and administrative checks to limit the excesses of this principle of ownership by riverside residents.

Concern with public hygiene also played an important role (access to drinking water, urban waste disposal), priority being given to protecting the health of the population. Moreover, it became necessary to adapt the legal framework to a new situation, where water use problems were no longer dominated solely by agricultural issues. For example, a specific law was passed in 1919 to deal with the development of hydro-electricity production, abolishing in this connection the distinction between national and private waterways. Life-style changes also brought about an increase in the number of uses needing to be coordinated. This led to the demand for new ministerial powers regarding water management (industry, public health etc.) This period was remarkable for the major development works undertaken, and the vast mobilisation of water resources (e.g. construction of dams and canals; flow modification for navigation; works for hydroelectricity production and irrigation; drainage of wetlands, etc.). In fact, specific measures regulated by different codes of law (civil, rural, public health, local government, etc.) for mines, navigation, fishing, public health etc. made water management increasingly complicated.

The status of groundwater was partially covered by decrees of 1935, but the inadequacy of sectorial management became very apparent, especially after World War II. Prior to 1945, there was only a small amount of abstraction, with slow growth of facilities, and relatively low industrial or irrigation needs. Surface-water quality was considered acceptable, and little abstraction was required during the low-flow season, allowing a high degree of auto-purification. Urbanisation was slow, sewerage systems were in an embryonic stage because there was little waste, and industrial structures were un-developed. Only in a few large urban agglomerations or industrial areas (e.g. the present-day Ile-de-France and Nord-Pas-de-Calais regions) was the water quality affected. After World War II, reconstruction policies were drawn up in a context of State consolidation. The State undertook the management of private waterways, drew up planning and management policies of which water constituted an element, particularly after the nationalisation of electricity and the launch of large hydroelectricity programmes. In the 1950s it was involved in setting up regional management companies which took on water equipment programmes. Rapid urban development on the one hand and the rate of agricultural and industrial growth on the other led to large-scale abstraction and increased discharges into the river system. The quality of river water deteriorated rapidly, and there were increasing problems of conflicting use.

B. Global management of water resources

The State's awareness of this situation led to the constitution of a Water Commission as part of the *Commissariat au Plan (Audit commission)* in 1959². The Commission's study (aimed at a more rational management of the resource) led to the Water Act of 16 December 1964, which brought in a phase of global management, distributing the resource between the different users, and preventing scarcity (so as not to penalise industrial development) by controlling pollution. New bodies were set up under this law, characterized by the varied nature of their constituent members. A national committee was created, bringing together representatives of the State, regional organisations and users. More importantly, the act also created 6 basin agencies (these became the Water Agencies in 1992) with 6 basin committees. These consisted of representatives of the State, regional bodies and users for each basin. Management methods were more closely linked to the river system, and water came to be seen as having a monetary value, with the introduction of pollution and consumption fees, later known as the polluter-pays principle³.

The global management system set up under the Act of 16 December 1964 centred round the following principles:

- 1) The unitary nature of the resource. It was primarily concerned with surface water, but also made the abstraction of groundwater subject to notification;
- 2) The solidarity and inter-dependence of users;
- 3) Financial solidarity (payment principle).

The main result was the significant reduction of centres of pollution (provision of sewage treatment plants), and a significant improvement in user-satisfaction, as measured on a multi-use grid introduced by the agencies in 1971. This evaluation grid for surface water quality classified waterways according to a range of categories, from excellent, suitable for all uses, to very bad, unsuitable for any use.

The representation of different categories of actors/users in water management in the basin committees (State, regional bodies, users – particularly industrial and agricultural) introduced a new coordinated approach into water management. It introduced financial mechanisms for pollution control, and brought together different view points and interests on a single stage, under the aegis of state representatives.

² The *commissariat general au plan* is a think-tank for planning and forecasting economic and social developments in France during 5-year national indicative plans.

³ The polluter-pays principle was not defined until 1974 within the framework of the OECD.

However, from the 1970s onwards, this predominantly quantitative approach was gradually replaced by a more qualitative approach, motivated by the environmental issue. This new concern (creation of the Ministry of the Environment; the Nature Protection Act in 1976) was particularly apparent in the Fishing Act of 1984, which introduced the notion of the “aquatic environment”, replacing earlier regulations concerned with “water”. This trend away from the essentially quantitative approach of the 1964 Act is also shown in the gradual development of contractual procedures (river contracts) concerning waterways during the 1980s.

C. Towards integrated water management

The outcome of this trend was the adoption of the Water Law of 3 January 1992 which spoke of the “balanced management” of water resources. This law was passed following an important debate on water policy (National Conference on water), which gave a largely unsatisfactory assessment of the 1964 Water Act. At the time this conference was held, France had experienced several years of drought (1976, 1989, 1990, 1991) resulting in a fear of water shortages. At the same time, European legislation was moving significantly towards a new water policy.

The balanced management advocated by the 1992 Water Act consisted of cooperative action to ensure the conservation of aquatic ecosystems, protection against different forms of pollution, the development and protection of the resource, and the enhancement of water as an economic resource. The management organisation drawn up by the law consisted of: 1) master plans for water development and management (SDAGE); 2) plans for water development and management (SAGE) at the level of a river basin or an aquifer system.

