



Sustainable management principles of French hydro-agricultural schemes

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Abstract. Everyone in France, whether user, manager, or local authority, is aware of the common heritage of water, which implies management of the assets in the general interest. This management engages the responsibilities of all the participants, and relies on the golden rules of public service – continuity, equity, transparency – to guarantee the required level of service at the least cost. Because of its enduring importance, water use cannot be regulated only on the basis of short-term market forces.

Generally, the facilities belong to a public authority, either a local Water User Association (with public status) or, a Regional Development Agency concession awarded by the state or by the local authorities. These service-providers develop very long-term management strategies to ensure financial autonomy and sustainable quality of service. The efforts that have been made to ensure effective accounting mechanisms and to obtain objective data on the real condition of their systems have proved to be very effective in optimizing the management organisation, particularly in terms of maintenance, modernisation and renewal policy.

Key words: asset management, common heritage, continuous equilibrium, operational value, economic value, maintenance and renewal costs, long-term views, balanced management

The concept of asset management applied to water

The first obstacle when discussing a particular topic is to reach agreement on the definitions of the terms involved, in this case a common understanding as to what exactly is meant by “ASSET MANAGEMENT”. Dictionaries generally give an accountant’s definition of the term “asset”, thereby assigning to hydraulic schemes an “asset value”. After the debate on “Water, economic wealth”, should we now examine the concept of asset management and discuss hydro-agricultural schemes from the standpoint of direct returns on investments, and thereby move into the debate on privatisation and economic viability? If we were referring to publications presented at the ICID on this topic, we feel the word “asset” is used in a much wider sense, designating the physical schemes themselves with all their technico-economic and financial implications: Burton, Kingdom and Welch (1996)

state that “*asset management planning can be defined as: a structured and auditable process for planning investment in infrastructures to provide users with a sustainable and defined level of service.*” It relies on an assessment of the state and the performances of the facilities relative to the services they are deemed to provide.

This approach was used in the United Kingdom as the background to total privatisation of the urban public water services, although the authors consider that it can apply to facilities depends in public or the private sector, and also companies that generate profits or those that determine the real cost of the services, which may or may not be subsidised. Therefore, insofar as the concept of “asset management” in the United Kingdom is not limited to a purely commercial and financial approach but also includes the fundamental and sustained organization of the services provided by these schemes, it can be compared to the French concept of “common heritage management”. Indeed, in the French concept, the term “common heritage” or “*patrimoine*” designates all the property, rights and responsibilities of a public authority whose vocation is to maintain and transmit this common heritage from one generation to another.

The history and the culture of France have been deeply marked by the common heritage notion of soil, water and especially hydro-agricultural scheme management. In Mediterranean regions especially, since ancient times, Nature has ensured that the management of water is a key factor in their civilisation and development. It has generally been shown that the problem of water management is unsuited to individual solutions, but rather concerns society as a whole. Thus, from very early on, the people of Mediterranean regions worked to find sustainable solutions to the risks of shortages faced by a whole range of water users, and to make full use of the harnessed resources. Hence, in these regions, we now find a range of multipurpose infrastructures (intakes, reservoirs, transfer facilities, hydropower plants, urban and agricultural supply networks) resulting from an accumulation, over the centuries, of progressively executed, remodelled, transformed and developed facilities. These facilities reflect difficulties which have had to be overcome, and the constant technical and institutional adjustments implemented at various times.

The historical diversity of hydraulic schemes, some lasting centuries while others fell into disuse, has taught us how fragile lasting socio-economic equilibrium can be and how difficult it is to maintain. Thus we are able to understand the mechanisms involved in conflicts of interest which, under the pressure of individual and short-term concerns, may compromise the long-term sustainability of a lasting service in the public interest. The purpose of the present paper is to describe the main information which can be drawn

from tangible French experience on which effective principles for sustainable management of the “common heritage” have been based, namely the hydraulic schemes.

