



Ministry
of Public Works,
Transport
and Housing

MINISTÈRE
SPATIAL PLANNING
AND ENVIRONMENT



WATER

THE FRENCH EXPERIENCE

321-FR 98-16 949

LIST OF ABBREVIATIONS AND NAMES

A.F.D.	Agence française de développement
B.E.I.	Banque européenne d'investissement
B.R.G.M. / A.N.T.E.A.	Bureau de recherches géologiques et minières
B.R.L.	Compagnie nationale d'aménagement du Bas Rhône Languedoc
C.E.M.A.G.R.E.F.	Centre national du machinisme agricole, du génie rural, des eaux et forêts
C.I.R.A.D.	Centre de coopération internationale en recherche agronomique pour le développement
C.F.M.E. - A.C.T.I.M.	Agence pour la promotion internationale des technologies et des entreprises françaises
C.L.E.	Commission locale de l'eau
C.N.R.S.	Centre national de la recherche scientifique
C.N.U.E.D.	Conférence des Nations Unies pour l'Environnement et le Développement
C.S.P.	Conseil supérieur de la pêche
E.N.G.E.E.S.	Ecole nationale du génie de l'eau et de l'environnement de Strasbourg
E.N.G.R.E.F.	Ecole nationale du génie rural des eaux et forêts
E.N.P.C.	Ecole nationale des ponts et chaussées
E.N.T.P.E.	Ecole nationale des travaux publics de l'État
F.A.S.E.P.	Fonds d'études et d'aide au secteur privé
F.E.D.	Fonds européen de développement
F.E.M.	Fonds pour l'environnement mondial
F.F.E.M.	Fonds français pour l'environnement mondial
F.N.D.A.E.	Fonds national pour le développement des adductions d'eau
I.F.E.N.	Institut français de l'environnement
I.F.R.E.MER	Institut français de recherche pour l'exploitation de la mer
I.N.R.A.	Institut national de la recherche agronomique
I.N.S.E.R.M.	Institut national de la santé et de la recherche médicale
NANCIEau	Centre international de l'eau de Nancy
O.I.E.	Office international de l'eau
O.M.M.	Organisation météorologique mondiale
O.M.S.	Organisation mondiale de la santé
O.R.S.T.O.M.	Institut français de recherche scientifique pour le développement en coopération
P.P.R.	Plan de prévention des risques
R.I.O.B.	Réseau international des organismes de bassin
S.A.G.E.	Schéma d'aménagement et de gestion des eaux
S.C.P.	Société du canal de Provence
S.D.A.G.E.	Schéma directeur d'aménagement et de gestion des eaux
V.N.F.	Voies navigables de France

WATER - THE FRENCH EXPERIENCE

INTRODUCTION

ACCESS TO WATER: A MAJOR INTERNATIONAL CHALLENGE page 04

THE MAJOR USES OF WATER IN FRANCE page 06

WATER AND TOWN AND COUNTRY PLANNING page 10

MANAGEMENT OF THE WATER RESOURCE page 12

MEANS OF MANAGING WATER SERVICES page 14

RUNNING COSTS AND PRICE OF WATER SERVICES page 16

PUBLIC AND PRIVATE RESEARCH IN THE WATER SECTOR page 18

TRAINING FOR PEOPLE page 20

THE EUROPEAN DIMENSION page 21

INTERNATIONAL OPENING page 22

FOR MORE INFORMATION page 24

Library

IRC International Water
and Sanitation Centre
Tel.: +31 70 30 689 80
Fax: +31 70 35 899 64

This document was produced by the Directorate of Economic and International Affairs on behalf of the Ministry of Public Works, Transport and Housing and by the General Directorate of Administration and Development of the Ministry of Spatial planning and Environment

Graphic design, production : Cete de l'Ouest Groupe Vidéo-Communication

Paste up : Michel Leplard

Printed in december 1998 by Édycom, Rennes 35

Cover photos : Waterfall in Haute-Loire (*M. Leplard*)

Fountain complex in Pikine (Senegal) (*C. Le Jallé*)

LIBRARY IRC

PO Box 93190, 2509 AD THE HAGUE

Tel.: +31 70 30 689 80

Fax: +31 70 35 899 64

BARCODE: 16949

LO:



▲ L'Eventail
waterfall

M. Leplard

Where there is life, there is water. Water is an inherent component of living elements of which it represents the most important part and the major agent for exchange with the outside environment. On account of its remarkable physical and chemical properties, under the combined impetus of solar energy and gravitation, water shapes our geographical landscape and the very conditions of life itself: relief, sedimentation and climate. The water cycle, in its three separate states (liquid, gas and solid), is inseparable from all forms of life.

Since time immemorial, the majority of human, economic, social and cultural activity has used this resource in varying quantities and qualities, developing hydraulic systems whose degree of complexity has changed with the different forms of civilisation, but has invariably been used at great expense.

Today, world events constantly remind us that water is a resource which is not always renewable and is often capricious since it is unequally distributed in space and in time. Additionally, some of today's imbalances created by man, natural cycles, biological rhythms and the balance of our ecosystems can, in the longer or shorter term, threaten the very

health of population groups right through the food chain.

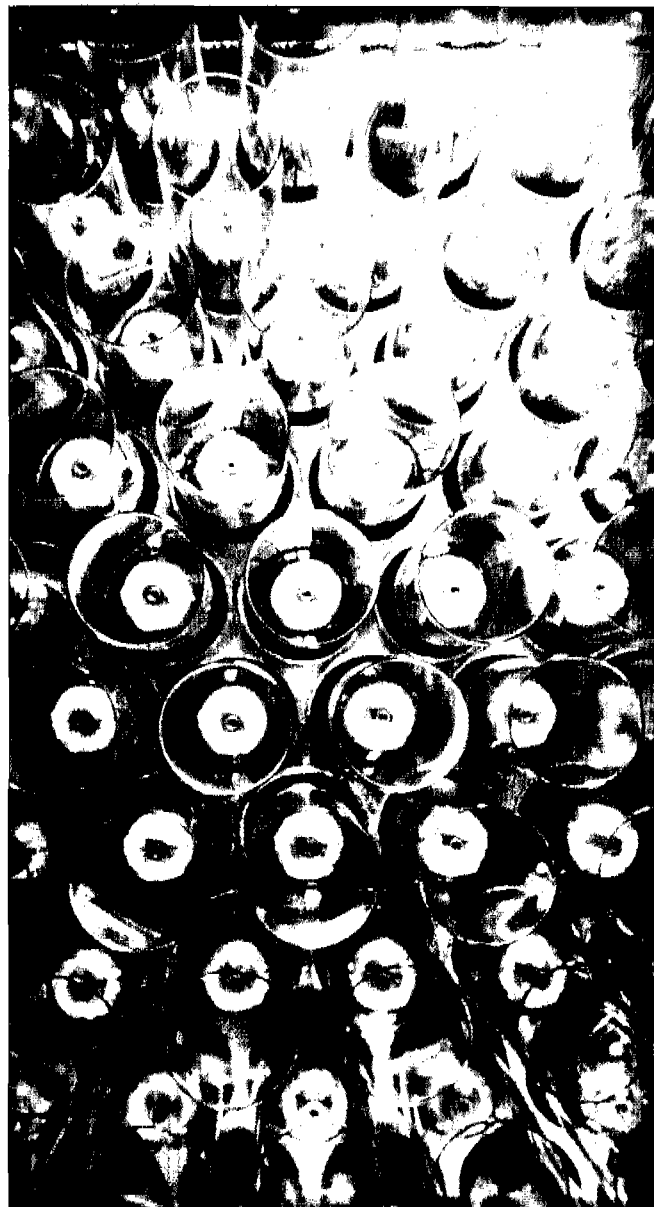
As a vital resource, water - whether above or below ground - must be managed in a global, quantitative, qualitative, coherent and balanced fashion. Attention should be paid to long-term urban or rural development as is required to secure sustainable development. Not only is it important that the specific management of each application of water is efficient, but also that between the different types of usage there is a harmonious and evolutive balance involving a vast number of both public and private bodies whose responsibilities vary greatly, both in terms of territory and activity. These responsibilities will often be contradictory, always interdependent but in every case must be reconciled. It is almost an art form, requiring:

- suitable scientific, technical and technological resources;
- economic and financial instruments which are properly adapted to a market environment;
- legal and institutional tools which are suitable - in particular from a social and cultural point of view - for the management of water which requires greater collective awareness, solidarity and co-operation on all sides.

Sustainable development is a powerful concept within which we can rationalise the notion of water management with and for the benefit of one and all.

The international conference on water and sustainable development organised in Paris at the Headquarters of UNESCO in March 1998 allowed us to move some way down this particular path.

▼ Ozone unit (indoor)
Suez-Lyonnaise des eaux



a major international challenge

Water, a gift from heaven which is critical to sustaining life, health, well-being and economic and social development is becoming a rarer and rarer and therefore increasingly expensive commodity.

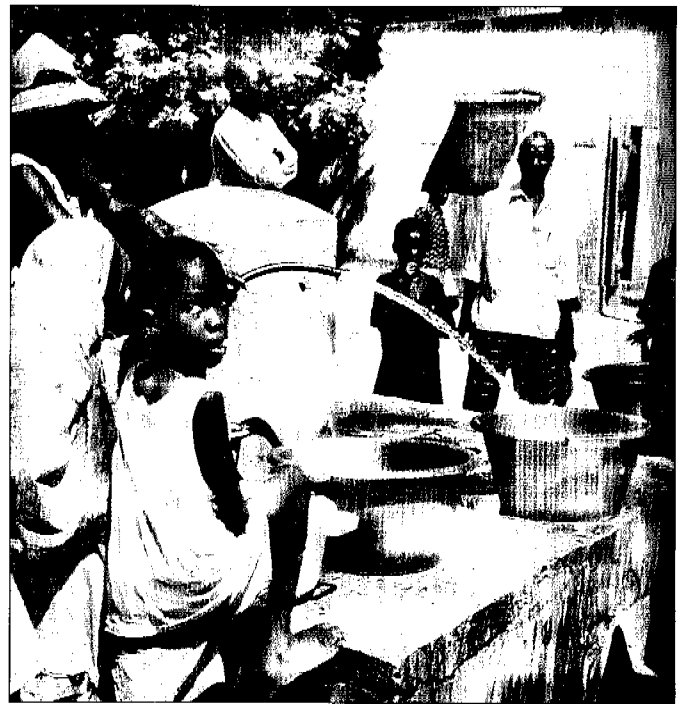
■ Water: a necessary natural resource for the majority of human activity

Potential resources are sufficient overall, but are unequally distributed in space and in time. Nine countries across the globe share 60% of the resource. More than 30 countries are today below the threshold of 1000 m³ per inhabitant per year; according to the World Meteorological Association (WMO), by the year 2020, shortages could affect two thirds of the planet. Future challenges will be considerable. One in five of the earth's inhabitants does not have access to water

▼ Water treatment facility

Tianjin, China

Vivendi



and one in two does not have proper sanitation. According to the World Health Organisation (WHO), more than 5 million people die each year from diseases caused by water which is unproper for human consumption. The water cycle is at the very heart of our ecosystems. All pollution passes through it: a growing proportion of resources is polluted by human activity. A natural resource which is as precious as this must be subject to

▲ Fountain complex in Pikine Senegal

C. Le Jallé

effective, demanding and pragmatic management in order to ensure the satisfaction of its multiple uses within a sustainable development perspective.