The new SAGE procedure was entrusted to the local water Commission, and territorial authorities were able to strengthen their links through the creation of local water communities. The procedure could lead to integrated management at the basin level, which could possibly appear to be the result of the success of good balanced management. This trend has been supported by the strengthening of the State representative's role at the *Département* level (the *Préfet*), and a move towards coordinating the structures involved in water management under his authority through the Interdepartmental Water Mission (MISE).

With the adoption of outline directive no. 2000/60/CE of 23 October 2000 by the EEC authorities, a reform of water management is under way. The prime objective of this directive is the good ecological condition of water in the EEC by 2015. The impact of this outline directive on French legislation concerns essentially the integration of certain technical features. In particular, the following impacts can be observed (Hennache, 2001):

- the extension of quality objectives to all surface water, including coastal waters;
- the revision of criteria for assessing water quality, with greater emphasis on biological criteria: the traditional “multi-use” grid of 1971 has been replaced by a new system of assessing water quality (SEQ-Eau), which takes greater account of the ecological state of water, adding biological indicators to chemical criteria;
- consideration of the obligatory results in terms of water quality improvement: objectives to be achieved must be revised on average every six years (instead of ten currently in France), in order to achieve good water quality by 2015;
- increased control of the chemical quality of ground water, particularly through developing a stricter monitoring system (particularly for trans-border water tables).

By adopting drainage basin districts on the principle of natural entities, and not on a purely administrative basis (districts can be trans-border), the directive generalises and extends the French model of water management by drainage basin. However, the French system of agencies could be modified to have greater respect for natural scales (e.g. Corsica), or take

into account international basins (e.g. the Rhine-Meuse and Artois-Picardy). The functions of basin authorities could be centralized round the préfets coordinating the basins, who would then be the competent authorities required by the outline directive to authorise the district management plans.

The qualitative assessment of water, based on an inventory focusing particularly on protected zones and catchments, has already been partly taken into account in the SDAGE. However, taking the directive into consideration requires a more detailed integration of these documents, economic data and analysis of human pressures. Moreover, revision of the inventory, not planned under current French regulations, must be carried out every six years according to the terms of the Directive. From this perspective, implementing SAGEs would prove an important element for collecting data (both economic and concerning pressures on the water resource), and could then be developed.

The directive provides planning and action tools (management plans and procedural programmes), and encourages the active participation of the population. Regular monitoring of methods and actions undertaken provides the possibility of adjusting intervention strategies every six years. Setting up management plans at drainage basin level would strengthen the existence of SDAGEs and extend their content (more detailed inventories, need for an economic approach specifying the intervention measures planned). The procedural programmes include basic provisions for regulatory controls or tariffs, and supplementary arrangements. Traditional interventions by basin agencies would then be legitimised, as would certain existing policy arrangements (protection of catchment boundaries, Ferti-Mieux operations).

The programme would include technical tools, concerning:

- monitoring and constant information about the state of water quality, enabling existing control networks such as the National Basin Network (RNB) to adapt the parameters used, the frequency of sampling, the density of measuring points, etc.;
- the definition of a regulatory framework (threshold values and quality norms; stricter restrictive measures to achieve quality objectives where necessary), enabling a “combined approach” to control diffuse and one-off pollution of surface water;
- setting up strategies to combat pollution, notably for ground water.

The French reform project has shown particular interest in the economic tools of the directive. This insists on the need for economic analysis as an awareness tool, and on water levies based on a generalisation of the “polluter-pays” principle to the whole of the economic sector influencing the water quality or regime. On this basis, the agricultural sector in France would be subject to higher levies, and electricity production could be subject to new taxation.

Administrative and regulatory procedures are fixed by the directive. In particular, it defines the organisation of information by each member State, with the aim of achieving consistent results and harmonisation at the community level. For example, systematic mapping of information concerning drainage basin districts is emphasised.

Within this general framework, the reform bill for water policy has four main objectives:

- 1) to transpose the outline directive 2000/60/CE into French legislation, and reinforce decentralization with regard to water;
- 2) to strengthen transparency, democracy and solidarity in the public departments of water supply and treatment, notably to guarantee the universal right of access to drinking water in order to meet basic needs;

- 3) to ensure a better application of the polluter-payer principle (reform fees to water agencies) and allow parliamentary control of the water agencies' multi-year programmes;
- 4) to improve water-policing operations.

To sum up, the evolution of the water management regime combined changes to the framework of legal ownership of water and a search for a greater balance in the compatibility of rival uses (settlement of disputes). For a long time, water had been considered purely as a resource for economic development (as a condition and/or support for various activities). However, a different concept emerged in the mid-1980's, taking a broader view which was stated in the Act of 3 January 1992. From then on, the "water environment", first mentioned in the Fishing Act of 1984, constituted "part of the common national heritage". Accordingly all actions aimed at the protection, enhancement and development of the usable resource came under the heading "common interest". This heritage view of the 1992 Act gave greater impetus to the control of water pollution, through the shared concern with the preservation of the water environment as a living environment.