The principles of water resource management: a public service for achieving sustainable development

The importance of managing the sustainable development of natural resources is clearly set out in Article 1 of the French 1992 Law on water management: “*Water is part of the common heritage of the nation. Its protection, use, and the development of usable resources, while respecting the natural equilibrium, are in the general interest. Water resources belong to everyone within the limits of laws and regulations, and any previously established rights*”. Therefore, water cannot be appropriated by individuals. At the same time, its use is accessible to everyone provided the constraints of common heritage management, which override those of individual interests, are complied with.

This management of the general or common interest is also one of the golden rules of public service, i.e. continuity, equity, durability, transparency, intended to guarantee the required level of service, at the lowest cost (J. Plantey 1996, H. Tardieu 1998). The promotion sustainable development implies that the common interest is accorded priority, both now and in the future, that social and territorial cohesion are based on principles of equity and transparency, that there is a reliable service available to users which is always able to match the evolving requirements and constraints (all at the best quality/cost ratio). Therefore, in its principles, the public service ethic applied to water perfectly reflects the objectives of sustainable development. In practice, implementing these principles to exercise control over the management of a water supply in the public interest involves the agreement and responsibilities of all the participants, and the application of the foresight and authority needed for their sustainability. The institutional and economic organization currently applied to water management in France seeks to render all participants responsible according to their respective interests and roles.

Everyone, whether user, manager or local authority, is aware of the “common heritage” of water, which implies management conducted in the public interest. It is of course understood that a water resource has an economic value and that the cost of the service – recognised as being of public interest – must be met in one way or another. The main fundamentals of public service, designed to guarantee equity and sustainability, guide the management organization. They are responsible for the schemes that they manage and so must adopt sustainable policies that overcome short-term considerations

based on immediate gain. The public service cannot be regulated only by market rules governing the short term. The diversity of institutional tools allows management organization to be adapted to a socio-economic context, and even to a region's specific culture. When the will is there, the interrelated components that are the foundation of a sustainable institutional system can be developed. For all that, sustained management reflecting users' needs as closely as possible is not easy to achieve, nor ever definitively established. All participants must be provided with all the relevant information, and constant vigilance, cooperation and objectivity are needed to foster a desire for the common good.

Management of the common heritage in hydro-agricultural schemes

Definitions

What is the common heritage

When managing the common heritage of hydro-agricultural schemes, a distinction must be made between the "water resource" and the "infrastructure". The theme of the seminar at which this paper was first presented was oriented towards management of the infrastructure itself and seems to be positioned downstream of resource availability, i.e. at the irrigation areas once tapping of a water resource for agricultural use has been authorized. Therefore, the remainder of this paper does not address the steps taken in France to ensure the overall and concerted management of water resources, the preservation of aquatic ecosystems, and the satisfaction of all the different users throughout a hydrographic basin. Further reading on this subject can be found in all the publications which accompany the 1992 Water Law. It must simply be remembered that the fundamental requirements for the balanced management of a resource has obvious repercussions for overall scheme management. In the context of a resource that is insufficient to satisfy all users, the management of the scheme's common heritage must not underestimate the need for a water-saving policy (SCP, 1990); the operator, like the user will be motivated to save water if explicitly responsible for bearing the cost of that water. Therefore the hydro-agricultural scheme's common heritage itself can be defined as all the plant and equipment, together with a corresponding right of use enabling the water necessary for agriculture to be stored, transported and distributed in due time in contractually agreed quantities and at specified qualities.

Who owns this common heritage?

Even though, because of the large institutional diversity that exists in France, there are a few cases of irrigation facilities which belong to private companies (e.g. Canal de la Brillanne), but the general rule is that these facilities belong to a public authority, as described below.

- In the case of small areas, Water Users' Associations have public status (including a clause for return of the asset to the local authority or the state in a case of default).
- Intercommunal authorities are responsible for certain medium-sized areas.
- In the case of large multipurpose areas, the State or, more recently, the local authorities award design, building and management concessions to the French SARs (Regional Development Agencies).

Who manages this common heritage?

The owners are able to manage the facilities in-house or can sub-contract this management, with more or less extensive delegation, to specialist management organizations, as described below.

