

Scheduling and Built-in Management of the Resources in Water of the Basin Pouring of East-Kebir River (North-East of Algeria)

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Abstract: In Algeria water is a resource as much more important than it is rare. It is a country semi arid or even arid (200-400 mm) and resources are distributed unequally (localized in tea inshore strip) and extensively used (notably the reserves in underground waters). indeed Algeria is located among countries poorest in matters of hydrological potentialities is below 1000 m³/year/capita. currently tea availability in theoretical water per capita and per year is estimated to 500 m³ and would be even more reduced brought back to resources in mobilized water. In Algeria on 119.5 billions of water meters cubes recognized mobilizable 12.5 milliard of m³/an stream indeed toward the sea and chotts and the present mobilization is hardly 2 billions of m³. Besides the competition that deliver to himself agriculture the industry and cities to have access to these availabilities in water strike of now and already efforts of development of or the vital importance that dresses the big questions relating to the mobilization and the management of water. So one meets in the paradoxical situations even in the rich in water recognized regions whose users see their needs far from being satisfied: - such is the case of the basin pouring of east kebir river. The basin pouring of east- kébir river is part of the inshore pouring basins of the north extreme is Algerian, a surface of 1200 km²s presents the paradox to be a rich in water recognized region with potentialities important hydrological (climate Mediterranean sub - humid with a yearly rainfall superior to 800 mm) , materialized on the one hand by the almost permanent flooding during seasons autumnal and wintry and sometimes vernal and has flagrant water lack at the level of the defers users marked by restrictions operated by the technical services (rationing through cuts of water of ORSEC plan and restrictions in irrigated perimeters) Only one hydraulic work of big enough span exists at level of this : It is basin dam of Mexa. So therefore the problem puts itself in terms of mobilization that in terms of availabilities. The goal pursued in this note is the understanding of problems may one hand for the satisfaction of demands in water and to their possible solutions and in the other hand, that cannot be made that in the setting of has scheduling by the slant of the hydraulic planning while taking account of the defers: Surfaces components of uses, organs of accumulation and affectation of resources. The recommended planning took account of the existing infrastructures however under realization one hand and was spaced out for the setting up of the defers works of storage and perimeters of irrigation in the other hand. The gotten results permitted to raise the problematic of the water use in the basin pouring of east-kebir river is in view of its better restraint of this wealth that rarefied from day to day considering has more and more increasing demand and that all management efficient and rational waters must make himself .one has regional basis, in the setting of the big wholes of the hydrographical basins.

Key words: Resources in waters, demand in water, areas of uses, organs of accumulation, satisfaction of needs

INTRODUCTION

In Algeria water is much important resource, it is rare and fragile, distributed unequally and exploited extensively. Algeria is located among countries poorest in matters of hydrological potentialities is below the theoretical doorstep of stationary rarity by the World Bank (1000 m³/year/capita). Indeed the present availability

in theoretical water per capita and per year is estimated to 500 m³ and it will only be 430m³ in 2020 and would be even more reduced brought back to resources in mobizable water (Fig. 1).

The competition that deliver to himself agriculture , industry and cities to haggard access to thesis availabilities now limited in water d strike and already efforts of development where the vital importance that

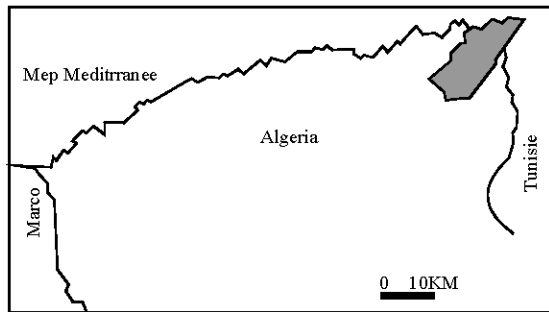


Fig. 1: Situation of study

raises the big questions relating to the mobilization, to the treatment and the management of water.

In this present study the choice of the region was largely determined by the paradox that seems to present the basin pouring of east-kébir river is-that quotes conceals of resources incontestable hydrological materialized by the almost permanent flooding during the wintry and sometimes vernal season in one part and in the other hand by its flagrant lack at the level of the defer users marked by restrictions operated by the technical services (rationing through cuts of water of the hovers ORCSEC however restrictions in perimeters irrigates). Only one hydraulic work of big enough span exists in this basin at this level: It is the dam of Mexa.

Situation of study: To priori the problem of this region puts itself more in terms of mobilization and restraint of the of the resource that in terms of availabilities, that cannot be fears that by the slant of the hydraulic planning through:

- The' identification of the hydrographical basin from the cartographic support.