III.2 Development of the French water regime towards integrated management

- Attempt to coordinate different actors

Before the Ministry of the Environment was created, the offices of the Ministry of Agriculture (DDAF) and Public Works (DDE) at the level of the *Département* were the main bodies responsible for management of waterways (with water policing powers). The Ministry of Industry joined with these bodies following a decree of 1935, with responsibility for policing some groundwater. It was in the 1960's that the need to co-ordinate the work of these different ministries became clear. It was thus, between 1961 and 1963, under the auspices of the Prime minister, that the inter-ministerial committee for national and regional development (CIAT) saw its powers increased to include water-related issues. This national co-ordination led to the creation of the Water Act of 1964 and over the next ten years, with the creation of basin agencies, it was implemented on a scale corresponding more closely to specific needs. However, the diversity of the central bodies in charge of water management remained and it was only with the creation of the Ministry of the Environment in 1971 that there was a gradual integration into this ministry. Decree 97-715 of 11 June 1997 attributed the following powers to it: the quality of the environment; nature conservation; the prevention, reduction and suppression of pollution and disturbances. This ministry thus currently deals with the policing and management of fresh water fishing as well as of watercourses, with the notable exception of the public river system. The latter remains under the control of the department of Navigation in the Ministry for Public Works. However, the Ministry of the Environment, on behalf of the Prime Minister, still co-ordinates all the ministries who are involved with water.

This evolution of institutional bodies, which can be seen in the laws of 1964 and 1992, has shown a gradual move from separation (sectorial laws of the first half of the 20th century) towards an attempt at global coherence (Act of 16 December 1964). Then the Act of 3 January 1992 sought a more balanced management of water (both as a resource, and as regards its various uses), with its new instruments (SDAGE and SAGE) moving towards integrated management. In order to meet the demands of the different uses it was necessary to view the situation in terms of a negotiated plan, where all needs were considered by specific bodies representing the users and the managing authorities. The main transition in this evolution can be seen partly in the 1960's, and partly from the middle of the 1980's. The former was marked by strong government intervention in water management, whereas the latter encouraged the involvement and greater participation of local bodies. Thus conflicting uses were dealt with close to their geographical source, where there was a good understanding of the problems and where more appropriate solutions could be found.

This drive towards “decentralisation” of certain aspects of water management was part of a more general political movement, even if State power remained predominant in this matter. The fragmentation at local community (*commune*) level –local government (*Mairie*) having important responsibilities in relation to water management – led to the need to set up specific bodies to enable efficient integrated management, outside the usual administrative organisation. In addition to State departments, an important factor in integrated water management in France is the concentration of technical know-how in certain large groups in the private sector (Lyonnaise des Eaux, Vivendi) who manage the water and sewerage systems for many local authorities.

Today then, the main levels of organisation of water management can be classified as coming under the responsibility of: 1) the European Community (directives to which national legislation must adapt); 2) the State (general regulations for management and coordination); 3) the water basin (resource planning and management); 4) local, which can be a sub-basin, amalgamating several communes (service provision, and technical, administrative and political management). The level and scale of management are therefore very varied, as are the objectives, methods and instruments. This diversity is matched by that of the actors intervening in water management. Some of these actors, such as mayors, have had increased responsibility since the 1992 Act.

The following table summarises the main intervention levels regarding water management. The implementation of integrated management is influenced by the objectives of some of the lower levels in relation to those of some of the higher levels (the EC or State) regarding certain aspects of water use and its impact.

The main organisation levels and their principal objectives

LEVEL OF INTERVENTION	GENERAL OBJECTIVES
EUROPE (EC)	directives on water addressed to member states
NATIONAL (STATE)	. draw up rules and general principles of management (laws, decrees, by-laws etc.); . make national legislation conform with EC directives; . ensure administrative coordination of state actions and actors.
REGIONAL (OR BASIN)	. ensure planning and management of the water resource (quantity and quality): SDAGE
LOCAL (contact with users)	. ensure services (often with the participation of private companies); carry out political and administrative management of water; . implement (possibly) planning (SAGE), technical and ecological management (design, implementation and management of work)

- *Change in policy concerns*

In the 1960's, the depletion of water stocks was the main concern of the water authorities, industrialisation being a large consumer of water as well as an important factor in water pollution (through discharge of waste products into surface water). With the modernisation of agriculture, which increased the need for water, as well as urbanisation leading to increased domestic needs, the 1964 Act introduced a water management regime which took into account the compatibility and requirements of all the different users. The main innovation of this law was to set up a dialogue between users (industrialists, farmers, and local authorities) and government representatives on the Basin Committees of the Agencies. These were defined in relation to the main river basins. The main objective was to create financial solidarity between the different users in order to control water pollution. It was considered that by maintaining the quality of waterways, the growing needs of the consumers could be met. By putting into place a system of water levies on the “polluter-pays” principle, even if the

functional framework of the agencies was essentially one of mutualisation, a marked reduction in pollution from urban and industrial waste was noticed. However the fight against diffuse pollution due to agriculture (nitrates, pesticides) was not effective due to a lack of appropriate means. From 1971 evaluation grids were used to assess water quality in the waterways, and to draw up regular maps of each *Département* in order to highlight the situation.