▼ River navigation

Ministry of Public Works

G. Crossay



■ Water: a vast economic sector

Professions connected with water include a wide range of activities:

- **intellectual activity** linked to study and research, technical, economic and financial aspects and legal and institutional aspects;
- **construction work** associated with water: civil engineering and construction;
- **supply and installation of equipment and facilities** (canalisations, metrology, fountains, water treatment products, etc...);
- **service activities** relating to the exploitation, maintenance and servicing of urban, industrial and agricultural facilities (dams, water treatment plants, networks, etc...).

In each of these areas, world needs are considerable, with substantial financial implications, since water cannot naturally be transported in any economic way other than by gravity. Therefore, initial investment costs but also operating, storage, intake, collection and treatment costs are very high indeed.

■ Water: environmental requirements

The Rio de Janeiro Summit in 1992 and the second world habitat conference in Istanbul in 1996 increased awareness as to the sharp increase in urban development across the globe. This was particularly true of countries of the southern hemisphere, with greater demand, the need to adapt water treatment plants and networks, negative impacts on the resource, etc... Yet, urban development is increasing run-off and pollution due to leaching. The impermeable nature of modern surfaces reduces infiltration and can affect the water table. The quality of both surface and ground water can be affected by pollution caused by urban, economic, industrial or agricultural activities.

Irrigation and agricultural activities which are not handled properly can also present a threat to water as a resource, ecosystems and wetlands.

Thanks to major global events such as the Rio sum-



mit in 1992 and other international conferences, in particular in Paris and New York in 1998, the international community has now realised that the management of water is a major challenge in our economic and social development which must also take into account the fine balance of our ecosystems. The international community has also realised that there is a need for regional strategies to share transboundary freshwater supply management: 215 rivers are concerned; of these, the United Nations has named over 70 areas of tension...

▲ The Charente river in Cognac

The Adour-Garonne Water Agency

▼ Harnessing a water source in Armentières

Sagep, Abron



of water in France



▲ The Dordogne river in Argentat

The Adour-Garonne Water Agency, Leforestier

■ Water in France

France has three sea coasts (English Channel, North Sea, Atlantic and Mediterranean), all of which have different climates but which are mainly temperate; temperatures and rainfall vary substantially according to the seasons. The natural hydrographical network includes 260 000 kms of waterways, of which 8 500 are navigable.

METEO-France

The public state establishment METEO-France sets up observation, collection and data treatment systems to forecast and disseminate information falling within its responsibility.

Its hydrology activities are developing constantly in response to increasing demand. Its operational activities, such as the management of new radars and improving high-water warning systems seek to give better warning of high rainfall and use the quantitative data produced by the radars in the ARAMIS network: the HYDRAM project to supply meteorological centres with images of water swells, particularly in Mediterranean regions such as Montpellier; the ASPIC software which provides network management assistance for urban water treatment for the Paris and Marseilles regions in particular; the hydrological modelisation of the Rhône basin in collaboration with the Ecole des Mines de Paris and the CENAGREF; surveillance of acid rain with the OMM, etc... This sort of information can be especially helpful to farmers in their management of the additives they use, particularly phyto-sanitary ones.

METEO-France plays a major role in a large number of international meteorological co-operation organisations and is actively involved in European scientific and technical development in this field. It is increasing its bilateral relationships with a large number of foreign partners and relies upon its overseas departments for meteorological support in interdisciplinary regional projects in the Indian Ocean, the Caribbean and the Pacific.

Finally, METEO-France contributes substantially to international co-operation activities in the area of training, in particular in Europe (the EUROMET project for computer-assisted teaching) and in Africa (Morocco, etc...).

Underground water tables are abundant and are generally of good quality.

Average rainfall of 800 mm per year and evapotranspiration of 500 mm brings around 3 000 cubic metres of rainwater per year per inhabitant on average.

The French West Indies, Guyana and the Reunion Island, plus France's Pacific territories have tropical climates bringing hot and humid conditions.

■ Drinking water and sanitation

The supply of drinking water in France today is practically guaranteed for everyone: 99.5% of the population has it. At every level, water is subject to constant surveillance from the time it is harnessed up to the point it is returned to nature. To guarantee the cleanliness of water, 63 parameters have been defined by the Ministry of Health in compliance with European directives.

Consumption of drinking water is now stable: the cam-

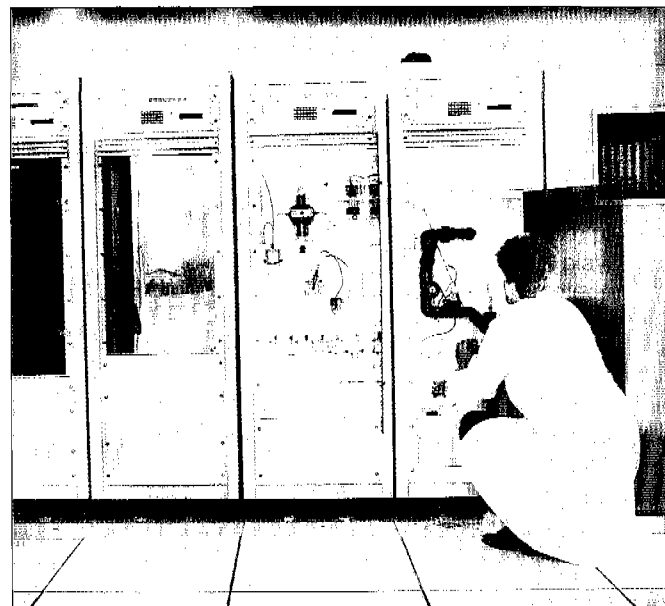
paign against leaks in the water networks and the introduction of more effective household apparatuses have compensated for increasing demand resulting from demographic growth and improvements to people's standard of living.

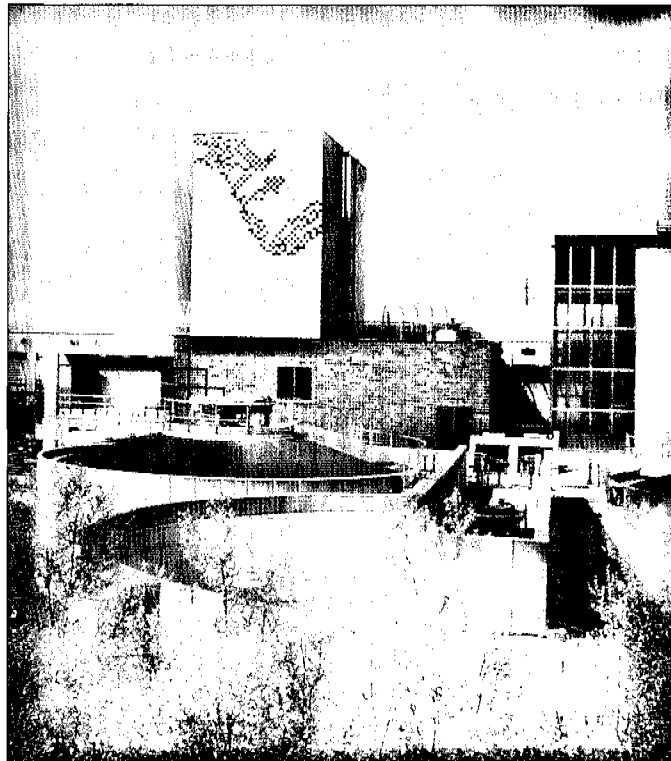
For a long time now, metering has been systematic in France: individual meters (or collective ones in the case of apartment blocks) allow us to measure water consumption by subscribers who, as a result, feel more responsibility for their levels of consumption.

Urban water treatment has also progressed: by virtue of a European directive in 1991 and the water law of 1992, all districts of more than 2 000 inhabitants must be linked to a high performance water treatment installation which allows the objectives of quality of recipient bodies to be met by the end of 2005 at the latest.

▼ Drinking water production, Joinville factory

Sagep, E. Gaffard





■ Irrigation and agricultural use

More than 70% of the water consumed around the world is used for irrigating cultivated land. This proportion will increase as a result of demographic growth right across the planet, which is bound to bring an extension of cultivated land and an intensification of crop farming.

In France, irrigated areas have tripled since 1970 with an increasingly high consumption of water.

Irrigation and poorly managed agricultural practices can have crippling quantitative and qualitative consequences which are incompatible with sustainable development.

In order to manage major irrigated zones in the south of France, regional development companies such as the Compagnie Nationale d'Aménagement du Bas Rhône Languedoc (the natio-

nal company for the development of Bas Rhône Languedoc) and the Société du Canal de Provence (the Canal de Provence company) ensure the construction and exploitation of water-related infrastructures (reservoirs, canals, galleries and networks). These companies also offer consulting services to farmers with a view to more rational use of water.

France has progressively become involved in a process of agricultural water pricing which can incorporate charges (and financial aid) from the water agencies: hence the emergence of incentives for water saving (IRRIMIEUX), good fertilisation practices (FERTIMIEUX) the treatment of waste water from breeding activities, etc...

► Agricultural watering

M. Leplard

Water and public health

Alarmist figures are regularly published by the WHO. Drinking water contamination and insufficient levels of purification are thought to be the cause of millions of deaths every year throughout the world.

Health risks must be evaluated on the basis of official WHO standards but also on the basis of local conditions.

The recycling of used, pre-treated water is a solution for dry countries; however, the re-use of water by industry, agriculture and aquaculture must be very strictly controlled on account of the chemical, biological and toxicological implications such practices carry.

If we manage to control health risks at a reasonable cost, waste water can become a new "unconventional" resource.

◀ Waste water treatment plant

Ministry of Public Works

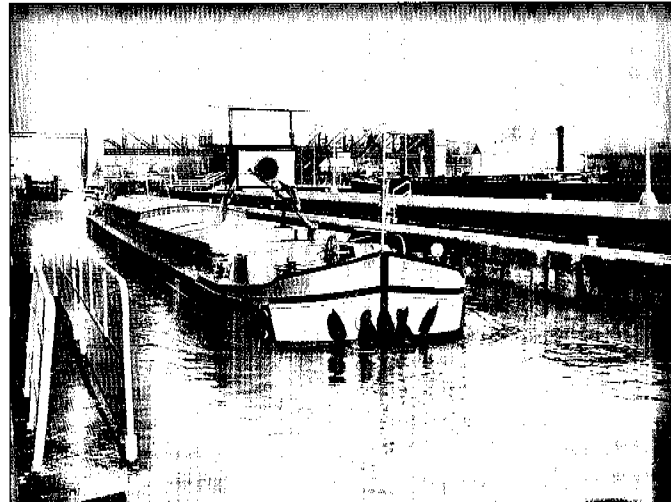
G. Crossay



of water in France

Desalination of sea water

Desalination techniques used for sea and briny water are really being put through their paces. In particular they have been implemented with success by French companies in the Mediterranean basin (Malta, Gibraltar, Palma de Majorca) and countries of the Persian Gulf (Saudi Arabia). The still relatively high cost (between 5 and 11 French francs per m³) limits, for the moment, its use to the provision of drinking water in dry but sufficiently wealthy countries; the emergence of "low pressure" membranes should nevertheless allow us to reduce treatment costs substantially. The fact remains, however, that transport costs from the coast to the point of consumption will always be high if it is far from the sea.