The recognition deepened of resources in water mobilizable and the localization of possible potential sites of dam reservoir based one the establishment of the hydrological balance

- Funding of the local strategy however even regional exploitation and of the distribution of the resource in water, which strategy integrated, the all needs in water (AEP, AEA, AEI)
- The global need confrontation expressed by sector and the offer in water as natural system permitted custom to raise has balance global offer/needs/satisfaction for a more efficient scheduling.

presentation of the basin pouring: The basin pouring east- kébir river - cover a surface of 1200 km² its situated in the north extreme of Algeria is and makes leaves of the inshore hydrographical basins of the Algerian East (Fig. 2).

It is a rich in water well-known region, characterized by many plans of water (lakes of birds, ubeira, el melah) and of big surfaces marsches (mekradas). It is a region that enjoys of Mediterranean climate sub-humid with the relatively abundant precipitations (> to 800 mm), in spite of its weak altitude (< 400 m). It is characterized however by a strong variability of the offer in water that appears by the extreme fluctuations aggravated by droughts and the periodic flooding. the soils of plain essentially of alluvial origin and permitting when drains, a intensively agriculture resources in water underground are little important and exploited extensively while the abundant superficial waters are far from being used.

It is a region that enjoys of substantial physical and climatic assets for few that a rational and reflexive politics is led to was able to them in been worth.

Resources in mobilizable superficial water: The inventory of hydrological resources on the hydrographical basin permitted custom to been worth potentialities in water superficial that rises to 248hm³s with an evaporation of 538 mm and have yearly out-flow of 209 mm. Thesis waters come from precipitations and remain exploited little since one has yearly middle volume estimated to 248 hm³s; 18.5% only are mobilized, the remainder flows out toward the sea and nourish the swampy zones makes by mistaken mobilization currently theses waters are mobilized in the following works: Dam of Mexa: Volume regularizable of 51hm³ and an useful volume of 41hm³ (national agency of the dams)

Restraints hills: 0.23 hm³ the dam was mainly the only vector concerning superficial water domestication. They are destined to the mountainous agricultural earth irrigation one weak surfaces of 05 to 10 hectares.

Resources in underground waters: They are constituted by the tablecloth of the dune massive of bouteldja, they are hardly importing and only represent 10% of the set of resources hydrological of the basin pouring (28 hm³) in (Gaud, 1976). The 28 forages in exploitation one fields capturing haggard bouteldja has global debit of 600 L sec⁻¹ have yearly volume appropriated of 18. 9 hm³ also it would be hazardous to increase the number of forages.

Use of water and balance resources/needs: One of the constant preoccupations of the public powers was to

