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Integrated management of water resources and demand in the touristic area of Saint-Tropez in a drought context

F. Jose-Maria
Syndicat Intercommunal de Distribution d'Eau de la Corniche des Maures (SIDECM)
(Intercommune Water Distribution Syndicate, Corniche des Maures Area),
BP 50, 8330 Cogolin, France

SUMMARY – The SIDECM Syndicate is in charge of water supply in France's touristic Mediterranean area of Saint-Tropez, which has experienced high growth in consumption. Confronted with severe drought spates, the Syndicate has set up the following management capabilities: (i) factoring in climatic changement; (ii) preserve the upstream-downstream balance of the flux resource; and (iii) act on both supply and demand to maintain such equilibrium. The key actions on supply consisted of: (i) diversifying and protecting the supply sources; and (ii) devising predictive resource management tools. The demand-side actions are four-pronged: (i) progressive pricing; (ii) regular information campaigns toward the users; (iii) education and cooperation actions; and (iv) a pilot economy-seeking operation.

Key words: Diversification, protection, predictive management, information, education, cooperation, economies.

RESUME – *"Gestion intégrée des ressources en eau et de la demande dans la zone touristique de Saint-Tropez dans un contexte de sécheresse". Le SIDECM est chargé de l'alimentation en eau de la région touristique méditerranéenne de Saint-Tropez, qui a connu une très forte croissance des consommations. Confronté à des épisodes de sécheresse sévère, il a développé des outils de gestion qui permettent : (i) d'intégrer le facteur de changement climatique ; (ii) de préserver l'équilibre de la ressource flux entre l'amont et l'aval ; et (iii) d'agir à la fois sur l'offre et sur la demande pour maintenir leur équilibre. Les principales actions sur l'offre ont consisté : (i) à diversifier et protéger les sources d'approvisionnement ; et (ii) à développer des outils de gestion prévisionnelle des ressources. Les actions sur la demande se déclinent en quatre volets : (i) une tarification progressive ; (ii) des campagnes régulières d'information en direction des usagers ; (iii) des actions d'éducation et de coopération ; et (iv) une opération pilote de recherche d'économies.*

Mots-clés : *Diversification, protection, gestion prévisionnelle, information, éducation, coopération, économies.*

Presentation

The "Syndicat Intercommunal de Distribution d'Eau de la Corniche des Maures" (SIDECM) is in charge of drinking water supply for the towns of the Saint-Tropez Bay area, on the southern French Mediterranean seaboard of the Maures massif.

The findings

Expanding needs

Over the last three decades, the permanent population of SIDECM's territory grew threefold, with a fourfold increase in the number of subscribers to the water utilities, while the consumed volumes grew by a factor three (Fig. 1).

During the dry summer period, the tourists' inflow multiplies the population and water consumption by five, the highest pressure on water management, forcing SIDECM to size all its utilities, facilities and network to meet the peak-day need, which today exceeds 80,000 cubic meters, as against the average 15,000 cubic meters supplied on a January day (Fig. 2).

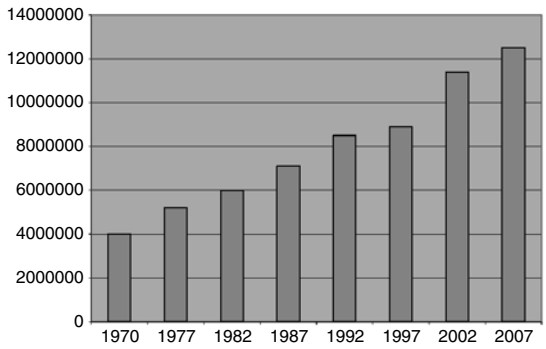

Fig. 1. The 1970-2007 trend in water consumption (m^3).

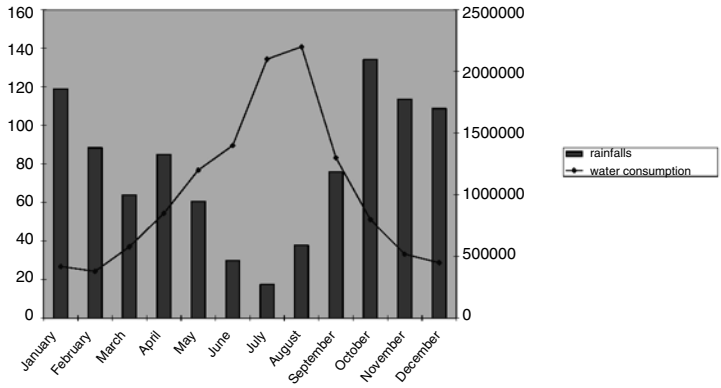

Fig 2. Monthly distributed volumes (m^3), and average monthly rains (mm).