Following the Fishing Act of 1984, water management started evolving towards a greater integration of environmental issues. This development was linked to a growing awareness of the strong inter-dependence of economic activities, impact management and the resulting quality of the environment. The aquatic environment was dealt with as a whole, whereas water and its users were for a long time under regulatory control. Contractual policies such as that initiated by the Ministry of the Environment from 1987 within the framework of “river contracts”, gradually followed the experiences of integrated water management at basin level. The same ministry joined with the six Water Agencies in 1987 to set up a national network of basins in order to give a general overview of the state of waterways and to evaluate anti-pollution measures. Moreover, several important events (successive dry summers in 1989, 1990, 1991; the catastrophic flooding of Nîmes in 1988; the impact of storms on fish mortality in the Seine in 1990 and 1992, etc.) helped to accelerate the change in attitude towards water. The unitary aspect of the water resource became apparent with the impact of drought on the pumping of large quantities of groundwater by farmers. Elsewhere, the accident at the Protex factory near Tours in 1988 led to the water supply being cut off due to contamination of the Loire and the Vienne. The ensuing debate on water resulted in the Water Act of 3 January 1992, which was also influenced by European legislation: a large part of this law deals with the integration of the European directive of 1991 on urban waste water. At the same time, the innovative experience of water management at the river basin level was gradually implemented at the more operational level of the “sub-basin”. The contractual policies such as the river contracts initiated in 1981 also played a part, since water quality could not just be improved by the policy of installing water treatment plants. At the same time, setting up environmental protection organisations, and the increasing awareness of inhabitants of the water issue, were contributing factors in the change in the water management regime in France.

In general terms we can consider that the current regime represents a step towards an integrated approach, but is centred more on co-ordination of action and different uses. There is a gradual progression from a technical approach of infrastructural works, towards a negotiation process between the different actors to define a multidimensional water policy (Le Coz, 1994).

IV. Water regimes and their sustainability performance

The development of the water regime is based around two main elements: the definition of property rights, the structure of which was laid down in the law of 8 April 1898, and the setting up of public policies to control and manage the multiplication of uses, from the 1950s.

The promulgation of the Civil Code in 1804 did not transform the water regime, and it was not until statutory provision of the law of 1898 was written into this code that individual property rights in this area were formalized. However, the ownership of water is more a question of principle than a reality, and since the end of the 19th century, it has been restricted by numerous clauses with a view to satisfying and coordinating an ever greater number of often conflicting uses. Thus, various forms of easement, the specific rights given to the grantee, and more recently the obligatory authorizations and declarations for significant withdrawals and discharge can be noted. In general, the increasing predominance of public law in water management has gradually led to water rights becoming a set of regulations concerning the uses of the resource.

IV.1 Regime evolution in terms of coordination between PR and PP

The coordination of ownership rights and water management has not been greatly modified since the end of the 19th century. The legal regime arising from the 1898 law has been amended by administrative restrictions for tighter controls of uses. The most recent expression of this trend is the generalization of the principle of authorisation or declaration by installations, technical works and operations liable to affect water quality to non-domestic use (law of 3 January 1992). These restrictions have not so far brought into question private water rights. Moreover, private rights are accompanied by various easements which are to the advantage of both private individuals and local communities.

IV. 2 Identification and explanation of regime transitions : factors explaining the transformations in water management

Changes in water management in France can be summarized as follows:

- **1566-1789** : simple regime, with few uses (navigation, water supply), and division between royal right on major rivers and feudal right on other surface water;
- **1789-1898** : simple regime, with few uses, but the appearance of some new uses (irrigation, industry, water treatment and waste disposal) and disputes linked to the absence of clear laws concerning non-navigable or floatable water, whose status was clarified in the law of 8 April 1898;
- **1898-1945** : diversified and complex regime (sectorisation), with management of different uses weakly coordinated (supply, agriculture, navigation, hydro-electricity, etc.);
- **1945-1964** : complex regime with increase and particularly intensification of uses linked to industrialisation and urbanisation, but the appearance of the first elements to coordinate different uses (new actors such as EDF and regional development companies);
- **1964-1992** : “global” regime, weakly integrated, ensuring coordination between different uses, notably at the drainage basin and national levels; preservation of quality by fighting pollution, and limitation of conflicts over ground water between industrial uses and water supply; first steps to “polluter-payer” and “abstractor-payer” system; assessments (regular pollution checks of watercourses) and experimentation (river contracts from 1981); consideration of ecological quality of the water environment (cf. 1984 “fishing” law), etc.
- **since 1992** : “balanced” regime, directed towards local integration centred on the resource and its quality: fight against diffuse pollution (particularly agricultural); search for better application of “polluter-payer” principle; application of scheduling: SDAGE (obligatory for the six drainage basins) and SAGE (optional and depending on the will of local authorities round the sub-basins).