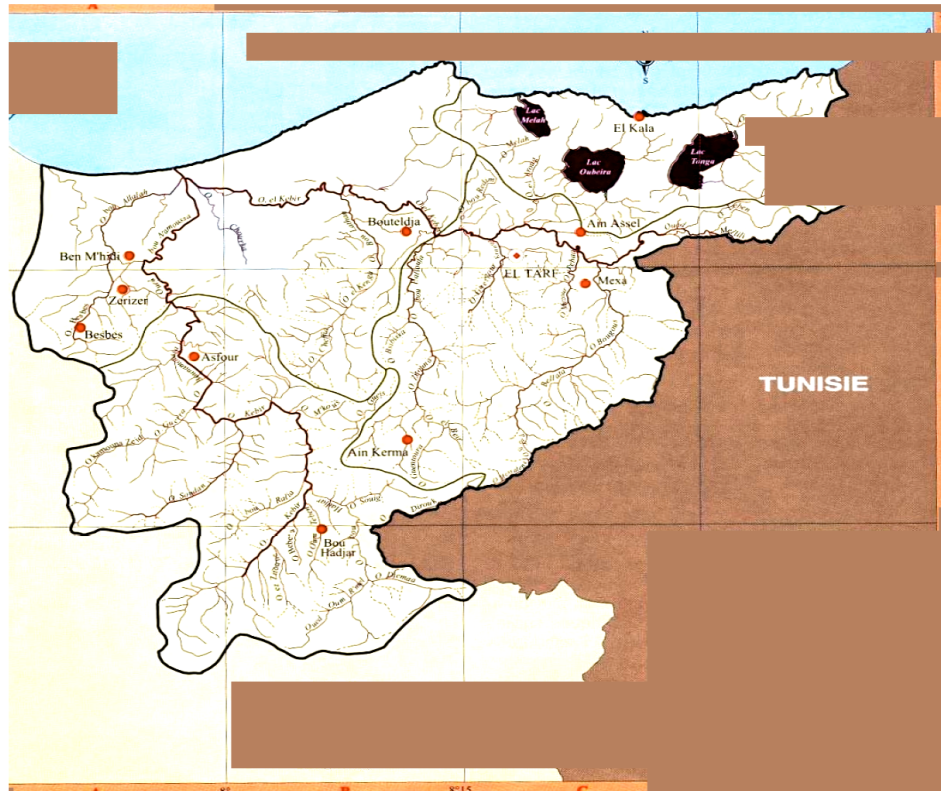


Fig. 2: The basin pouring of East-kebir river

endeavor to solve the spiny equation between the resource and the satisfaction of needs, however the determination of needs in waters and their evolution in the time and in the space in confrontation with the real resources of the hydrographical basin that will permitted to define bases of the scheduling however even one a global scale regional of the basin pouring.

Determination of drinking water: The combination of the growth of the population with the progressive endowment in water permitted custom to establish the global needs in drinking water by horizon.

According to results consigned in the Table 1, needs in drinking water would be in the year 2010 that is has say has means term of the order of 12.23 h3s/year is a growth of 183% for a population of 162700 in relation to the last census of 1997 for a population of 88907 inhabitant.

These needs would be 18.85 h3s in the year 2025, has long term is a growth of 252%, says needs estimated in 1997 otherwise would be doubled nearly at the end of 13 years (2010) and triplet at the end of 28 years (2025).

Needs in agricultural waters: As in the all Algeria country in the priority of water has been granted everywhere essentially to the domestic uses and secondarily to tea industrial uses.

The irrigation is the more often sacrificed to the profit of thesis last and benefit therefore from the weakest misses of quantitative need guarantee in water more it constitutes the sector with difficulty quantifiable in terms of surfaces agricultural need . The determination in water supposes specified knowledge of surfaces irrigated of culture types that are exercised, there of which the demand in water is bound to the importance of hydrological deficit itself even being function of the climatic conditions and the state of reserves in water of soil.

In Algeria since more than 02 decades the agricultural production remained practically to the same level since the agricultural need cover only represented the third, the remainder is simply imported.

The advent of perimeters irrigated will certainly give a new dynamics to agriculture in order to intensify cultures: Its the places of the two perimeters irrigated of our basin: el tarf and bouteldja.

Table 1: Global needs in drinking water by horizon established from population statistics from national agency ,2000

Horizon	1997	2000	2005	2010	2015	2020	2025
population	116101	126495	145915	162700	182398	200276	220851
Needs/year	6686.51	8133.95	10356.08	12230.72	13755.97	15265.79	16845.37
Needs/day	18.32	22.29	28.37	33.51	37.69	41.82	46.15
needs l/s	214.04	257.99	328.36	387.85	436.23	484.03	534.13

Table 2: The global needs in waters of irrigation haggard been determined for the defers perimeters

	Bouteldja 6728 ha	El -tarf 2870 ha	Autres périmètres 600 ha	Total 10198 ha
Needs m ³	46 130 600	19 494 420	4 097 660	69 722 680 m ³
Year m ³ average ha ⁻¹	6 856.51	6 791.53	6 829.43	6 836.63 m ³ /ha
m ³ /ha	14 262.81	5 916.90		
Peak	(june)	(june)		

Table 3: Needs in water by sector

	needs in water Hm ³	2005	2010	2015
AEP	6.29	10.36	12.23	13.76
Agriculture		69.72	69.72	69.72
Industry	0.04	0.55	0.85	1.20
Total	10.83	80.63	82.80	84.68

Needs in water of earths irrigated have been valued on the basis of middle unit endowment differentiated according to the big regions bio-climatic of Algeria after: SOGREAH "

To 4500m³/h/an for zones coastal of which our basin pouring and according to the real need of culture plans exercised (maraîchage, dry vegetable, cereals, industrial culture of which the tomato) according to Saadi (1990).

These brought back needs have the hectare are estimated to 6856.51 m³/ans for the perimeter of Bouteldja are slightly superior has those expressed in the perimeter of el-tarf are 6791m³/year, this last being watered more and more humid (yearly middle rainfall of 812 mm against 700 mm) records a demand in less important water (Table 2).

For the cub perimeter of least importance needs are the order of 6800 m³/year.

The peak needs are located in the month of June or the agricultural deficit begins has that to make feel and a real demand in water of plants more and more increasing.

Considering the new political orientation of regional development that foresees the future development of the industry inside the country and considering the specificities natural of the basin pouring (zone to agricultural and protected vocation) the industrial cloth remained weak its without big units consumers of waters; needs would rise to 43360 m³ and would be located to the future around 1.8 hm³.