■ Fishing and fisheries activities

River fishing has always been a highly popular pursuit in France. There is a well-structured organisation called the Conseil Supérieur de la Pêche (CSP) and county-level federations and numerous local associations (over 4 000).

Protected fishing areas, widely distributed over the whole of France, play an important role in water management.

▼ Fishing in Garonne

The Adour-Garonne Water Agency, Leforestier

▲ The Suresnes locks

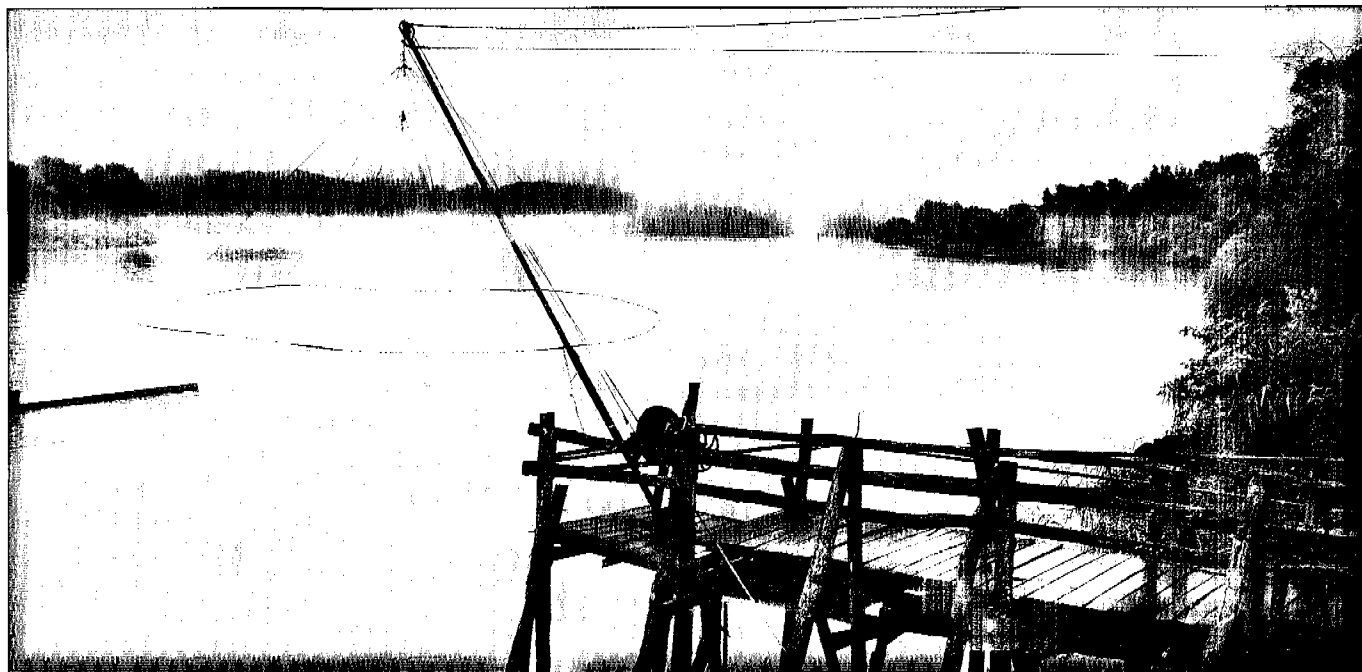
*Ministry of Publics Works,
G. Crossay*

Fishing benefits directly from efforts made in a variety of areas of intervention involving water policy: improvements to water quality, restoration and maintenance of rivers, the installation of fish channels in existing or planned hydraulic developments, etc...

■ The use of water in industry, transport and energy generation

Water policy in industry and energy generation targets better quantitative and qualitative management of water in companies which use sometimes high quality water for specific purposes: in chemicals, high-tech industry, etc...

This policy seeks to control the risks of chronic or accidental pollution.





Water agencies have substantial experience in the area of industrial pollution control, with quite remarkable results. Consequently, waste from major industry is increasingly well controlled. This policy has led to companies developing innovative processes for the multi-site treatment of industrial effluent, even at international level.

Concomitantly, the emphasis is placed on non-point pollution emitted by small and artisanal type companies as well as on non-point pollution and accidental sources of pollution.

On account of the extended use of recycling and the development of more water-efficient procedures (and

▲ The Roselend dam

EDF mediatheque, P. Charlat

energy-sensitive procedures as well), industrial water use has declined substantially in France over the past 15 years.

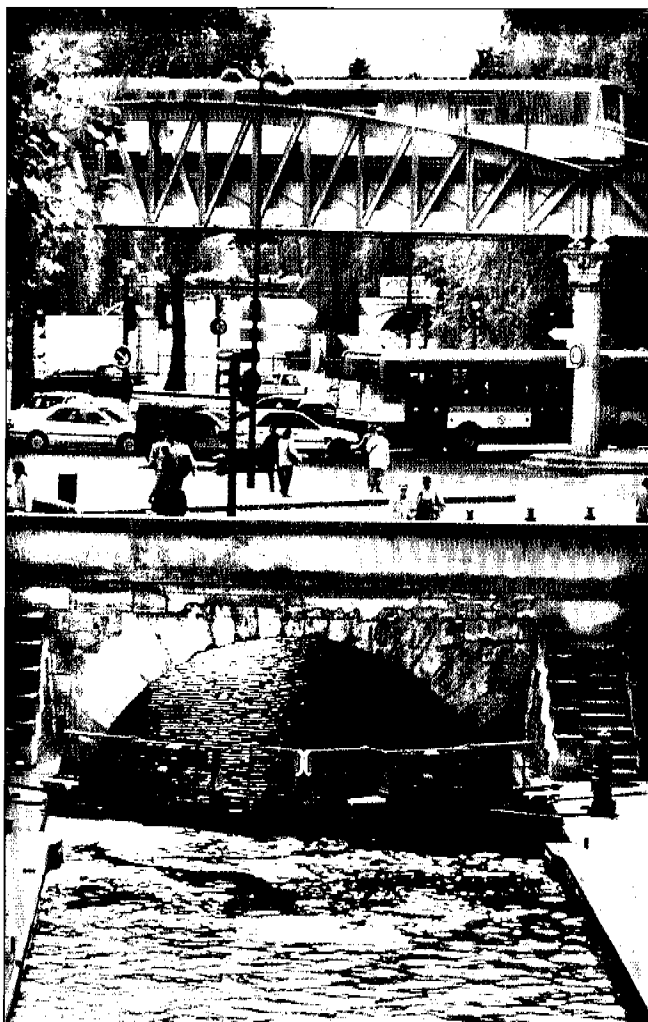
Apart from the use of water for cooling purposes in thermal or nuclear energy production (63% of national usage), hydraulically-generated electricity represents 18.5% of total electricity generation; this has led to the need for the design and manufacture of a certain number of first rate dams, both in the mountains and along our rivers.

This vast experience allows our engineering and civil engineering companies and

equipment suppliers to work abroad on a regular basis for the study, construction and management of major hydraulic developments with a multitude of different applications: energy production, water harnessing for irrigation, industry and drinking water; tourism, sporting and leisure water activities; navigation, the fight against flood and excessively low water levels.

▼ The Villette basin, Paris

RATP SG/Audiovisual, Minoli



Voies Navigable de France - VNF (navigable waterways in France)

Voies Navigables de France (VNF) is a public, state establishment of an industrial and commercial nature which was created in 1991.

Its missions include the maintenance, exploitation and development of a network of navigable waterways as conferred upon it by the State (6 800 kms of the 8 500 kms of all French navigable waterways), the optimisation of public waterways and the development of water-bound transport and leisure activities.

Apart from its direct employees, VNF is assisted by the Ministry of Public Works in its contributions to navigation.

and country planning

Because of its fundamental role in all natural phenomena and in every aspect of human life, the water cycle must be considered an integral spatial regulator and as such, a hydrosystem which must be regulated.



Water and land live complex relationships which manifest themselves in spectacular fashion in extreme situations like flood or drought.

Water is therefore a major preoccupation in the field of town and country planning: the choices at regional or urban level are of prime importance both in the short

or long term, and in every area. This is true not only from a financial point of view (investment and exploitation costs of such apparatuses), but also from the point of view of the environment and sustainable development.

Agricultural activities (the drying up of swamps, the regrouping of lands, forests, breeding and intensive dry or irrigated crop-growing, fertilisers and pesticides, etc...) have great quantitative and qualitative implications for

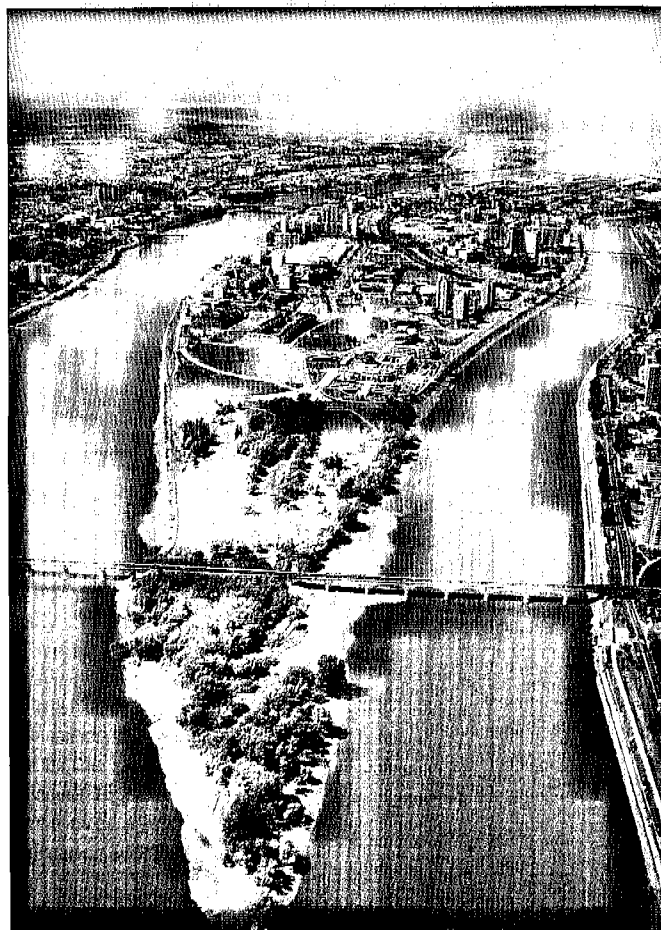
▲ The Guérande marshes

CETE de l'Ouest Video-Communication group, J.R. Barillère

water resources. The same applies to urban developments, whose multiple relationships with water must be carefully taken into consideration: with contractions in the surface area of permeable ground there is a simultaneous increase in water run-off, a reduction in concentration time and a more sudden onset of high waters. To prevent floods and

▼ The Loire

CETE de l'Ouest Video-Communication group, J.R. Barillère



Plan Loire Grandeur Nature (full-scale plan for the Loire): controlling the river's capricious character

The charter signed in 1994 between the State, the EPALA (*Etablissement Public des Aménagements de la Loire et ses Affluents*) and the Loire Bretagne water agency sought to achieve four specific objectives:

- to protect people against the risk of flooding;
- to redevelop the middle and lower Loire to reinforce *levées* (mini barrages, of which the oldest date back to the 11th century);
- to preserve the quality and quantity of water resources;
- to restore the ecological diversity of the areas involved.