- In the case of small irrigation areas, the Water Users' Associations (WUAs) are generally self-managed but with assistance from the Administration. A certain number of their tasks (maintenance, repairs) can be contracted out to specialist companies through sub-contracting agreements. Occasionally, in the case of major WUAs that have complex equipment, the associations contract out their management to specialist companies (private water companies or regional development agencies). The allocation of responsibility of the assets then becomes a delicate issue: generally, the managing organization only has the responsibilities of a lessee, while the owner remains responsible for the heritage aspect and must be able to effectively exercise this responsibility.
- The large multipurpose schemes are leased out to regional development agencies (SARs) under long-concessionary management agreements. The advantage of this system is that it accords the operator full and overall responsibility and this encourages consistency in its actions (design based on requirements, and on how the means to satisfy them will be operated). These companies have a very unusual status allowing "self-management" by the public authorities involved, as executives of a company governed by corporate business law but subject to achieving balanced accounts.

The management aims

As a diligent and reasonable owner of a common heritage, the management must be

“Far-sighted”, implying the ability to

- clearly and objectively identify all the obligations and tasks to be assumed in order to provide a sustained service,
- constantly optimize actions based on the means actually available,
- carefully monitor the level of performance and the requirements of customers, and
- consequently, consider and anticipate the need for change.

“Responsible”, implying

- financial independence,
- a commitment to a quality of service with respect to the contract with the customer, observance rights and attributions established by the public authority.

“Equitable”, implying that

- everyone contributes “insofar as it has rendered the expenditure necessary, and has an interest”,
- the tariffs must be related to the service provided.

“Diligent”, implying

- the application of the public service principle,
- the passing on of the common heritage is a usable form to future generations.

Management must aim maintain a continuous and fair equilibrium

- between the needs and the resources (both physical: water resource, and financial), by overall concerted and transparent management,
- between the general interest and the individual interest by rendering responsible all the participants: users, managers, local authority, whilst at the same time ensuring solidarity between users, between districts and between generations,

- between the public service values and the efficiency of the private sector (which is something that can be perfectly reconciled, as demonstrated by the French mixed private and public capital companies which have operated for 40 years), and
- between tradition and revolution, by constant crisis-free adaptation to an evolving world.

In his speech to the International Conference on water and sustainable development on 20 March, 1998, the French President, Jacques Chirac, underlined these points, saying “*let us put an end to the sterile oppositions between the market and the State, between the gratuitous and the tariff-driven service, between sovereignty over resources and necessary solidarity*”.

Difficulties to be overcome

How can a common heritage be assessed?

The first duty of the holder of any heritage is to be aware of, and have accurate and objective knowledge of, its value. In practice, this is rarely the case, for many reasons, particularly in that this value is multi-factorial: comprising historical, social, accounting, economic and other features.

- Socio-cultural value: this aspect, which is difficult to quantify, covers the social role of water management, the physical link between solidarity and regional management, the historical and cultural values; the secondary impacts (landscape, etc.), and, generally speaking, the interaction of development with the environment (A. Galand, 1997).
- Accounting value: this value is often imprecise. In the case of WUAs, for instance, it is only recently that the texts on public accounting in the field of water management have introduced the requirement for balanced accounts, allowing the fixed assets to be valued and technical depreciation to be offset. Of course, historical data, when available, can be used to trace the costs of the facilities since the beginning and the subsidies which enabled the charges to be borne by the users. But generally this cannot be easily applied to deduce the current value of these facilities. We will see below that the special stipulations adopted by the SARs lead them to incorporate the current investment values into their balance sheets and to keep the assessment of the current value updated. If SARs were to be constructed today, they would be required to pass on an undepreciated asset at the end of the concession.
- Operational value: this involves assessing the actual ageing and obsolescence of the structures and their capacity to provide the required quality of service.