The notable changes that have been implemented in water management over the last century, between the 1898 Act and today, can be characterised by a diversification through sectorial management (from 1898 to 1964). This was followed by global management methods (the 1964 Act), which in turn gave way to a balanced and more integrated system of management (the 1992 Act). The main transitions could be explained by the general evolution of regional management policies, put into place under the aegis of the State (national and regional development), and the recent emergence of environmental issues. These find favourable ground in the water resource, which is both indispensable for development and a living environment which must be protected from deterioration. As a resource, the uses of water are extremely diverse and are not all compatible, and therefore ways of resolving rival uses must be found. This became a serious issue with

industrialisation and urban and agricultural development after 1945, and the 1964 Act brought a satisfactory solution to this situation. When taking on the issue of a deterioration in aquatic environments however, the multidimensional characteristic of this issue became apparent: this could not just be dealt with by the development policies which dominated the period 1945 to 1970. The approach instigated by the act of 16 December 1964 was thus accompanied by administrative changes (the gradual transfer of national water management to the Ministry of the Environment) and new legislation (the Nature Protection Act of 1976). With the Water Act of 3 January 1992, the water management closely followed the organisation methods for land usage (master plans and town and country planning documents). This last act therefore promoted the SDAGE and the SAGE, even if certain aspects of it were modified by the Act of 2 February 1995 which places greater emphasis on nature conservation.

From then on, it can be said that water management in France had to reconcile different uses, by placing consumers in competition with each other (for development purposes). At the same time, it was necessary to protect the resource from the consequences of its utilisation (conservation of the aquatic environment). Balanced management had thus to be carried out in a context where the territorial levels of intervention tended to increase, and the number of actors involved also increased. New management tools were therefore introduced. These were both of a general nature, such as the Water Act of 1992 (SDAGE, SAGE), and of a more specific nature (risk prevention plans - PPR) as, for example, in the "Barnier" Act of 2 February 1995. Intervention methods in water management thus evolved under the influence of various factors: level and scale of organisation; a richer network of actors; co-ordination of the multiple viewpoints affecting water management; use of different means for developing the policy; making those involved take responsibility for reaching objectives.

While traditional management of water was carried out at local authority level (water supply and sewage disposal), the *Préfet* and the State departments of the *Départements* had important powers in managing watercourses. Since 1975 there has been significant involvement of the European Community through the issue of directives. Their integration into national legislation has transformed the standards used in water management: criteria for drinking water for example, have highlighted the impact of intensive agriculture (e.g. pig farming in Brittany) on water quality.

The main elements which help explain the general developments in the water regime since 1898 are:

- a) the multiplication of uses, particularly those linked to urbanisation, the intensification of agriculture and industrialisation: the major consequence of this is to address the water issue from the perspective of general regional organisation (Act of 16 December 1964);
- b) the need for an organisation of water management that includes the objectives imposed at a national level by European regulations, particularly for urban water discharge (Act of 3 January 1992).

A. From sector-based management to global management

This transition started taking effect from the 1950's. The end of the Second World War opened the way to State-controlled centralisation, justified by the extent of the damage suffered by the French economy. The general state policy for territorial organisation after the Second World War, in particular laying the foundations for industrial expansion, played a fundamental role in the evolution of water management which would come into effect with the law of 16 December 1964. This same period was marked by rapid industrial growth, a high level of urbanisation, and a desire for modernisation of agriculture involving particularly an increase in irrigation. The increase in the quantity of water abstracted to meet the many needs exacerbated rival uses, while the role of the State became predominant in satisfying demands (financing installations). The water issue thus emerged as an essential element for national and local development for which the Act of 1964 was seen as one of the main tools.

The post-war period was marked by a high level of urban development: the rural population decreased as people moved to the towns, while the population in general increased rapidly. As a result, urban areas doubled in France between 1954 and 1975, and a radical change was seen in the farming community. The latter was required to increase production, which was done largely through irrigation and drainage, the rationalisation tools of agriculture. This policy allowed irrigated areas to be extended by carrying out major regional improvements.

The policy of reconstruction fitted into this context. Circulars were published giving details of the technical and financial means available for urbanisation projects. For example, in 1946 a circular concerning water supplies to local urban communities (*communes*) was published. A similar one on rural water supplies was produced in 1948, followed by a general circular on sewage treatment in built-up areas in 1949. These documents resulted in centralising the examination of local projects, which was essential for obtaining State subsidies. This situation allowed the state to intervene in the main stages of urban policy relating to water management. However, the concentration of industrial activity in the main urban areas during this period of massive expansion meant that industrial needs had also to be taken into account in water installation projects in built-up areas.

Electricity production was nationalized in 1947 with the creation of EDF which replaced numerous private companies. This new firm took on large-scale water development programmes to increase production capacity. At the same time, regional development companies were set up, particularly in the South of the country, within the context of a national and regional development policy. The creation of the *Canal de Provence* company in 1957, for purposes of irrigation and water supply, enabled EDF to develop close relationships in the water management field. Under the Act of 5 January 1955, EDF had already undertaken the development of the river Durance with the construction of the large dam of Serre Ponçon (electricity production, control of water flow, etc.). The creation of other organisations (state-owned or semi-public companies) responsible for large development works (SOMIVAC for the enhancement of Corsica, the *Coteaux de Gascogne* company, etc.) strengthened the role of EDF in water management through its close involvement with all these organisations. In addition to their initial concern with irrigation, these companies often became involved in river flow control and leisure activities, with the development of the tourist sector round some reservoirs.