The *Plan Loire Grandeur Nature*, which is based on a wide variety of studies led in particular by environment protection associations, integrate resource management, the reclaiming of free hydrosystem areas - since high water levels are beneficial for the revitalisation of the river bed -, procedures to raise the water line and lower high water levels. This includes a financial programme over a ten-year period (1994 to 2003) involving 2 billion Francs worth of works.

pollution in and downstream of built-up areas, it is no longer enough to harness, store and evacuate rain water; it is now necessary to develop so-called "alternative techniques" which are designed to limit and slow down the flow (semi-permeable roadways and car parks, etc...), or even to treat such water.

Since 1994, a ten-year plan for the restoration and ecological conservation of rivers has sought to integrate water more effectively into town and country planning and in particular, to provide protection against flooding in inhabited areas.

On account of the scale of the challenge ahead, a specific and highly original approach was adopted in the Plan Loire Grandeur Nature (full-scale plan for the Loire). In all cases, the operations planned are co-financed by the State, local authorities, water agencies (in some cases the VNF, for navigable

waterways) and the local residents concerned.

Furthermore, risk prevention plans (PPRs - Plans de Prévention de Risques) are systematically drawn up by decentralised state departments.

On the other hand, it may be necessary to prevent instances of, for example, water shortage by backing seasonal conservation to maintain water levels in rivers to promote and preserve water usage, aquatic life and ecosystems using "reserved flows" or the co-ordinated management of surface and ground water.

Another major area of intervention in water policy is the protection and restoration of wetlands - where swamps in many cases are threatened by drought - and coastal areas (bays, estuaries, etc...), which are both very important exchange and regeneration areas for our ecosystems and for the bio-diversity of our regions

The protection of wetlands

The number of areas which are naturally subject to flooding or gorged in water have dropped by half in France over the past 30 years. An action programme has been adopted to put a stop to this regression, intended to reclaim wetlands and in particular those which are of national or even European interest:

- an inventory was carried out and permanent monitoring set up during the drawing up of the water management master plans, the "schémas directeurs d'aménagement et de gestion des eaux" (SDAGE). The most remarkable of the areas affected benefit from protection measures which are covered by international conventions ratified by France. The French environmental institute the "Institut Français de l'Environnement" (IFEN) is playing the role of national observatory monitoring the evolution of wetlands, with co-ordination of scientific works having been entrusted to the national natural history museum;
- public works development policies meet the need to protect these wetlands;
- the reclamation of wetlands which are of national interest is the subject of management programmes in co-operation with the "Conservatoire du Littoral" (the coastline conservation body) and of the water agencies, with the state sharing a lead in the management of such areas in the public domain. The Ministry of the Environment and the Ministry of Agriculture provide information and training for the State departments, local authorities and agricultural bodies..

▼ High water on the Saône, evacuating horses

Lyon Fire Fighters



▼ High water in Paris in 1910

Photographic archives



of the water resource

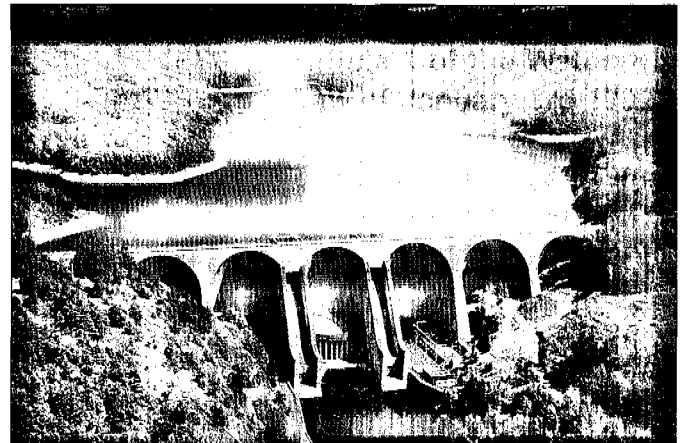
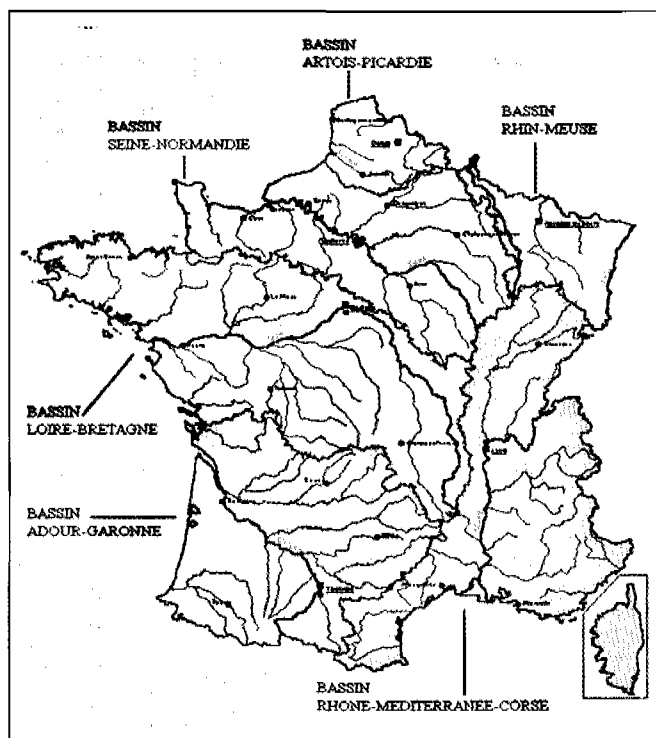
In compliance with Article 1 of the Water Law of January 3rd 1992, "water is part of the common heritage of the nation. Its protection, valorisation and development as a useable resource whilst respecting natural balance is a matter of public interest. The use of water is a right of all within the framework of laws and regulations as well as of previous rights".

The law of December 16th 1964, which was completed by that of January 1992, brought in a new policy based on four fundamental principals:

- the approach must be global (or integrated) in nature, and must concern both surface and ground water, its quantity and quality and must take into account the physical, chemical and biological balance of our ecosystems in the long term;
- the most suitable territory for the management of water resources is the hydrographical basin;
- the success of a water policy requires the consultation and participation of the very wide variety of user categories concerned;
- complementary to regulations and planning, water management must also make use of economic incentive instruments, and in particular, the "polluter pays" and "user pays" principle.

▼ Basin agencies

Ministry for Spatial Planning and Environment



■ The distribution of responsibilities

Water policy is defined through a partnership between the State, local authorities and consumers, and these are associated at every level:

- at national level, the national water committee, which is made up of elected representatives and representatives from socio-economic and associated sectors, is consulted on the major policy orientations, white papers or regulatory texts planned in this area;
- involving six major river basins, the basin institutions, comités de bassin (river basin committees) and water agencies, groupings of local elected officials from the three territorial levels (communes, counties and regions), representatives from socio-professional and associated sectors and the civil servants and state administrations concerned;
- for the sub-basins, there is a local water committee comprising a majority of elected representatives (50%), users and administrations which will draw up a schéma d'aménagement et de gestion des eaux (a water development and management scheme: SAGE) which defines more detailed objectives of water uses;

▲ The Grandval reservoir

EDF médiathèque, C. Pauquet

- at local level, communes (of which there are 36 000 in France) have a very important role to play to the extent that they are responsible for the provision of drinking water and water treatment at urban level (for waste water and rain water).

■ The bassin Committee: an instrument for consultation and strategic orientation.

The Basin Committee, which is also called the "water parliament", engenders debate and consensus between the different categories of users acting within a large community, reunited by their mutual interest in water as a resource. The Basin Committee draws up a master plan for water development and management (schéma directeur d'aménagement et de gestion des eaux SDAGE), which provides guidelines for sound water management, minimising potential conflict between users or between regions.

Every year, it gives its opinion on the level of charges collected by the water agency, which are used to finance the five-year action plan

drawn up by the water agency.

■ The water agency: a technical and economic tool

The water agency - a public state establishment - prepares and implements the policy defined by the Basin Committee. In order to do this, it collects (and redistributes) two types of charges from all users of water as a resource:

- "extraction charges" which are designed to finance the management of the resource from a quantitative point of view;

- "pollution" charges which are calculated on the basis of pollution caused and designed to improve the quality of the resource.

These charges are invoiced through the water bills of subscribers who are linked up to a network. The agency collects from those who use the resource or discharge it directly into the natural environment.

Charges are decided on the basis of current priorities, economic activity and the impact usage has on the resource in compliance with SDAGE objectives, and of the five-year intervention programme.

For the private user, these charges represent an average of 17% of the water bill overall.

Revenues collected in this way remain in the water sector's financial cycle through aid and loans attributed by the agencies to local authorities and industrialists to construct or modernise hydraulic equipment and for water treatment in particular; bonuses are paid to contractors to reward them for effective functioning of water treatment plants.

The water agencies (1 500 people managing 12 billion French francs of aid annually) have no power in the area of water "policing" as this remains the responsibility of the state. Nor can they commission work.

After 30 years of work in this field, the results achieved are significant: today more than 90% of those living in towns of over 10 000 inhabitants are connected to water treatment plants; industrial depollution is 87%-controlled.

■ The adaptation of the system in time and in space

Since its launch, this very original experiment in the field of overall integrated water resource management has demonstrated its effectiveness due to a large extent to its capacity to adapt as the country has evolved: decentralisation on a large scale at the beginning of the 1980s, broadening and intensification of European construction, globalisation, etc...

This system of specific, decentralised regulation has drawn the attention of a large number of countries in particular on account of its coherent, flexibility which make it adaptable to a wide variety of conditions.

■ Policing water resources

Policing water as a resource is the responsibility of the State and has been so since the French Revolution. It is today the responsibility of the Ministry for the Environment through its Directorates which co-ordinate and direct activities.

The development of management by hydrographic basin abroad

For around ten years now, the French experience of basin-based institutions has inspired a certain number of other countries starting with Poland and Indonesia. Kazakhstan has begun a pilot project in the Irtysh basin. Russia is setting up the Tom basin. Mexico has committed to something similar in partnership with the water agencies and the International Office for Water (IOW).

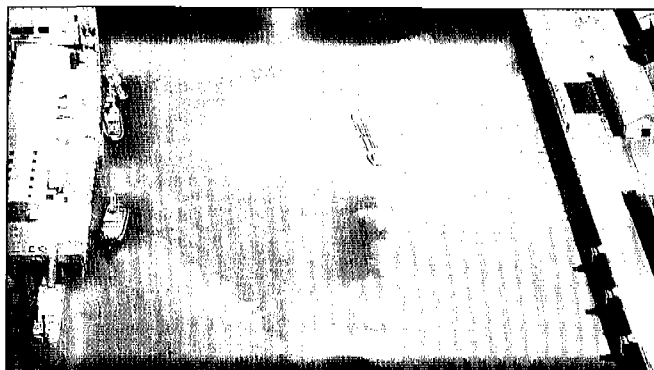
The International Network of Basin Organisations (INBO) brings together 68 organisations from 32 countries for information exchanges on databases, methods and professional training; the IOW has taken on the technical secretariat of the organisation.

This approach, using hydrographic basin methodology, is also clearly advisable in the case of transboundary surface and ground water resources. This is the case for example with the countries bordering the Senegal River.

For field implementation, this Ministry uses the services attributed to it by the technical ministries involved: public works, agriculture, health and industry as well as having at its disposal resources provided by the CSP (the higher fisheries council). The co-ordination of actions is carried out at county level within the framework of inter-departmental water missions (MISEs), under the supervision of prefects, in their capacity as state representatives, providing individual authorisations for water extraction or discharge, enforcing the law from an administrative point of view (injunctions, penalties, suspension or annulment of authorisations, etc...).