This is a difficult area as such assessments are often global and implicit, and reactive rather than predictive. It is not easy to keep a reliable and detailed evaluation updated. Too often it is observed that the effort is extended only on exceptional events, for example on crises requiring modernization/rehabilitation, or in the case referred to by Kingdom and Welsh, during the privatization process. Of course, crisis situations can be regarded as perfect opportunities for qualitative surges and consequent progress. However, the principle of continuity of public service requires that such progress takes the form of continuous efforts as opposed to revolution. Bearing this in mind, it is important to have an ongoing evaluation. However, this is not easy to achieve, although it can be done; costs will be offset by the increased efficiency after maintenance and renewal. It involves using systematic tools and procedures (R. Tiercelin et al., 1998) to measure changes in:

- the physical condition of the structures (by auscultation and inventorial methods), and
- the adequacy of service (methods of monitoring performance and feedback from customers).

Contrary to opinions often expressed (Van Hotwegen, 1997), the necessary measurement tools and computer technology are easily accessible to developing countries. It is a question of organization and realism, i.e., of moderation and perseverance.

- Economic value: of course we must be aware of the viewpoint from which this economic value is assessed (state, local authority, organization, users, etc.). Here we are examining the management organization: its economic value can be assessed by the net income expected from the remuneration for services, which brings us to the problem of a balanced operating account.

How to ensure balanced financial management

- *The problem of committing financial resources.* Apart from the case of crops with high added values (fruit, vegetables, seeds), irrigation charges constitute an important item in the budget of farms and not all crops provide sufficient income to sustain irrigation (Montginoul, 1996).

This means that farmers are extremely sensitive to the price of irrigation and find it difficult to assume the overall cost. The farmers are well aware that two categories of expense are inevitable: the operating costs, and the repayment

of the loans they have obtained to cover their share of the investment. Therefore they are tempted to make maximal savings on maintenance costs, which they often find difficult to comprehend, as long as the structure remains operational. In the context of an uncertain future for their operations, they find it even more difficult to take the long-term view in order to ensure the sustainability of their schemes.

- *The problem of the high inter-annual variability of expenditure.* Hydraulic schemes involve very heavy investments that are supposed to have a practically unlimited life encompassing years and even decades before they can be fully completed and used. Any changes in use are therefore fairly unpredictable in view of the uncertainties of long-term agricultural policies and practices, and the changes in regional land use (urbanisation, industrialisation, environmental protection, etc.). The annual running costs represent only a very small fraction of the investment value. They are relatively stable over time. The charges associated with establishing and maintaining the value of a common heritage (maintenance, adapting to changing requirements, renewal) are of primary importance and vary a great deal over time: even in the case of initially largely subsidised investments, the self-financed part generally covered by a loan is often a heavy burden during the period of loan reimbursement. Thereafter, we move very quickly into increased maintenance costs requiring the commitment of large renewal costs.
- *The structure of income and expenditure therefore fluctuates very much over time.* This raises a problem of balance if excessive instability of tariffs is to be avoided. It also highlights the need to release the means of financing maintenance and renewal costs. Maintenance work on structures cannot be delayed too long, but at the same time can only be executed if the means are actually available. Hence, objective and concerted methods of analyses using data acquired on the operational value of facilities (see above) are helpful in the scheduling of heavy maintenance operations.

Case study: common heritage management of major irrigation areas operated by regional development agencies (SARs)

SARs, created some 40 years ago to enhance the regional development prospects of southern parts of France where water was then the limiting factor on agricultural growth, have proved that it is possible to ensure well-balanced water management, and reconcile competing uses, in the common interest. Indeed, that these regions today are not threatened by water shortages is due to a mutual decision, on the part of all those interested in the fair management of the regions' water resources, to work together and find original solutions. These have so far proved to be relevant and efficient. From the outset, these solutions were founded on principles that closely correspond to the aims of sustainable development, and this implied the active involvement of all concerned.

The SARs' original approach to institutional structure

“In France, and in other parts of Europe, we have developed schemes under which companies are entrusted with water management, under government control. These techniques, called delegated management or public service concession, are neither nationalization nor privatisation. They are the fashioning of specific instruments for administering a common heritage. These instruments are particularly suited to economic start-up situations where immensely expensive initial investment is required” (J. Chirac, 1998).

