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Contribution to the Management of Water Resources Watershed of Isser (Algeria)

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Abstract. Effectively and equitably manage water resources is one of the most important challenges the region of extreme (Center Algerian) must face, especially with issues related to the assessment and management of water resources that continue to grow in importance under the combined effect of population growth and increasing per capita needs .So that water is threatened by its scarcity, waste, pollution and greater demands on the agricultural and industrial sectors.In terms of water potential, the average rainfall reached 400 mm, respectively, and 760 mm, reflecting a very important contribution to the overall order of 640 million m3 per year. This potential is unfortunately faced with major problems of management and maintenance of hydraulic structures in place, reducing the amount of mobilization.Water resources are important in the Center area and are formed by the flow of wadis Sebaou, Summam and Isser. In fact, these resources are not used as a volume of 836 hm3 / year, only a relatively limited amount is stored by dams and some hill reservoir, and the rest of the volume flows to the sea.The establishment of the map alteration of surface water and vulnerabilities in areas of extreme Algerian center were classified surface waters according to their degree of impairment.The assessment and situational analysis of water resources should examine the quantity and quality of surface water and groundwater as well as the potential use of unconventional sources with the development, reuse and water demand.

Keywords: management, water resources, Watershed Isser, requirements.

1. Introduction

Algeria is in a region of the world most disadvantaged in terms of water availability for this water shortage has become a major problem experienced by all societies.

Indeed, population growth and the development of settlements, industrial plants and farmland have been accompanied by a deterioration of groundwater quality and a very significant decline in reserves which sometimes represent the only water resources for feeding populations. [1]

Like most parts of the country, far Center- Algerian region contains a very important resource in groundwater and surface water mainly due to rainfall often exceeding 600 mm and characterized by large bodies of groundwater large extension. [2]

2. Description GIS Models

Provide, including engineers and planners, complex information needed, eg design of structures or their management GIS aims. It combines the techniques and methods of acquiring information spatially referenced their coding in vector form or regular mail, their organization database, and the various treatments and procedures to suit their use.

3. Description of Study Area

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The study area is located in the center it has four Algerian wilaya 50has municipalities spread over an area of 4149 km2, it is limited as follows: [3]

To the east, the basin Soummam

To the south by the Basin Hodna

To the west and north by the Coastal Basin-Algiers. As presented below (Fig. 1)

Fig. 1. plan of study area

4. Water Resources

4.1. Surface water

Dam Beni Amrane: This is an intake structure located on the river isser. With a current capacity 6 Hm^3. The contributions of the river are estimated to isser 414 Hm^3 for a catchment area of 3710 Km^2.

Dam ladrat: is located on the river Ladrat with intakes at the dam is estimated to 8 Hm^3 has a drainage area of 73 Km2, with a current capacity of 9 Hm^3. The dam is used to irrigate.

Dam Koudiat Acerdoune: impoundment of the dam was made in 2009, it is intended to supply drinking water to 14 urban centers and 34 locations across the territory of willayas Bouira, Tizi Ouzou, Medea, and M'sila and the irrigation 3000ha perimeter means isser and perimeter of the center and is Mitija.

4.2. Groundwater

Hydrological descriptions are the watershed can be ISSER. Presented in the following way:

•Hydro geological unit of the high and medium ISSER.

•Hydrogeological unit ISSER bottom.

•Hydrogeological unit of the plain Aribe.

• Hydro geological unit Oued Mellah.

The potential for groundwater and surface water in the watershed are estimated respectively at 729 Hm^3 and 210.2 Hm^3. Totally a volume of annual water 750.2 Hm^3.

The volume mobilized annually from surface and groundwater is of the order of 95.66 Hm^3 14.7 Hm^3 are surface waters.