A diminishing rain supply

Drought has settled in our region over the last five years. Whereas mean annual rainfalls over the elapsed forty years is 950 millimetres (mm), the past five years' figure is 750 mm, with a sharp drop to 450 mm in 2007. The cumulated rain deficit over the last five years stands at over 1700 mm (Table 1).

Table 1. The last 5 years' rain deficits compared to average

	Jan.	Feb.	March	Abril	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2003	-25.90	-60.50	-64.20	71.50	-50.00	-30.60	-18.80	-40.80	28.00	-8.40	-10.80	0.30	-210.20
2004	-80.40	-37.00	-47.80	15.30	-25.90	-17.30	-14.00	-25.30	-39.40	66.50	-86.10	-10.50	-301.90
2005	-121.10	-73.90	-21.90	-59.40	-22.90	39.90	-17.40	-21.40	97.40	-33.20	-26.60	-38.50	-299.00
2006	-35.90	-32.70	-32.80	-80.70	-57.00	-26.50	0.50	-32.00	-10.90	-63.20	-43.60	19.20	-395.60
2007	-104.00	-55.90	-23.50	-66.50	47.80	-21.90	-17.50	-32.80	-77.90	-97.20	4.40	-52.80	-497.80
Total													-1704.50

Embrittled local resources

Supplied only by the watershed basin's rains, the seaboard underground water tables permanently relate to the marine medium. Over sampling from their natural flux may create depressure capable of easing out inland penetration of the coastline's salty wedge. Such contamination not only would doom a significant reserve of water but would also burn its environment's lush vegetation.

The tools for integrated management of water resources and demand

The definition of integrated management reflects several layers of a targeting strategy: (i) integrate the notion of climatic change; (ii) keep the supply (resources) to demand (uses) equilibrium; (iii) preserve the upstream-downstream (i.e. system) "flux resource" balance; and (iv) act concurrently on supply and demand.

The supply-side actions

They come as a three-pronged strategy: (i) diversification; (ii) protection; and (iii) predictive management.

Diversification of resources

To secure its territory's water supply, SIDECM endeavoured to diversify its supply sources, which are threesome: (i) the seaboard silting sites; (ii) a dam built amidst the Maures massif; and (iii) the water from the Alps, routed through the Canal de Provence works.

Protection of resources

To check the risk of inland penetration of the salty coastline wedge, the underground water tables are regularly targeted by monitoring and measurement campaigns using significant networks of a hundred piezometers distributed throughout the alluvial plain.

To ward off other pollution risks, water catch protection perimeters inhibit all activities in immediately adjacent areas, and regulate other activities in both nearby and remote areas.

An intervention aid plan was set up with the concerned services to ward off risks of road crash-related pollution.

The Verne dam's reserve, too, is surrounded with protection perimeters throughout its watershed, with its medium's physical and biological quality regularly monitored.

Predictive management of resources

Backed by four decades' campaigns of hydro geological measurements of the watershed basin's underground water tables, SIDECM developed a computerized tool, dubbed "Manon" for measuring its resources. From the history of the climatological data recorded at the watershed basin, and from the forecast needs, Manon can simulate the conditions for repletion of each and every local resource (water tables + dam). Depending on the assumed rainfalls for the subsequent months, it calculates the volumes that can possibly be taken out of each local and external resource, bearing in mind to take into due account the respective repletion fluxes, especially when it comes to keeping the balance between the freshwater threshold and the coastline salty wedge.

By factoring in the new climatological data, the Manon program enabled SIDECM to forestall the severe droughts that came in a succession over the past years. Thus, starting in the fall of 2006, the predictions for exploitation of the resources by summer 2007 were assessed against the assumption of a further severe drought (quintile 25%). The key interseasonal (October to May) focuses were on: (i) leaving the local resources to rest; and (ii) using the maximum available flow rate of the Alps' external resources in catering to the population, while storing the unused portion behind the Verne dam.