By law (Rural Code, Article 112), the SARs are entrusted with public-interest assignments. These assignments, covered by a state mandate, particularly concern the setting up and operation of the water infrastructures necessary for regional development. As water-resource managers, therefore, SARs supply urban and industrial centres as well as irrigated agriculture. During the entire period of their mandate (75 years), they assume all the rights and obligations of project owner.

Because of their status, the SARs deal with regions and departments as well as a variety of socio-professional interests, in their different assignments. They observe the corporate laws of public limited companies, which require the same type of management and economic efficiency as private businesses; but public institutions make up the majority of the shareholders. To meet water demand, regional authorities are therefore responsible for the management of this strategic resource, which they are able to allocate according to the general interest of their clients. Irrigators are specially represented and take part in the decision-making process through Chambers of Agriculture,

which are among the SARs' private shareholders. Because of the mandate, the state retains a high degree of control over the SARs.

SARs are particularly receptive to users' opinions, and to this end they have developed procedures for systematic collaboration, for example in commissions with farmers' representatives. In this way it is possible to improve both the quality of the service offered and the management of the resource itself. These are therefore regionally based structures in which collaboration between all the different interests is a permanent, ongoing process. These companies are managed with transparency and in a climate of mutual agreement. Their actions are a consequence of their public service assignments and have to be financially balanced, whether in terms of investments or operating costs. They combine technical, economic and financial competence to implement investment programmes or to undertake the day-to-day running of facilities.

How well have the SARs performed in their financially balanced public assignments?

The exercising of their public assignments

The principles underlying the SARs' organization and actions have remained those of sustainable public service management: continuity, equity, sustainability and transparency are there to guarantee the quality and minimize the cost. The contracts between SARs and their users, therefore, are based on user-defined quality requirements. The general operating principle, also valid for irrigation, is the continuous supply of water to meet an unrestricted demand, under agreed conditions of discharge and pressure.

Water tariffs are established so as to orient customers' decisions towards collective economic equilibrium and optimal use of existing facilities. This enhances the responsibility of water users by making their consumption cost-conscious and by highlighting the environmental or *in situ* value of water, investment and operating costs to tap, carry, sometimes treat and supply it. Water charges are arrived at with transparency and remain constant (in real terms) over time. They help to allocate the costs equitably between urban, industrial and irrigation water uses according to their different quality and specificity.

The SARs' actions are long term: for the duration of their entire mandate (75 years), they are required to manage the facilities in such a way as to guarantee their transfer back to the state in perfect working order. We shall see (below) that an optimized policy of maintenance requires special financing arrangements, thus minimising the impact of faults, improving the reliability and adaptability to demand of facilities, as well as scheduling heavy maintenance and renewal expenditure. With this in mind, the SARs have drawn

up systematic methods and procedures for monitoring the functioning and performance of facilities and for ensuring that supply is always adapted to users' needs (P. Augier et al., 1997). These procedures are being further developed in collaboration with the research organizations. Thanks, in particular, to the automatic remote control systems developed, monitoring now depends on extremely precise databases drawn from objective observation of the facilities which provides a rational basis for action. Dialogue with users is also encouraged in order to analyse any changes in the nature and quality of service expected, in order to adjust the situation if necessary.

However, the importance of the long-term general public interest over short-term individual interest can never be taken for granted. It implies constant vigilance to ensure compliance with a coherent development policy once a collective solution has been adopted. The role of the state is essential in safeguarding the coherence of this policy. SARs' compliance with the rules governing the assignment and orientations fixed by their administrative boards is supervised by shareholders and by the State. Accounts are audited by an inspector from the Ministry of Finance. The Ministry offers day-to-day assistance and monitors the SARs' operations in detail. Periodically, the SARs receive more detailed financial inspections by the Ministry or the Board of Public Accounts. This close monitoring confirms, if it were necessary, the need for transparency (the best guarantee of a quality service to water users); the French saying "do what one says, and say what one is doing" sums this up very well.