▼ Industrial waste

CETE de l'Ouest Video-Communication group, J.R. Barillère



water services

It is quite paradoxical to note that very often, high-cost hydraulic constructions which take so long to build and are so necessary for the community are not used or indeed maintained with the care they perhaps merit.

It is not by chance that France has the three biggest industrial groups in urban services: Vivendi (formerly the Compagnie Générale des Eaux), Suez - Lyonnaise des Eaux and SAUR. During the 1990s, the latter, working in association with local partners, replied to many international invitations to tender for services connected with drinking water and water treatment over the five continents.

These successes can be explained by the technical competence of our companies coupled with their commercial dynamism and financial solidity. More fundamentally, they can rely on the inherent flexibility of delegated public services



▲ Meeting with the Mayor

Suez-Lyonnaise des Eaux

according to the French model, which has accustomed them to having to adapt to the specific conditions of each type of service.

In order to establish relationships between public contracting authorities and the private operator, a range of contracts has progressively been defined: the concession (or BOT: Build Operate Transfer), leasing, management contracts, state-managed projects and technical assistance.

"Delegated management" of this sort today accounts for 75% of water distribution in France in terms of consumers and more than 35% - and this percentage is rising rapidly - of water treatment. Only a minority of local authorities - primarily in rural areas - have kept on with the direct management system where investments and operations continue to be their responsibility.

■ The complementary nature of partners of delegated management

The intervention of private operators in the water business dates back to the first urban networks. It was borne of the need to associate the

capital and skills of private enterprises with objectives defined by the public authorities. This long experience has allowed us to develop pragmatic solutions which are able to adapt to different latitudes.

Whatever form the contract takes, delegated management is based on a balance between three complementary partners: the local authority, the operator and the end user:

- the relationship between the contracting authority and the operator is established during the negotiation and signature of the contract: the local authority can use the expertise of its choice to evaluate the proposals upon which its decision can be made;

- relationships between local authorities and users are different in nature: consumer associations can intervene in contractual service provision (water quality, service quality, price, etc...);

- the relationship between the user and the operator is organised around a commercial exchange: it is the res-

Delegated management mode

In a concession-type arrangement, the operator finances all or part of the construction or renovation investments involved in constructions as well as providing operating funds. It is a long-term but limited-period contract at the end of which the facility is returned to the local authority. The price charged by the concessionaire for the water supplied must allow it to remunerate and reimburse invested capital, cover its running costs, renew and maintain the equipment and make a profit to finance future development.

The leasing model differs from the concession to the extent that the local public authority is responsible for the investments of which it is the owner. The private operator only puts up the necessary operating funds to cover running expenses.

In the State-run and management models, the local authority assumes responsibility for the construction, maintenance and management of the equipment, and determines and receives charges for the service provided. In these two cases, the private operator is paid not by the users but by the local authority.

- In the State-run model, the operator is remunerated on the basis of a fixed payment which is topped up by a productivity bonus and, in some cases, part of the profit.
- In a management contract situation, the operator's remuneration is proportional to physical parameters: number of users, number of m³ of water pumped, etc...

Finally, the **technical assistance** contract does not in the strictest terms constitute a mode of delegated management; the local authority calls upon a private operator to provide technical or administrative assistance which is clearly defined for a pre-determined period.

possibility of the public authorities to legitimate the invoicing of a public service and to control the technical measures such organisation implies (water quality and service quality). They also shoulder the financial responsibility (the structure and level of pricing) governing this relationship.

Those mechanisms which confer maximum responsibility upon the private operator are concession and leasing modes, where the operator works at its own "risk and peril".

In practice, the different management models are not quite as differentiated as this classification would suggest; indeed, it is quite frequent for contracts to take certain elements from some or all of the different intervention models: this is proof of the flexibility and adaptability of the system in place!

■ Controls provided by the public authorities

The conditions relating to the operation and transparen-



cy of contractual relationships between local authorities and operators have been defined by the Legislator.

In its capacity as state representative in the county, the Prefect exercises legality controls on the actions of its local authorities.

The operators must provide a detailed annual report on activities carried out. The role of the Mayor is to publish an annual report on his water services and sanitation initiatives. The State departments which are primarily at county level are responsible for administrative, technical and health-related aspects.

The regional audit bodies, under the control of the central audit court, ensure that financial and market conditions are respected. All these different parties must secure the respect of the different national and European regulations which are applicable in this area.

The *Haut Conseil* (higher council) of public services for water supply and sanitation, which is currently being set up, must supervise the whole of this sector.

▲ Paris, dispatching at Denfert-Rochereau

Sagep



◀ Reading the meter

Suez-Lyonnaise des Eaux

of water services

A water service is never and can never be free: even in the poorest of villages, the well-diggers and water carriers have to be paid; the "drudgery" of water, although not always expressed in monetary terms, has a cost in terms of time and labour.



Whilst investments in the water business are extremely costly, the unit price of the product generally remains very, even excessively, low, because it is not simply regulated by the market mechanisms of supply and demand. Other considerations such as health and social and environmental issues contribute

to price fixing. For the public authorities, the difficulty remains in integrating economic elements: from the very moment of design of new installations, it is important to determine who will pay for the water service and in what form: paying for connections, price structures and tariffs, water charges and even taxes.

▲ The Sarthe river

CETE de l'Ouest Video-Communication group, M. Leplard

transported, treated, stored and protected;

- the running of each service must be financially coherent;
- according to the "polluter pays" principle, those who create pollution should pay and those who de-pollute should be financially rewarded.

Expenditure linked to water must be covered by corres-

▼ Water bill

CETE de l'Ouest Video-Communication group

VOTRE POINT D'ACCUEIL CLIENTS:
16 AVENUE DU LUDY
49800 SIE LUCE S LOIRE

Votre interlocuteur: **Jessine GERTHOON**
☎ 02 40 25 99 91

Heures d'ouverture:
du lundi au vendredi
de 0930 à 1200 et de 1300 à 1700
URGENCES 24h/24: ☎ 02 40 25 82 80

SAUR
SERVICE DE L'EAU ET DE L'ASSAINISSEMENT

Adresse Client: 01046000

FACTURE
N° 22003487
du 16 décembre 1997

REFERENCE CLIENT à rappeler:

Distribution de l'eau: Syndicat Intercommunal d'Adduction d'Eau THOUARE SAINTE LUCE CARQUEFOU
Cadastré et traité par le client: Commune de THOUARE SUR LOIRE

Nous avons relevé votre compteur d'eau le 17 octobre 1997.
votre consommation s'élevait à 123 m³ (123 000 litres).

Voici la présentation simplifiée de votre facture, dont le détail figure au verso

Abonnement TTC	342,04 F
Consommation TTC	914,17 F
Total facture TTC	1 256,21 F

A payer le 2 janvier 1998
La société ne paie pas l'acompte.

COMPTEUR	Date du relevé	Nouveau relevé	Ancien relevé	Consommation
n° 00053486	17/10/97	945	422	123 m ³

Distribution de l'eau	Unité	Volume	Coût	France HT	France TTC	TVA
694,02 F TTC						
Appareil réseau part Syndicat	1er semestre 98			104,58	125,49	5,96
Consommation part Syndicat	Année 97	114 m ³	40	5,540	101,05	5,96
		41 à 100	69	0,5002	529,20	5,96
		101 à 123	23	6,9100	158,93	5,96
Déduction d'acompte consommation part Syndicat	Année 97			-463,92		5,96
Abonnement compteur part SAUR	1er semestre 98			56,43	66,50	5,96

Cadastré et traité par le client	Unité	Volume	Coût	France HT	France TTC	TVA
518,20 F TTC						
Abonnement part Communale	1er semestre 98			44,00	51,96	5,96
Abonnement part SAUR				39,03	45,96	5,96
Consommation part Communale	Année 97	114 m ³	40	1,9600	78,40	5,96
		41 à 123	65	4,5006	389,27	5,96
		101 à 123	23	0,9918	39,64	5,96
Consommation part SAUR	Année 97	114 m ³	40	0,9918	39,64	5,96
		41 à 123	83	2,3506	199,12	5,96
		101 à 123	23	3,5006	113,40	5,96
Déduction d'acompte part Communale	Année 97			-283,80		5,96
Déduction d'acompte part SAUR	Année 97			-117,38		5,96
Déduction d'acompte consommation part intercommunale	Année 97			-181,80		5,96

Organismes publics	Unité	Volume	Coût	France HT	France TTC	TVA
120,26 F TTC						
Aide au développement des régions touristiques (FNDAE)	Année 97			120	137,22	5,96
Lutte contre la pollution (Agence de l'Eau)	Année 97			120	140,00	5,96
Déduction d'acompte aide au développement des régions touristiques	Année 97			-9,94		5,96
Déduction d'acompte lutte contre la pollution (Agence de l'Eau)	Année 97			-181,80		5,96

Total Facture: 1 256,21 F TTC HT soumise à TVA: 1 180,72 F TVA sur les droits: 65,49 F

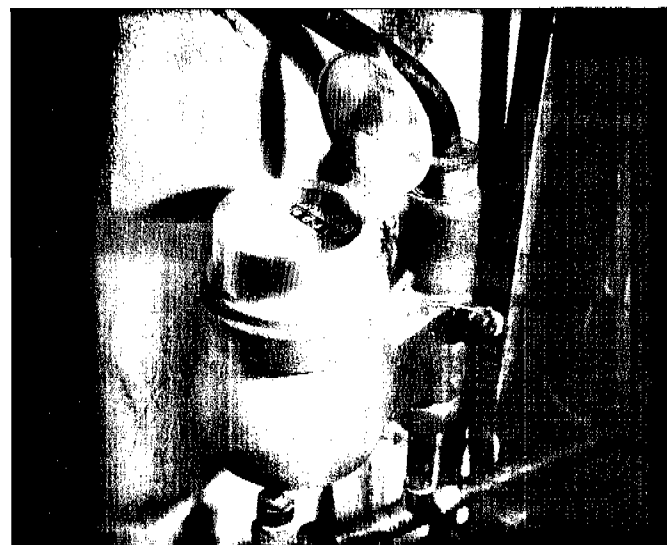
■ The components of the price of water

The funding of water in France is based on the following elements:

- water services carry a cost because water has to be

▼ Water meter

The Seine-Normandie Water Agency



RUNNING COSTS AND PRICE

ponding revenues and can only be financed by local or national taxes in extraordinary circumstances.