The development of leisure activities associated with water was partly connected to the growth of towns and cities which characterised France at that time. Urbanisation increased the need for recreational and leisure areas for these new populations, leading to the development of "leisure centres" for swimming and water sports. The main developments presented above enabled and encouraged this urbanisation. The latter considerably improved the standard of comfort, illustrated by the fact that average water consumption increased by more than 50% between 1946 and 1985. Moreover, there was a marked improvement in the water network of rural communities (drinking water and sewerage systems). With the generalisation of a sewerage system (which discharged waste more often than not without prior treatment), waterway pollution also increased. Diffused discharge of waste water was now replaced by concentrations at specific points, thus increasing pollution. However, the most important element in the need for a new water policy was the growth of industry, which led to a five-fold increase in abstraction (and discharge) between 1945 and 1975. Industrial production in France (excluding building and public works) more than tripled between 1945 and 1964. But industrialists considered water as a raw material which was available for all, with no specific economic value. Thus their abuse of the resource led to increasing competition with other users (domestic water supply, agriculture, etc.)

Problems thus became apparent as it became increasingly difficult to meet demands, with a considerable rise in the quantities needed, as well as in the concentration of the demand. Furthermore, the large increase in the discharge of waste water, which had not received satisfactory treatment, was leading to a serious deterioration in water quality. In the main urban centres, it became increasingly expensive to bring water long distances to where it was needed. In fact water treatment plants had to be built further up-river to avoid urban

pollution. Gradually, the need to manage domestic and industrial waste water treatment became essential.

This issue was highlighted with the appearance of critical zones for water availability. In general terms, throughout the whole of France, abstraction rose from a quarter to two-thirds of the average low-flow season level. Locally, in certain zones, the increased density of activity and population led to considerable pressure on available supplies. So one of the essential factors behind the Act of 16 December 1964 was the need to set up a system of management that would reduce the conflicts of water use, in order to maintain the potential industrial growth of the country. The situation in fact led to an awareness that management in terms of separate uses (in existence since the law of 8 April 1898) was no longer appropriate. It became necessary to make choices about how to use the water resource, and control pollution, taking into account all the uses, needs and emissions of a unique resource.

The situation created serious disruptions that led to a fear of water scarcity in the 1950's. The elected representatives and the general public (particularly the fishing associations) were made aware of waterway pollution through the mass death of fish that it caused. Another consequence was that in some areas ground-water reserves became the only available source suitable for domestic and industrial needs, surface water quality only being suitable for cooling. The authorities were unable to harmonise the various needs of users, and conflicts of use became more and more frequent. Economic development was being threatened, not only during periods of drought, but also as a consequence of the deterioration of the quality of surface water due to effluents.

There were two major inadequacies in the regime introduced by the 1898 Act :

- 1) There were very few restrictions in the user-rights of riverside residents. In practice, with the exception of public authorities, non-riverside residents did not have access to water. The State only controlled national waterways, which only represented a fraction (18,000km) of the overall French waterway network (270,000km). Such a situation created a challenge for all the engineers and civil servants who were faced with the problem of regional and national development. Discussions between the Audit Commission (created in 1946) and the Delegation for National Development and Regional Action (DATAR - created in 1961) led to a recommendation to look beyond sectorial interests in order to reconcile different needs.
- 2) There was no standard practice for pollution control, methods being linked to use. Responsibility for these was taken by departments of the Ministry of Health (protection of drinking water supplies against health risks), the Ministry of Industry (monitoring of establishments classified as hazardous, undesirable or creating a disturbance), etc. The collection and discharge of urban waste was managed through application of town planning laws, whereas the fisheries police were in charge of protecting fish. Poor co-ordination of these civil servants (interdepartmental meetings), often at the *Département* level, prevented the incoherence and contradictions of the work of the different authorities being resolved.

The Act of 16 December 1964 prioritised two main issues: the powers given to the State for improving water management, and pollution control. It thus defined objectives and created the methods for implementing them by referring to two complementary principles :

- 1) the unitary nature of the resource, justifying the creation of consultation bodies for users through a decentralised system of management (with the basin Agencies and their committees). However, there was no change in the traditional powers of the different State departments in relation to water;
- 2) the introduction of an economic dimension to water management tools, in order to reconcile public and private interests: this involved providing funds for the investment needed to ensure permanent water availability.

The transition from sectorial management at the beginning of the 20th century to global management in 1964 can be explained as the result of social changes taking place in France at the time. The law of 16 December 1964 brought important innovations into water management. It achieved results in terms of improved pollution control methods, and it

introduced methods of evaluating the impact of this policy on the improvement in the quality of surface water.

The initial issue, which was essentially quantitative, was thus gradually enlarged to cover the management of water quality. The latter became increasingly important from the 1970's onwards, but became even stronger in the 1980's. As a result, the effects of the 1964 Act were brought into question, as were the developments necessary to meet the demands of the European Community in relation to water management (directives). This debate led to the Act of 3 January 1992 and the promotion of the idea of "balanced management".