The quality of the service they offer has already been recognized. One of the SARs has received ISO 9002 accreditation.

Financial equilibrium

Given the long time span and the development function of the investments, they were initially implemented with the help of public funding from the European Union, the State or local authorities. The subsidy rate has varied between 20 and 90% (50–60% on average) according to the nature and purpose of the works, with bank loans topping the funding. These investments only become fully profitable after several decades, substantial operating costs and heavy reimbursements being incurred in the first few years. Consequently, specific measures have been taken jointly with the State and local authorities to finance intermediate bank charges. This initial phase has now been complete for several years and balancing of the accounts now relies on the water charges alone, without any operating subsidies; these charges pay for all the wage costs, bank instalments and expenditure incurred for the operation, maintenance or renewal of the works.

In order to maintain this balance, all necessary maintenance and renewal work must be funded at the appropriate time. In this respect, as mentioned above, the SARs are required, at the end of their concession (75 years), to return non-depreciated assets to the State. To this end, the State has issued accounting guidelines which establish that concessionary schemes cannot be offset against depreciation, since the SARs should carry out all preventive and corrective maintenance and renewal of the elements constituting this scheme on an ongoing basis. This system avoids SARs having to apply linear depreciation over a very long period of time and encourages them to build up provisional sums of money to cover these items of expenditures. To determine the amount of the provisional sums to cover this expenditure, every year the SARs revise the real values, per category, of the plant and equipment forming an integral part of their mandate since the outset (the present value in francs is indicated on their balance sheet, and the details are updated in an inventory). For each category of plant or equipment, the State establishes a range of rates. The rates and their development within this range are periodically revised according to the deviations noted between the quality objectives for maintenance of facilities and the actual situation. Every year, maintenance and renewal can thus be funded from provisional sums. The remainder feeds the account, which must be kept high enough to cover essential items for continuity of the service and unforeseen developments.

Of course, achieving financial equilibrium is not in itself a sinecure: it needs ongoing internal efforts to clearly grasp the economic realities and to improve the performance and productivity of the company. In this respect, each SAR combines the three-fold skills of designer-builder-operator, and this undoubtedly helps them to optimize investments by taking account of the recurring running costs related to demand. In fact, the investment and operating costs have proved to be competitive with those observed elsewhere for comparable equipment.

Some significant figures illustrating the concerns of sustainable management of the assets

To illustrate these concerns, we present the example of the SAR responsible for the schemes in the South-Eastern part of France, i.e., the “Société du Canal de Provence” (SCP). Figure 1 shows the time required to develop the main structures and distribution networks, against the investment burden and the progression of income recovered from the users. Actually, 40 years after the beginning of the scheme, their annual water charges represent less than 3% of the actual value of the assets.

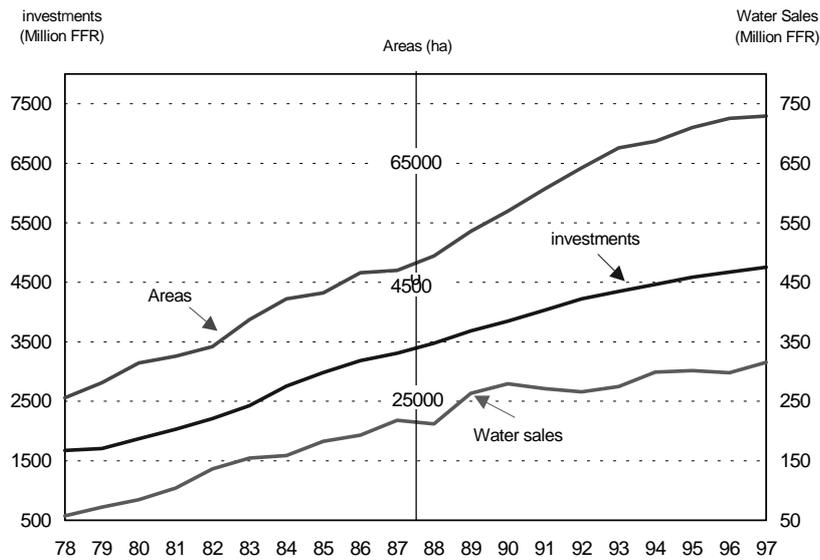


Figure 1.