In France, the water bill includes the following elements:

- the cost of drinking water which equates to costs associated with the construction, operation and maintenance of equipment, as well as subscriber administration and quality controls, accounting for around 40% of the water bill;

- the cost of the collection and treatment of urban water waste: 33% of the water bill;
- taxes and charges (20.5%): the water agencies, *Voies Navigables de France* (VNF) when water is tapped from navigable water ways and 1% for the national water supply fund for rural areas (FNDAE) which assures realignment in favour of rural

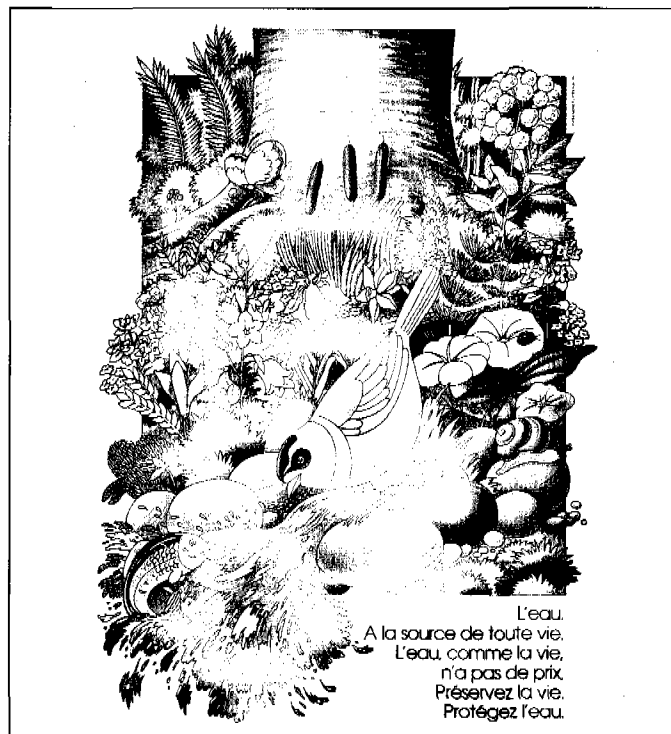
zones across the country. Finally, 5.5% of indirect tax goes to the State in VAT.

Thus, the Legislator has chosen to ensure that the party consuming the drinking water covers all the direct and indirect costs associated with its provision, encouraging saving and responsible utilisation of the resource.

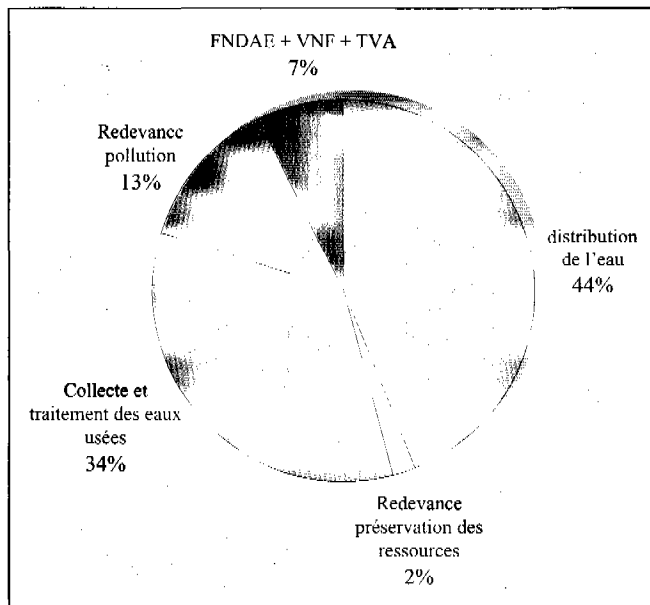
In 1997 the average price of water was around 16 FF per m³ which represented an increase of 9% per year in today's Francs between 1992 and 1997, with costs increasing substantially on account of the reinforcement of European quality standards which require more effective treatment of raw water which is often polluted, and the requirement to renew ageing infrastructure, and, more importantly, some of the major sanitation projects currently under way.

▼ Consumer information

The Rhin-Meuse Water Agency



L'eau.
A la source de toute vie.
L'eau, comme la vie,
n'a pas de prix.
Préservez la vie.
Protégez l'eau.



■ The requirement to inform on the price of water services

Making water accessible to the poorest sections of society requires solidarity. The measures introduced to achieve this are chosen by the public authorities and can only use national or local taxes in very exceptional circumstances.

In any case, the population's acceptance of the pricing policy adopted is a crucial factor which implies transparent information and communication regarding the cost of providing water and the prices charged for water. In France, the public authorities, basin institutions, local authorities and professionals involved have set up suitable forms of communication which are designed to reinforce their link with consumers. For example, educational "water classes" have been set up at different levels to give young people a grasp of good practice in the area of hygiene and water management.

▲ The price of water

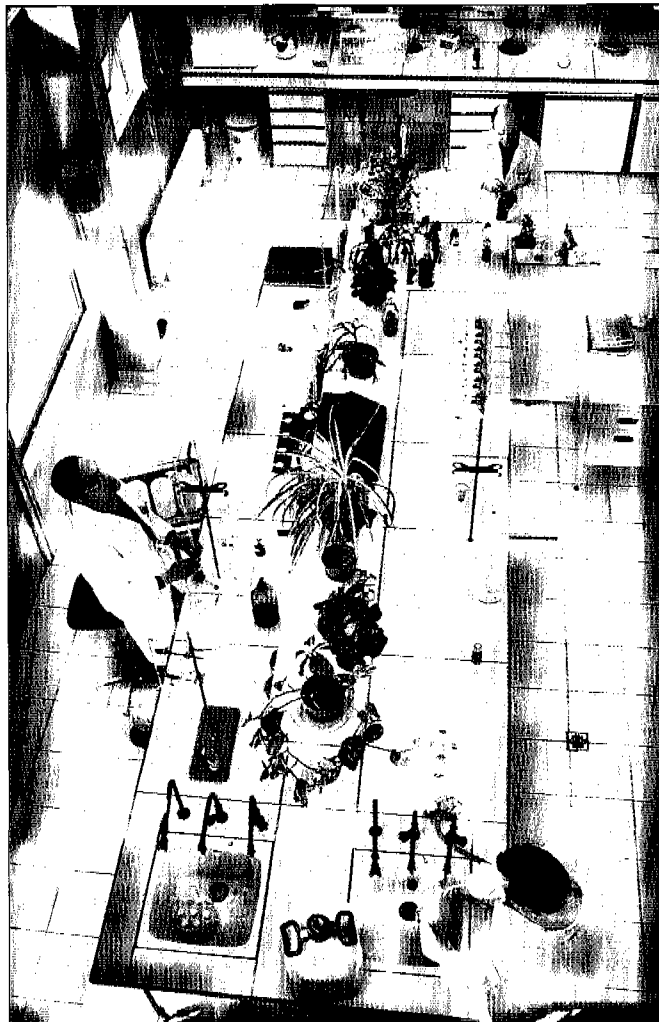
Ministry for Spatial Planning and Environment

in the water sector

Technological research into water treatment is led by public and private research teams to enhance our understanding of fundamental mechanisms from the engineering angle, involving design and exploitation teams whose business is to develop water treatment facilities.

▼ **Laboratory in the Ivry-sur-Seine factory**

Sagep, J.C. Pattacini



French research teams work on programmes organised at international, European and national levels.

■ **In the area of international research**

France contributes to all the major multilateral scientific programmes concerned with the hydrological cycle and energy audits at world level as well as the biological aspects thereof.

■ **At European level**

It is involved in framework programmes for research and development which are launched every 5 years.

Amongst other things, the measurement and treatment of water have been the subject of



▲ **Ultrafiltration membrane**

Suez-Lyonnaise des Eaux

EUREKA programme projects since 1982, bringing together the competencies of European research teams within the framework of technology-dominated research work, mostly through partnerships between private enterprise and public or private research organisations.

■ **At national level**

Cognitive research into the understanding of the mechanisms of the water cycle has a major role to play in France. It is led by research teams from universities and public scientific and technical institutions such as the CNRS/INSU, the INRA, the ORSTOM, the CEMAGREF and the INSERM on issues associated with health. It is the subject of permanent international exchanges (scientific reviews and international symposia), which are linked up through multilateral programmes.

Finalised research on water catering to the needs of the non-commercial sector - administrations, public services, local authorities, associations, etc... - is led by universities and public organisations whose funding comes for the most part from the research and development

budget (the BCRD) which is managed by the ministry of higher education and research. The research programmes of the Ministry of Spatial Development and the Environment concern the following aspects of inland water:

- **developing our understanding** of the functioning of the aquatic environment;
- **evaluating the impact** of human activity on the aquatic environment;
- **developing management tools** for the aquatic environment;
- **water quality** and treatment programmes;
- **sediment programme** as an element of environmental management;
- **preventing** extreme hydrological events.

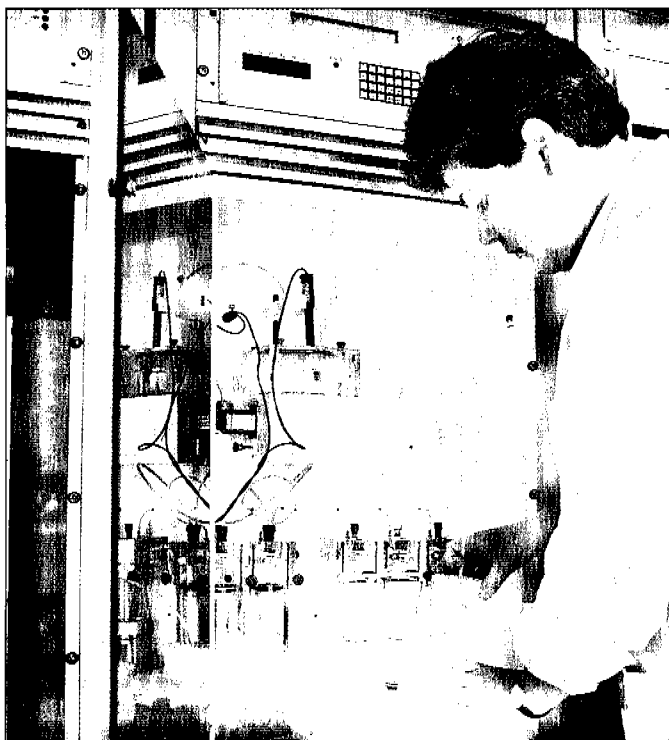
In the area of irrigation and agricultural uses of water, research activities are led by the CEMAGREF, the INRA (national institute for agronomic research), the CIRAD (international centre for co-operation on agronomic research for overseas) and

the ORSTOM, who have all been active in a large number of developing countries for many years.

In the area of urban engineering, Nancy's "Pôle de l'Eau" is an example of research and development at the top end of the network: it brings together research structures interested in the control of rain water, the treatment of waste water and the analysis of drinking water. It also includes two public interest groups providing an interface between technological capacity and research and analysis on specific themes (programmes looking at the interaction between water and materials; metrology and instrumentation), which are part of the European standardisation bodies on water and the environment.

▼ Automatic pollution warning stations

Sagep, J.C. Pattacini



■ Private research initiatives and partnerships abroad

Since the challenge is also to achieve differentiation through added technological value, major French groups are involved in world-wide research and development networks at a technical level; this allows them to adapt their products to local contexts and problems.

These scientific exchanges allow them to develop alternative solutions such as the desalination of sea water, the use of new filtration membranes for waste water or denitrification in small water treatment plants.

Technological advances achieved by these private centres are particularly related to water treatment and distribution. The large number of invention patents registered bear witness to the quality of the results achieved.

The public interest group GIP Hydrosystème: a research catalyst

The GIP Hydrosystème public interest group was set up in 1993 by three finalised research organisations (BRGM, CEMAGREF, IFREMER), three fundamental research organisations (CNRS, INRA, ORSTOM), the OIE and the two ministries responsible respectively for research and the environment.

This GIP plays a co-ordinating role in providing research and animation for the scientific community in the water sector; also, it is responsible for starting up finalised research programmes.