The highly severe drought did occur, creating a crisis situation for our region. In spite of that, the water tables and dams were sufficiently repleted to face up to the 2007 summer season, thanks to the water contribution from the Alps, which compensated for part of the Maures' watershed's rain deficit. The reserve accrued in the dam even enabled artificial repletion of the underground table during the summer.

The samplings that could be taken from the various resources did match the Manon program's predictions (Fig. 3).

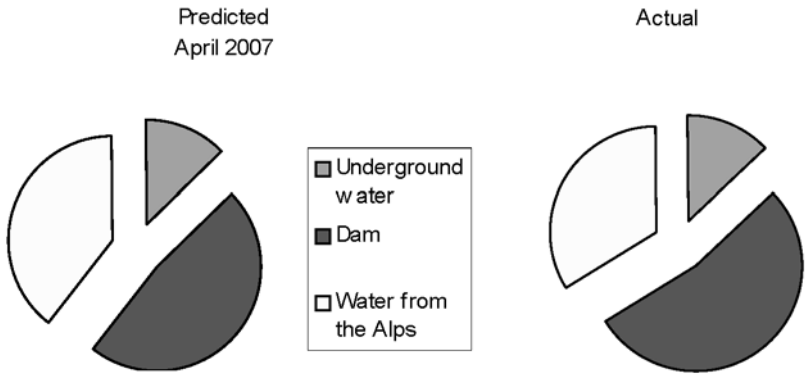

Fig. 3. Compared predicted/actual samplings, summer 2007.

The demand-side actions

In a finite-resource environment, one should no longer nurse the myth of infinite growth of our takings, and should act in a determined manner on our behaviours, with a view to make them more respectful and more economy-oriented.

SIDECM resolutely embarked on a demand policy based on four axes: (i) progressive pricing; (ii) regular information campaigns; (iii) permanent education and cooperation actions; and (iv) a pilot operation focused on water economies.

Progressive pricing

SIDECM's pricing includes a fixed part that increases versus the meter's diameter, and a variable one that that gradually follows the consumption instalments. In a first "tranche", the price is 0.51 euros per cubic meter, increasing to 2 euros per cubic meter in a second tranche.

SIDECM in 2002 also set up a special drought tax as an inducement toward economies for the users, as for financing the significant external water procurements.

Information to the users

SIDECM regularly sends letters and documents to each of its 43,000 sun scribers, to keep them informed of the drought's evolution and advise them on the water-saving practices best suited to the current situation.

Such direct relationship is not possible with the vacationers who are not subscribers of the service, only customers to touristic establishment or residences. For their benefit, SIDECM yearly produces information and recommendation folders that are dispatched through the camping sites, hotels, condos and tourism offices…

The education and cooperation activities of the Shared Water program

Sustainable water and environment management is predicated on radical changes in our behaviors, requiring well-suited educational actions. For fifteen years now SIDECM has run education and cooperation actions focused on water management, as a broad partnership with France's Education Ministry, the water and environment professionals, and the North-South solidarity NGOs. Each year, more than 2000 regional school kids trail on the Maures massif's hills to track the water's routes from its springs down to the sea. The so-called "démarche chemin" (Morin, 2003) used in the myriad field experiments favours the morphing of their mental representations, and, in a systemic approach, puts them in the context of having to share water, together with the other natural entities: minerals, plants, animals, human beings. Deeply rooted in the live reality of a territory, these activities open up to the planetary dimension of water management, discovering the day-to-day life of a village in Sub-Saharan Africa, as well as the educational, cultural and developmental exchanges with its population.

A pilot operation focused on water economies

Through its survey aimed at defining the conditions for its territory's water supply by year 2020, SIDECM measured that potentials water savings did amount to a new resource for the future. Therefore, it decided to launch a pilot operation aimed at measuring in real magnitude what water economies can possibly be achieved in the various uses typical of its region. One pilot facility was picked in each one of the SIDECM communes, namely a camping site, a hotel, a condo, recreational gardens, two schools, one supermarket and a pleasance harbour. Past the diagnostic phase for those facilities, carried out in 2007, the SIDECM will decide on an actions and equipment program which it will beef up with awakening and training actions, to be financed using solicited external aids.

SIDECM will ensure 3-year monitoring of consumptions to quantify the savings achieved and to investigate the possibility of a widespread water saving policy upgraded to the scale of the entire SIDECM territory.

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