Figure 2 shows the importance of the loan contracts negotiated with the banks to obtain the investments: the maximum was in 1989, when the loans for construction of the first main structures came to an end.

Then, up to 1996, income from the users was insufficient to cover the whole financial cost, and the public shareholders of SCP provided advance funds to achieve a balance: this is shown in Figure 3.

Now the Company has reached equilibrium, and, if the OM&M expenses were to remain stable and the users were to continue increasing the demand, it is possible that (if the loans can be reimbursed) the advance funds from shareholders could be repaid. Alternatively, difficult new schemes could be funded or tariffs lowered. Unfortunately, SCP is well aware that it now also has to face increasing expenses for renewing and modernizing its schemes. According to theoretical ratios for the lifetime of every component of its schemes, SCP has evaluated the national increase in these expenses, as shown in Figure 4.

What is encouraging is that the ultimate level of these expenses is of the same magnitude as the actual reimbursement of loans; it is possible that the system is sustainable, but in any case anyway these expenses will increase greatly in years to come. This led the board members to conclude that the first priority was to increase the budget for renewing the assets. The targets were fixed for the next five years, and it was decided to monitor the increasing needs in order to make periodic changes to relevant policies. topic.

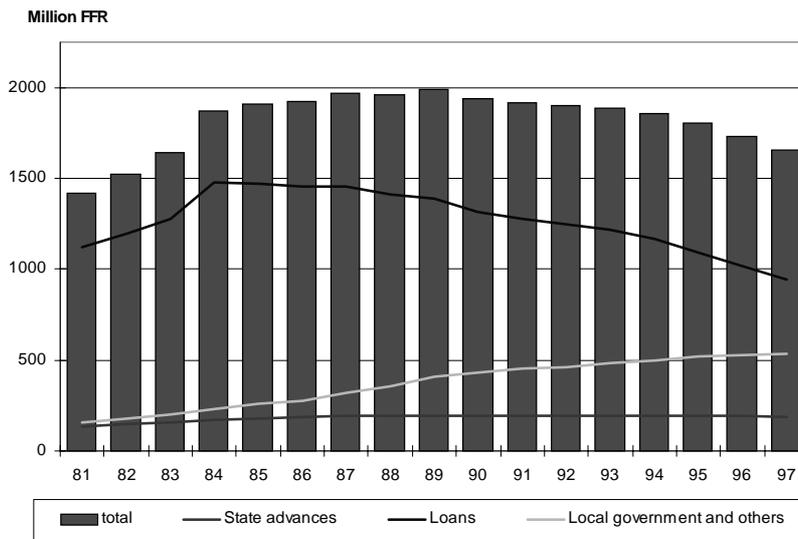


Figure 2. SCP indebtedness.

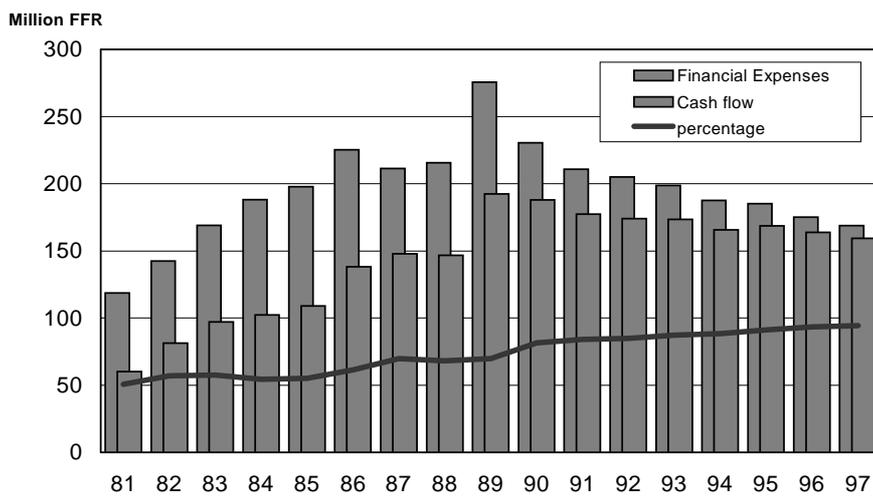


Figure 3. Financial expenses and cash flow.