▼ The central laboratory in Caguas, La Plata, Porto-Rico

Vivendi, C Bluntzer



TRAINING

for people

The quality and sustainability of water management depends upon the quality of the training given to those who are in charge. Initial and further training at every level of qualification constitute a critical component in French bilateral co-operation according to a very ancient national tradition.



The quality and sustainability of water management depends upon the quality of the training given to those who are in charge. Initial and further training at every level of qualification constitute a critical component in French bilateral co-operation according to a very ancient national tradition.

For a long time in France there have been tried and tested training courses at a very high level for technical managers and water managers. The Ecole Nationale du Génie Rural des Eaux et Forêts (ENGREF) and the Ecole Nationale des Ponts et Chaussées (the ENPC) train and refresh the knowledge of state and private sector engineers throughout their professional careers in the areas of hydraulic engineering and town and country planning. Strasbourg's Ecole Nationale du Génie de l'Eau et de l'Environnement (ENGEES), the Ecole Nationale des Travaux Publics de l'Etat (ENTPE) in Lyons and the Ecole de la Santé in Rennes provide more specialised training on water-related issues.

A large number of water-related courses offer students high quality training in all the technical, economic and legal areas concerned with these matters.

On account of the rapid development of techniques requiring the regular updating of knowledge at every level of qualification, private companies have set up high-performance professional

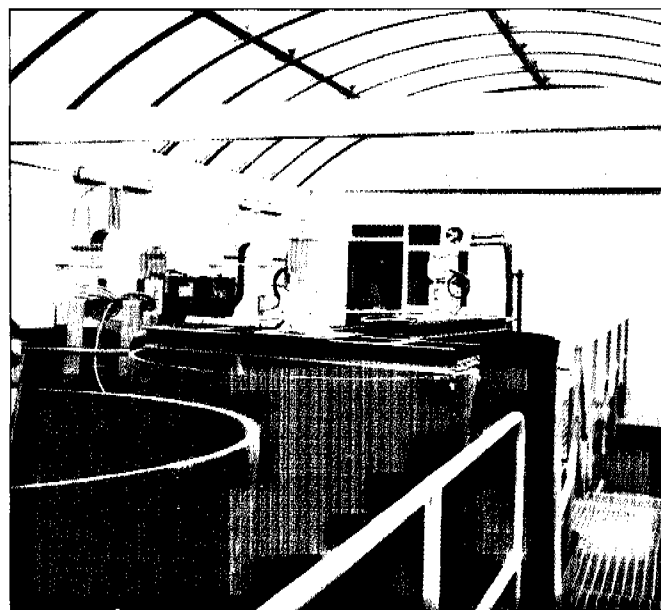
▲ Educational Unit for training in operating water treatment facilities

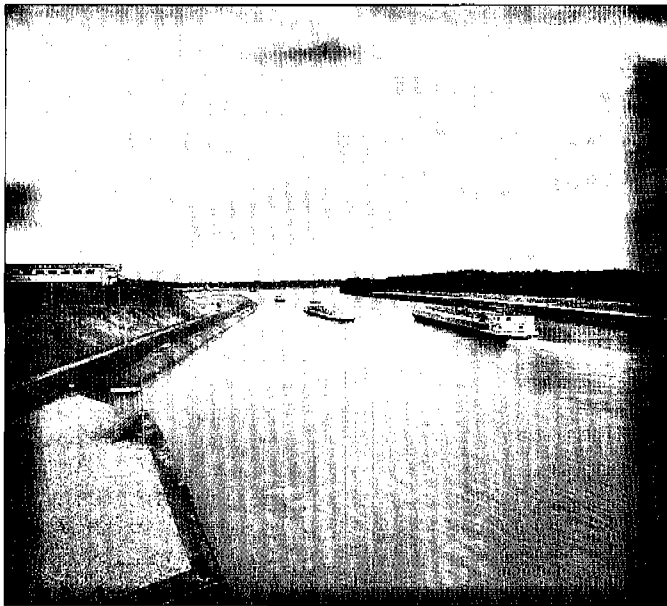
The International Office of Water

training programmes in association with local authorities through the Centre National de la Formation Professionnelle Territoriale and specialised institutions.

▼ Training centre in Gdansk, Poland

The International Office of Water





Water policy in France quite naturally complies with the different directives adopted by the European Union in this area over the past 25 years; these directives will be consolidated by a framework directive which will establish general management and protection principles for water, identifying the hydrographical basin as a unit of reference in this area. Finally, it is interesting to note that the concept of delegated management has been recognised at European level in the Amsterdam Treaty.

Through the different instruments (Structural Funds, European Investment Bank, etc...), the European Union has had to contribute more to the financing of hydraulic infrastructures which serve regional, urban and environmental policies, particularly in peripheral or border zones as well as outside the Union, through a certain number of specific procedures: the PHARE programme for Central Europe (in particular those countries which are seeking membership of the European Union), TACIS for

the Community of Independent States and Central Asia, MEDA for the Euro-Mediterranean partnership, the LOME Convention and the European Development Fund for the countries of Africa, the Caribbean and the Pacific (ACP) and PVD/ALA developing countries for the countries of Asia and Latin America, etc...

▼ Euro-Mediterranean partnership project

European Commission



◀ The Rhine

M. Leplard

The Rhine:

an exemplary cross-border co-operation project

For a number of years already, the five countries of the Rhine and Meuse basin (Switzerland, France, Germany, Luxembourg and Holland), grouped together within the international committee for the protection of the Rhine (the CIPR), have joined forces with the European Union to set up an ambitious programme with multiple objectives: the control of flooding in particular to restore flood plains, pollution control, the restoration of wetlands, the re-balancing of ecosystems and aquatic life.

The Rhine renovation plan, begun in 1989 by international convention, has provided financing to the tune of 100 billion Francs for work.

This exemplary co-operation project has served as a reference for several similar transnational actions more recently on other major European rivers such as the Escaut, the Oder, the Vistule and even the Danube.

In all cases, the setting up of a network of public interest measures constitutes the first step in these types of programme.

▼ Training centre in Mexico City Mexico

The International Office of Water



In parallel with international strategies led by major French private groups, the public authorities are developing a dynamic co-operation and exchange policy for bilateral or multilateral projects on water resources.

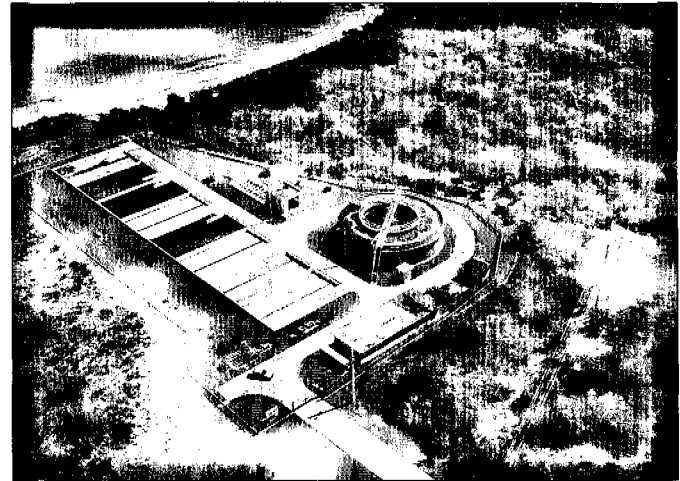
This technical co-operation programme can take on diverse forms. Thus, French specialists are carrying out a number of study, expertise and consultancy missions abroad in all areas connected with water. Additionally, French companies, by reinforcing their presence and their international operations, are going ahead with technology transfers and professional development actions.

■ Widely disseminated know-how

Water is a major sector for French co-operation: water administrations and agencies are contributing by bringing their experience to bear in the introduction of institutional reforms in particular during the definition terms of reference. These public engineering co-operation protocols are indeed in very great demand.

▼ The great falls of Kindia, Guinea

Suez-Lyonnaise des Eaux



▲ Water treatment facility, Ile de Vieques, Porto-Rico

Vivendi, C. Bluntzer

The International office for water (the IOW) is playing the role of catalyst for expertise, dipping into a pool of more than 400 experts from public administrations and establishments (water agencies, etc...), local authorities and study bodies to make up multi-disciplinary teams which are tailored to every specific case.

The Agence Française pour la Promotion Internationale de Technologie et des Entreprises Françaises (the French agency for the international promotion of French technologies and companies - CFME ACTIM)

runs technical information programmes for foreign decision-makers and puts out information on French technologies and products.

For its part, decentralised co-operation has oriented itself towards supporting local authorities abroad, witnessing an upsurge in interest in many different countries.

The *Cités Unies Développement* network, which is present in Africa and in Latin America, is bringing toge-

The International Office for Water (IOW)

The International Office for Water, an association bringing together more than 150 public and private organisations involved in water, is active in three priority areas:

- the management of databases and measurement and documentation networks;
- professional training and refresher courses;
- international co-operation.

The IOW is providing consultancy and institutional expertise missions on the management of river basins, drinking water supply and sanitation, the control of industrial pollution, irrigation, agricultural hydraulics, etc...

Each year it receives more than 4 000 trainees, in particular in its Centre de Formation aux Métiers de l'Eau (CNFME - training centre for water professions) in Limoges.

With other public and private partners, it is actively involved in the setting up of training centres abroad working on subjects concerned with water such as that in Gdansk (Poland) and Mexico City (Mexico).

The water solidarity programme: a primary network for consultation and exchange

The *Programme Solidarité Eau* (pS-Eau) was set up to facilitate local international co-operation initiatives in favour of the least privileged populations. It has mobilised the competencies of its diverse partners, including non-governmental organisations, local authorities, professional water organisations, etc... It capitalises upon the experience obtained by the different actors involved, through research programmes and disseminating the information resulting from those programmes.

The themes dealt with concern in particular water and health, managing water services, maintenance and local operators, the role of women in urban projects, etc...

The pS-Eau organisation promotes consultation between the French, those from the southern hemisphere and other European or international bodies involved. It contributes to the constitution of networks of organisations in civil society such as the Alliance Maghreb-Machrek pour l'Eau (AL.MA.E.). Within the framework of the Mediterranean Action Plan (MAP) initiated by the United Nations Environment Programme (UNPE), a diagnosis of co-operation in the area of water has been drawn up.

A new network entitled "*Solidarité Eau Europe*" (water solidarity in Europe) was created in February 1998 at the European forum in Strasbourg as an extension of the works of the European Council ("European Charter" and "Blue Europe") and international conferences concerned with water, the environment and sustainable development.

ther and capitalising on the "good practices" which have been experimented with at local level. A certain number of technical services in French towns are therefore able to intervene to support bilateral, European or multi-lateral programmes of this type.

■ **Public aid for development (APD)**

Depending on projects initiated, French public intervention can also take the form of financial aid funds (FASIEP, FFEM, etc...) or long-term concessionary loans from the Agence Française de Développement (AFD = French development agency), for whom water constitutes a priority intervention area.

Given the scale of needs

involved, co-financing formula for parallel or concerted funding are increasingly used, involving other bilateral backers both at European or multi-lateral levels, in particular the World Bank, the Global Environment Facility (GEF), etc...



▲ **The Ertan river, China**
Suez-Lyonnaise des Eaux

The Académie de l'Eau: a multi-disciplinary think-tank

The *Académie de l'Eau* - chaired by Professor Dausset, a Nobel prize winner for medicine - brings together 40 or so personalities and 20 major institutions which specialise in water, urban planning and town and country development. The themes it deals with are concerned with water and its links to town and country development, the rural environment, health, sociology, institutions and associations, economics and basin management.