B. From global management to balanced management

The first step towards this change was in the 1960's. In spite of the creation of basin authorities, the Act of 1964 did not simplify the administrative organisation of water management. In fact it had allowed different bodies to intervene: *départements*, local authorities, groups of *départements* and local authorities, different unions (articles 11 and 12), specialised public bodies (articles 16, 17, 51). Thus it became necessary to create co-ordinating bodies, which added to the administrative bureaucracy of water management. The overall supervisory role of the Ministry of the Environment over the activities of the different parties was insufficient to remedy this problem: this ministry relied on the decentralised departments of the other ministries that it was meant to supervise since it did not have operational departments in the field itself. The essential co-ordinating role of the Ministry of the Environment, in reality led to managing sectorial decisions relating to water, with little space to follow its own policy in this domain.

The 1964 Act looked mainly at surface water. The major changes that it made with the introduction of the basin structures had little specific relationship with the structure of water tables. The organisation at basin level did not lead to the removal of the other administrative levels in management. Instead, these were superimposed on the existing ones, which kept their responsibilities. The pollution issue, which is a fundamental aspect of the law, was dealt with on the basis of an infrastructure problem, and this could not deal with all the factors affecting the water quality. In the context of a more general public awareness of environmental issues, other aspects of the quality of the waterways (maintenance, preserving the environmental value, etc.) were taken into consideration in the procedure of river contracts from 1981. The need to transpose Community legislation, which had dealt with the water issue since the water quality charter at the end of the 1960's, added to the perspective of adapting legislation at the beginning of the 1990's.

Up to the end of the 1980's water policy relied on the objectives and means set out in the official reports on basins (1971) and the national official report. The assessment of this policy was made at the Water Conferences (local and national) from 1990 to 1991 following the work of numerous parliamentary, administrative or academic commissions. The extreme complexity of the mechanism and its short falls were underlined and proposals for reforms were made. At the same time a disagreement between France and the EC on the application of the directive on the protection of surface water destined for human consumption (June 1975) was taken before the European Court of Justice on 18 May 1990 by the Commission in Brussels.

Since the 1970's, various European directives dealt with the issue of water: their integration into national legislation has played a part in the changes in water management. The restrictions imposed by European regulations became tougher from 1973 with the first EC environmental action programme, modified and completed in 1977. In 1981 the EC advocated taking into account the part played by the quality of natural resources in the economy. This intervention had a double objective: 1) to ensure the protection of the natural environment and the inhabitants of the member States on a common basis; 2) to limit differences in the policies of individual member States to avoid serious distortion of competition. With the Act of Union of 1986 a real Community policy in the environmental field was set out. The many directives produced in this context were imposed on the member States: the individual States however retained the choice of how to implement the objectives and principles within their borders through legislation, regulations or administrative

measures, and this within a given time period. In France the texts were adopted by ministerial order, decrees or modification of existing laws. From 1975 to 1990 orders and decrees were prioritised to incorporate the directives on standards of water quality for certain uses or for restrictions on discharge of various substances. However the application of the directive on urban water waste (21 May 1991) was covered by the Water Act of 3 January 1992.

The preparatory work for this law was set in the context of a much deeper environmental consciousness, with an awareness of the new pressure from the green vote. It was in conjunction with the National Environment Plan therefore, that the effects of water policy since the 1964 Act have been carried through. Following three consecutive years of drought, heavy storms in 1992 caused a high mortality rate of fish (particularly in the Seine), while the depletion of the aquifer was reaching a worrying level. At the same time, pollution linked to agricultural activity (increased levels of nitrates) created situations of conflict of interest between the Ministries of Agriculture and the Environment.

The fundamental principles were based on: simplifying the regulation and policing of water, bringing together the departments responsible for the administration of this resource, creating a united legal framework for water, conserving water on the basis that it should be protected, in general and unlimited terms, against pollution. This last aspect was actually initiated in the Fishing Act of 1984 and its need was implicitly recognised in the context of river contracts from 1981 onwards. It involved a closer co-ordination of administrative bodies at the local level (MISE - Interdepartmental Water Mission) and a local planning policy more closely linked to the SAGE.

The general recognition of the idea of sustainable development can be related to the search for integration in water management. In fact the "Barnier" Act of 1995 complemented the 1992 Act on certain points. However, the fact that after the 1992 Act individual regulations for specific uses of water remain could lead one to think of a more unifying legislation in the future; moreover, European policy seems to be moving in that direction.

C. Towards integrated management ?

The Act of 1992, as that of 1964, did not touch on the legal framework of water ownership. Debates and preparatory work on the law had nevertheless envisaged a reworking of the general framework. The Water Conference had put forward two bold solutions but these were not generally accepted. In reality the Act of 3 January 1992 did not go as far as had been expected during the preparatory meetings. However by proclaiming water as an object of national heritage, the legislator recognised, for the first time, the need to protect this resource for itself, as much its quantity as its quality. The codification of the requirements of this new concept could lead to new legislation which would define more precise measures for an efficient management of water heritage.

Furthermore, the European Parliament has just adopted a directive project that should serve as a framework for a European policy in the field of water. The project should put into place a general framework for water protection (surface and ground) throughout the whole of the EC. It should organise the various texts written on the issue by the EC since the 1970's. The directive should impose the creation of river system districts at an international level on river basins. The desired objective is to obtain improved chemical and ecological water quality over the next fifteen years (by 2015).