The Table 3 and the Fig. 3 giving needs in water by sector clearly show the predominance of the demand in agricultural water that is equal 69.72 h³s on a total of 85 h³soits 82% of the expressed needs.

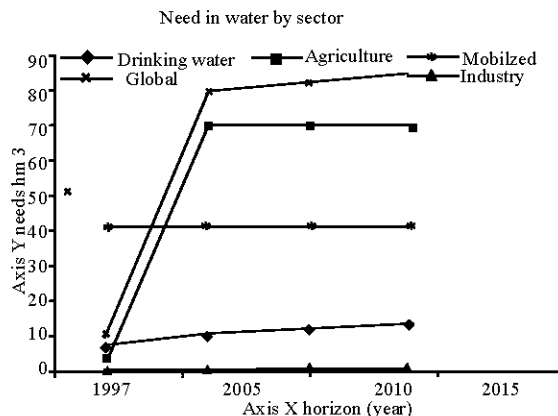


Fig. 3: Need in water by sector

The demand in drinking water only represents 16% seen the granted priority has the domestic consumption of water.

Considering the new political orientation of regional development that foresees the future development of the industry inside the country and considering the specificities natural of the basin pouring (zone to agricultural and protected vocation) the industrial cloth remained weak its without big units consumers of waters; needs would rise to 43360 m³ and would be located to the future around 1.8 hm³.

RESOURCES BALANCE/NEEDS

The rocks resources needs haggard been established while taking account of potentialities hydrological currently mobilized and demands expressed by the different users currently mobilized the resources rise is 41, 23hm³ for have global demand in valued water of 80,63 hm³ either have yearly deficit of 39,40 hm³.

To means term will be 41,5hm³. To long term this deficit will be accentuated more and will reach the volume of 45,43hm³ to the same mobilized resources.

The demand in drinking water is relatively weak and extensively out of dates by the demand of la agricultural; that means the mobilized availabilities hydrological don't permitted the satisfaction of needs express notably by agriculture (perimeter irrigates-el-tarf and Bouteldja).

To this effect of other works of mobilization represented by the potential sites of dam however restraints hill are in programming however under realization.

Table 4: Superficial waters mobilized by horizon

years	1997	2000	2005	2010	2015	2020	2025
Dam Mexa	41	41	41	41	41	41	41
Dam Bougous	-	-	52	52	52	52	52
DamBouhalloufa	-	-	-	25	25	25	25
RetenuecollinaireBoulatane	-	-	-	-	11.5	11.5	11.5
Global	41	41	93	118	129.5	129.5	129.5

Table 5: state of need satisfaction in drinking water and irrigation of el tarf.

Needs	1997	2000	2005	2010	2015	2020	2025
AEAnnaba			14.0	34.0	54.0	54.0	54.0
AEpbassin pouring	15.46	18.86	24.48	27.53	33.24	37.45	41.48
Irrigationel tarf	-	-	19.49	19.49	19.49	19.49	19.49
Mexa-bougous	41	41	93	93	93	93	93
Satisfaction	+25.54	+22.14	+54.52	31.47	+5.76	+1.55	-2.48

Table 4 gives us the useful volumes of works of accumulation or mobilization of water considering the bill book of their realization likely according to the services technique of the administration.

Leaving from the existing amenities and those, under realization taking account of the global needs one will be able to say that the complex mexa-bougous is able to satisfy the demand completely in drinking water including the backing of the city of Annaba and its region until 2025.

This same complex will guarantee the agricultural needs of EL-TARF perimeter also until 2015. The perimeter of BOUTELDJA cannot be irrigated considering the deficit recorded since its stake in water.

The combination in drinking water with the growth of the population on the one hand, needs in agricultural water on the other hand, in confrontation with the mobilizable waters permitted us to establish a state of need satisfaction expressed (Table 5).

Needs in drinking water are satisfied and those have long term (2025), has the demand contrarily in water agricultural can be satisfied that partially, the mobilized availability hydrological are able indeed of irrigated that 5500 hectare on the 6725 hectare foreseen a rate of 80.26% very well.

CONCLUSION

To the term of this note it comes out again that the basin pouring studied arranges potentialities in relatively importing water. Possibilities of water storage being identified for a systematic superficial water mobilization will permitted with year uses efficient and rational of the water to guarantee the cover of needs in drinking water until 2025 with a backing of the annaba city (outside of limits of the studied basin) and to increase the potential irrigated in the perspective of a global vision in the setting of the big natural wholes that is the hydrographical basins.

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