Within the framework of a strategy for sustainable development and social management, its works have been presented at several international symposia organised by UNESCO.

An experimental management tool developed at the Rio conference is being prepared to facilitate exchanges within an international network of large French, European and foreign towns which will benefit from the experience acquired in a perspective of harmonious and sustainable development.

useful addresses

Ministries

**MINISTÈRE DE L'ÉQUIPEMENT,
DES TRANSPORTS ET DU LOGEMENT**
Internet: <http://www.equipement.gouv.fr>

**DIRECTION DES AFFAIRES
ÉCONOMIQUES ET INTERNATIONALES (DAEI)**
Grande Arche de la Défense
92055 LA DÉFENSE Cedex
Phone: 33-1 40 81 27 64 fax: 33-1 40 81 27 70

**MINISTÈRE DE L'AMÉNAGEMENT
DU TERRITOIRE ET DE L'ENVIRONNEMENT**
Internet: <http://www.environnement.gouv.fr>

DIRECTION DE L'EAU (DE)
20, avenue de Ségur
75302 PARIS 07 SP
Phone: 33-1 42 19 12 01 fax: 33-1 42 19 12 06

Specialised organisations

AGENCE DE L'EAU ADOUR-GARONNE (A.E.A.G.)
90, rue de Férétra
31078 TOULOUSE cedex 4
Phone: 33 5 61 36 37 38 fax: 33 5 61 36 37 28
Internet: <http://www.eaufrance.tm.fr/aeag>

AGENCE DE L'EAU ARTOIS-PICARDIE (A.E.A.P.)
200, rue Marceline, Centre tertiaire de l'Arsenal BP 818
59508 DOUAI cedex
Phone: 33 3 27 99 90 00 fax: 33 3 27 99 90 15
Internet: <http://www.eaufrance.tm.fr/aeap>

AGENCE DE L'EAU LOIRE-BRETAGNE (A.E.L.B.)
Avenue Buffon
45063 ORLÉANS cedex 2
Phone: 33 2 38 51 73 73 fax: 33 2 38 51 74 74
Internet: <http://www.eaufrance.tm.fr/aelb>

AGENCE DE L'EAU RHIN-MEUSE (A.E.R.M.)
Le Longeau, route de Lessy, Rozériettes BP 19
57161 MOULINS-LÈS-METZ
Phone: 33 3 87 34 47 00 fax: 33 3 87 60 49 85
Internet: <http://www.eaufrance.tm.fr/aerm>

AGENCE DE L'EAU RHÔNE-MÉDITERRANÉE-CORSE (A.E.R.M.C.)
2-4, allée de Lotz
69363 LYON cedex 07
Phone: 33 4 72 71 26 00 fax: 33 4 72 71 26 01
Internet: <http://www.eaufrance.tm.fr/aermc>

AGENCE DE L'EAU SEINE-NORMANDIE (A.E.S.N.)
51, rue Salvador Allende
92027 NANTERRE cedex
Phone: 33 1 41 20 16 00 fax: 33 1 41 20 16 09
Internet: <http://www.eaufrance.tm.fr/aesn>

OFFICE INTERNATIONAL DE L'EAU (OIEAU)
Direction de la coopération internationale
BP 75
06902 SOPHIA-ANTIPOLIS
Phone: 33 4 92 94 58 00 fax: 33 4 93 65 44 02
Internet: <http://www.oieau.fr>

VOIES NAVIGABLES DE FRANCE (V.N.F.)
175, rue Ludovic Boutleux
62408 BÉTHUNE cedex
Phone: 33 3 21 63 24 24 fax: 33 3 21 63 24 42
Internet: <http://www.vnf.fr>

INSTITUT FRANÇAIS DE L'ENVIRONNEMENT (I.F.E.N.)
61, boulevard Alexandre Martin
45058 ORLÉANS cedex 1
Phone: 33 2 38 79 78 78 fax: 33 2 38 79 78 70
Internet: <http://www.ifen.fr>

CONSEIL SUPÉRIEUR DE LA PÊCHE (C.S.P.)
134, avenue Malakoff
75116 PARIS
Phone: 33 1 45 02 20 20 fax: 33 1 45 01 27 23
Internet: <http://www.rnde.tm.fr/français/frame/prgn.htm>

MÉTÉO-FRANCE
Direction générale
1, quai Branly
75340 PARIS cedex 07
Phone: 33 1 45 56 71 71 fax: 33 1 45 56 70 05
Internet: <http://www.meteo.fr>

**AGENCE POUR LA PROMOTION INTERNATIONALE DES TECHNOLOGIES
ET DES ENTREPRISES FRANÇAISES (CFME-ACTIM)**
14, avenue d'Eylau
75116 PARIS cedex 4
Phone: 33 1 44 34 50 00 fax: 33 1 44 34 50 01
Internet: <http://www.cfme-actim.com>

AGENCE FRANÇAISE DE DÉVELOPPEMENT (A.F.D.)
5, rue Roland Barthes
75012 PARIS
Phone: 33 1 53 44 31 31 fax: 33 1 53 44 38 38

Research and engineering

BUREAU DE RECHERCHES GÉOLOGIQUES ET MINIÈRES (B.R.G.M.)
BP 6009
45060 ORLÉANS cedex 2
Phone: 33 2 38 64 30 76 fax: 33 2 38 64 33 05
Internet: <http://www.brgm.fr>

**CENTRE NATIONAL DU MACHINISME AGRICOLE DU GÉNIE RURAL,
DES EAUX ET DES FORÊTS (CE.M.A.G.R.E.F.)**
Parc de Touvois BP 44
92163 ANTONY cedex
Phone: 33 1 40 96 62 81 fax: 33 1 40 96 61 42
Internet: <http://www.cemagref.fr/aeag>

FOR MORE INFORMATION

CENTRE DE COOPÉRATION INTERNATIONALE EN RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT (C.I.R.A.D.)

46, avenue Scheffer
75116 PARIS
Phone: 33 1 53 70 20 00 Fax: 33 1 47 55 15 30
Internet: <http://www.cirad.fr>

INSTITUT FRANÇAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER (IFREMER)

Technopolis 40
155, rue Jean-Jacques Rousseau
92138 ISSY-LES-MOULINEAUX
Phone: 33 1 46 48 21 00 Fax: 33 1 46 48 22 96
Internet: <http://www.ifremer.fr>

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE (I.N.R.A.)

147, rue de l'Université
75338 PARIS cedex 07
Phone: 33 1 42 75 94 51 Fax: 33 1 45 50 27 16
Internet: <http://www.inra.fr>

INSTITUT NATIONAL DE LA SANTÉ ET DE LA RECHERCHE MÉDICALE (INSERM)

101, rue de Tolbiac
75654 PARIS cedex 13
Phone: 33 1 44 23 60 00 Fax: 33 1 44 23 60 65
Internet: <http://www.inserm.fr>

INSTITUT FRANÇAIS DE RECHERCHE SCIENTIFIQUE POUR LE DÉVELOPPEMENT EN COOPÉRATION (ORSTOM)

209, rue La Fayette
75480 PARIS cedex 10
Phone: 33 1 48 03 77 77 Fax: 33 1 48 03 08 29
Internet: <http://www.orstom.fr>

CENTRE INTERNATIONAL DE L'EAU (N.A.N.C.I.E.)

149, rue Gabriel Péri
54500 VANDŒUVRE-LES-NANCY
Phone: 33 3 83 15 87 87 Fax: 33 3 83 15 87 99
Internet: <http://www.nancie.asso.fr>

Professional associations

FÉDÉRATION NATIONALE DES TRAVAUX PUBLICS (F.N.T.P.)

3, rue Berri
75008 PARIS
Phone: 33 1 44 13 31 44 Fax: 33 1 45 61 04 47

SYNTEC CONSEIL

3, rue Léon Bonnat
75008 PARIS
Phone: 33 1 44 30 49 20 Fax: 33 1 42 88 26 84
Internet: <http://www.syntec-conseil.fr>

UNION DES INDUSTRIES ET ENTREPRISES DE L'EAU ET D'ASSAINISSEMENT (U.I.E.)

10, rue de Washington
75008 PARIS cedex 07
Phone: 33 1 45 63 70 40 Fax: 33 1 42 25 96 41

SYNDICAT PROFESSIONNEL DES ENTREPRISES DE SERVICES DE L'EAU ET D'ASSAINISSEMENT (S.P.D.E.)

83, avenue Foch
75116 PARIS
Phone: 33 1 53 70 13 58 Fax: 33 1 53 70 13 41

ASSOCIATION FRANÇAISE DES INGÉNIEURS ET TECHNICIENS DE L'ENVIRONNEMENT

9, rue de Rocroy
75010 PARIS
Phone: 33 1 40 23 04 50 Fax: 33 1 40 23 05 39

ASSOCIATION GÉNÉRALE DES HYGIÉNISTES ET TECHNICIENS MUNICIPAUX (A.G.H.T.M.)

83, avenue Foch BP 39-16
75761 PARIS cedex 16
Phone: 33 1 53 70 13 53 Fax: 33 1 53 70 13 40
Internet: <http://www.professionet.com/business/ecol/info/aghtm.htm>

Training institutions

CENTRE NATIONAL DE FORMATION AUX MÉTIERS DE L'EAU (C.N.F.M.E.)

rue Edouard Chamberland
87065 LIMOGES cedex
Phone: 33 5 55 11 47 70 Fax: 33 5 55 77 71 15
Internet: <http://www.oieau.fr>

ÉCOLE NATIONALE DES PONTS ET CHAUSSÉES (E.N.P.C.)

28, rue des Saints-Pères
75007 PARIS
Phone: 33 1 44 58 27 00 Fax: 33 1 44 58 27 06
Internet: <http://www.enpc.fr>

ÉCOLE NATIONALE DES TRAVAUX PUBLICS DE L'ÉTAT (E.N.T.P.E.)

rue Maurice Audin
69518 VAULX-EN-VELIN cedex
Phone: 33 4 72 04 70 70 Fax: 33 4 72 04 62 54
Internet: <http://www.entpe.fr>

ÉCOLE NATIONALE DU GÉNIE DE L'EAU ET DE L'ENVIRONNEMENT DE STRASBOURG (E.N.G.E.E.S.)

1, quai Koch
67000 STRASBOURG
Phone: 33 3 88 24 82 82 Fax: 33 3 88 37 04 97
Internet: <http://www.engees.u-strasbg.fr>

ÉCOLE NATIONALE DU GÉNIE RURAL DES EAUX ET FORÊTS (E.N.G.R.E.F.)

19, avenue du Maine
75732 PARIS cedex 15
Phone: 33 1 45 49 89 39 Fax: 33 1 45 49 88 27
Internet: <http://www.ensp.fr>

ÉCOLE NATIONALE DE LA SANTÉ PUBLIQUE (E.N.S.P.)

avenue du Professeur Léon Bernard
35000 RENNES cedex
Phone: 33 2 99 02 26 91 Fax: 33 2 99 02 26 95
Internet: <http://www.oieau.fr>

CENTRE NATIONAL DE LA FORMATION PROFESSIONNELLE TERRITORIALE (C.N.F.P.T.)

10-12, rue d'Anjou
75008 PARIS cedex 15
Phone: 33 1 55 27 44 00 Fax: 33 1 55 27 44 01