In this way, SCP developed techniques and procedures to facilitate this monitoring: these are not described here in detail, but this is a topic worthy of discussion at another seminar on OM&M.

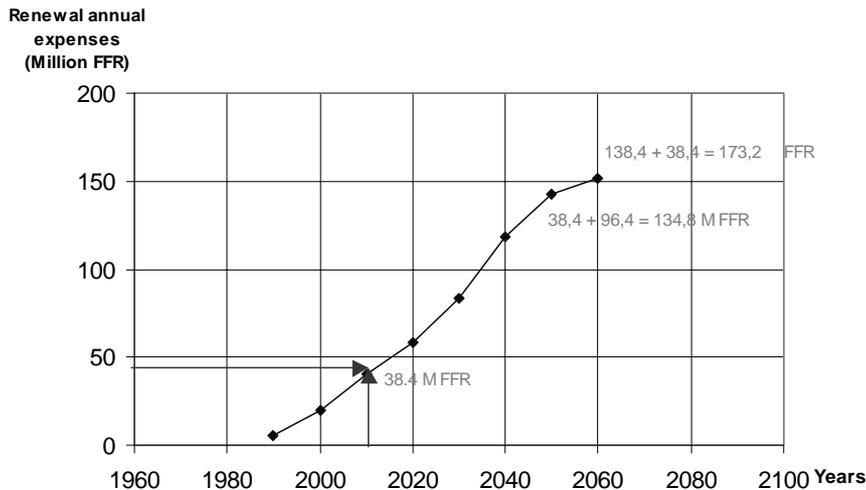


Figure 4. Renewal annual expenses for all assets of categories 2, 3, 4 and 5.

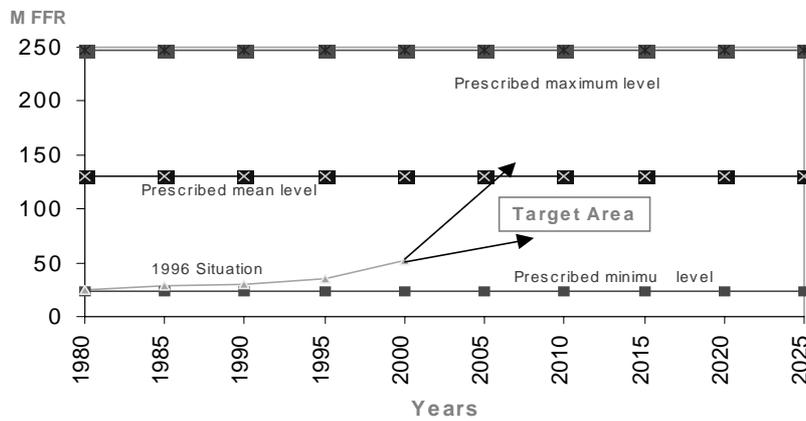


Figure 5. Corrective maintenance and renewal.

Conclusions

Paul van Hofwegen (1997) stressed that “*financial autonomy of the service provider, clear service agreements and effective and transparent accounting mechanisms are the ingredients of sustainable, reliable and effective services as in this way a direct relationship is created between the need, level and cost of service on the one hand and the payment for services on the other*”. The French examples given above use the following logic; they show that a long-term management strategy cannot really be applied if little effort is made to obtain objective data on the real condition of the system and to ensure

its adaptation to the changing needs of its customers. Such efforts need not be excessive and, if applied consistently and permanently, will prove to be very productive in optimizing the management procedures. The durability of the systems does not mean that they are immutable but that they can be maintained in a state of balance that is fair to all. To achieve this, the factors affecting any significant imbalance must be detected and the means to overcome them implemented.

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