A diagnosis needs to be carried out, both in relation to water abstraction (a survey of the quantity of water abstracted from the system) and regarding the impact of uses (the impact of human activity on surface and ground water). Following this, after public consultation, proposals would be made in the context of a management plan which would allow a "good" chemical and ecological state of water to be reached by the deadline of 2015. Within a time scale of three years after its adoption, the directive framework must be incorporated into the legislation of each member State. Even if the systematic application of the "polluter- pays" principle has not been adopted by Euro MPs, the discharge of certain substances should be illegal or limited by 2020, within the context of other directives.

The implementation of these measures by France could present an opportunity for a revision of the water regime towards a more integrated management system. It could particularly allow for the generalisation of the SAGE procedure, which currently remains only indicative of future implementation. At the moment around thirty SAGE exist, but only two have been approved. In fact the notion of integrated management follows on from a close co-ordination of sectorial and local initiatives, for which the SAGEs represent the favoured means. It also presumes that a management framework is defined at the level of surface water and its catchment area, as well as at the level of the water tables. Thus local operations should be in keeping with global planning. This combines socio-economic and environmental components as well as the issue of actors. The development of the SAGEs meets these different criteria, but they have not yet been set up on a widespread scale in France. So these first experiences can constitute a learning phase for integrated water management; it could be predicted that the evolution of regulations would be towards their generalisation under the impetus of the Ministry of the Environment.

V. Conclusion

Concern about water management in France goes back a long way, varying in nature according to the socio-political and economic conditions of the time. For example, without going back to the very earliest roots of certain forms of management, in 1291 the Forest and Water Inspectorate (*Maitrise des Eaux et Forêts*) was created by Philippe le Bel (Gazzaniga & al., 1998). Louis XIV gave greater powers to this institution (for military purposes: transport of timber to the royal naval dockyards) with the Water and Forest decree of 1669. By definitively placing navigable rivers under national control, certain authors see this Act as the true beginning of water policy in France (Barraqué & al., 1995). The setting-up of a Navigation Department in the 18th century supports this proposition, even though there is general agreement that up to the end of the 19th century water was managed on a local and autarkic basis (Chocat & al., 1997). Water resources retained their unitary character, although there was considerable conflict between ownership and use. The main management problems centred round the distinction between national (or navigable or floatable) and private waterways. In 1962, this distinction was at the root of administrative duality between the Ministry for Public Works (*Ministère de l'Équipement*) (bridges and roads division, responsible for navigation) and the Ministry of Agriculture (water and forests division, responsible for private waterways).

The French Revolution (1789) brought no radical modification to water management, transferring navigable and floatable rivers (previous royal property) and their dependencies to the state. However, the suppression of feudal rights that this involved created a legal vacuum for the other waterways: the debate over whether these were the property of the *communes* or whether they could be considered as private property continued for a long time. In terms of water management, the Civil Code of 1804 only looked at user rights, the rights to alluvial matter and ownership of islands. The legislation was soon realized to be inadequate for effective management of water resources, particularly for resolving repeated conflicts between ownership and water use by a population which remained predominantly rural.

Development specifically linked to industrialisation, urbanisation and a more intensive organisation of agriculture from the 19th century onwards, as well as the changes in water use that went with it, resulted in greater public authority intervention. This took the form of a proliferation of administrative measures asserting the policing powers of the State. As a result, local communities gradually relinquished their involvement in matters of water management, with a notable weakening of community methods of local management. This development was formalized with the Act of 8 April 1898, which is considered to be the beginning of the institution of a national regime for the management of water resources in France.

Subsequent changes to this national regime can be summed up in few significant issues circumscribed by major legislation:

- 1) From the 1898 Act, a series of particular regulations up to the middle of the 20th century (navigation, hydroelectricity, public health, etc.) led to what can be considered sectorial management of water;
- 2) After World War II, the strengthening of State intervention and an awareness of water as an important issue in managing economic development, led to the initiation of a system of global management of water resources (distribution and anti-pollution measures) with the Water Act of 16 December 1964. A notable innovation of this Act was to set up water agencies and basin committees.
- 3) The gradual emergence of new concerns since the 1970s (the creation of the Ministry of the Environment, the Nature Protection Act of 1976, the Fishing Act of 1984) has given a higher profile to the protection of the natural environment in matters of water management. The 1992 Water Act promoted the idea of balanced management, based notably on the setting up of new planning and negotiation tools (SDAGE and SAGE). This new water law brought to light problems concerning the integrated management of water at basin level.

As a general rule, the water management regime has evolved essentially through the defining of public policy modalities in France. There have been no major changes in ownership rights since the 19th century, but management of uses has led to the development of various regulatory provisions (easements, authorisations and declarations). User rights depend as much on private as on public law. Moreover, the considerable importance of the "collective good" status for the majority of watercourses justifies the extent of public intervention in water management. Since the 1964 law, the trend of these public policies (which have not brought into question the 1898 legal regime of water) has been to coordinate these various users in order to meet their needs. Integrated management has been introduced from local experiences (river contracts, SAGE) at a level as near as possible to the location of the problem. However, integrated water management has not yet been generalized throughout the country.

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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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