5. Rainfall and Climate Study

5.1. The representative stations of our Watershed

The principal component analysis allowed not only to study the variability of annual rainfall in space and define areas with the same precipitation regime but also to identify the representative station of each sub basins and basin slope. We have identified the actress stations for each sub-basins in the Table follows (Table 1)

Table 1: Representative station of the watershed

sub-basins	Representative station	Code
ISSER MARITIME	OULED TOUATI	90413
ISSER MOYEN	TABLAT	90203
MELAH YAGOUR	DJOUAB	90301
ZEROUA	DECHMYA	90314
MELAH KERZA	KHEMISTI	11004

5.2. Average precipitation in the watershed

Rainfall average is calculated for the period 1975-2006 for which the dry or wet years cycles are identified, so it is noteworthy that during this period there:

17 years are dry.

14 years are wet.

5.3. Adjustment of rainfall a probability distribution

Statistical analysis of precipitation is performed at the annual and monthly basis. It is worn only on stations representing different sub-basins; it is represented in Table 2.

Table 2: The calculate quantiles for dry periods as shown in Table adjustment aims.

Return Period (ans)	**2**	**5**	**10**	**20**	**50**	**100**	**500**
DJEBAHIA	534	343	380	357	323	302	263
ELOMARIA 2	313	209	209	187	164	151	127
TIZIGHENIF	635	519	467	428	388	363	318
KHEMISTI	269	146	106	81.6	60.7	49.8	33.4
MAHTERRE	493	394	350	318	285	265	229

6. Study of Flow

6.1. Average annual flow

Statistical analysis of the mean annual flow has to adjust to the Gumbel or log normally sets annual flows, as represented in the Table 3. [4]

Table 3: Average annual flow

Return Period (ans)	**2**	**5**	**10**	**20**	**50**	**100**	**500**
DECHMIYA	0.22	0.13	0.96	0.7	0.43	0.27	0
MEZAHIM	0.48	0.29	0.21	0.15	0.94	0.58	0
TRAILLE	3.71	2.06	1.15	1.17	0.88	0.73	0.49
BENI SLIMANE	0.34	0.16	0.89	0.35	-0.02	-0.05	-0.11
LAKHDARIA	6.84	2.99	1.94	1.36	0.91	0.69	0.41

6.2. Estimated trickling

The last layer of water is measured for each gauging station catchment Isser from flows measured at hydrometric stations; it is represented in Table 4. [5]

Table 4: Estimated trickling

code	station	Qmoy (m^3/sec)	apport (Hm^3)	water slide (mm)
090309	DECHMIYA	0.24	7.59	80.86
090101	MEZAHIM	0.53	16.7	22.26
090408	LA TRAILLE	4.74	149.84	58.30
090305	BENI SLIMANE	0.38	11.7	42.85
090501	LAKHDARIA	10.71	337.39	47.04

6.3. Determination of infiltration

Using the equation of the water balance, water infiltration is calculated each gauging station catchment Isser, the results obtained are summarized in the Table 5: [6]

Table 5: Determination of infiltration

STATIONS	Infiltration
LAKHDARIA	44.4
LA TRAILLE	63.71
DECHMIYA	7.17
BENI SLIMANE	14.33
MEZAHIM	1.23

7. Modelling of Water Balance

The water balance of a region is to assess the distribution of rainfall received over an area between the following different components: actual evapotranspiration (ETR) trickling (R) and soil infiltration (I) the water balance equation is expressed by the relationship Babkin: [7]

$$P=ETR+R+I \quad (1)$$

The results are summarized in the following Table 6

Table 6: Water Balance

STATIONS	P (mm)	Lr (mm)	ETP (mm)	infiltartion
LAKHDARIA	517.89	47.04	426.4	44.4
LA TRAILLE	632.21	58.30	510.2	63.71
DECHMIYA	531.40	80.86	443.4	7.17
BENI SLIMANE	464.85	42.85	407.7	14.33
MEZAHIM	304.29	22.26	280.8	1.23

8. Conclusions

The Watershed ISSER can be considered as the "water tank" of central Algeria.

In conclusion, potentionalités if the assumption or all wells installed and operate all wells dénitrent the length of the year are as following:

Potential groundwater extracted 210,2.M m^3 / year

Of surface water available potential = 729 Mm^3 / year

The total water (surface + groundwater) = 939,2.106 m^3 / year

Part of the estimation of the water and up the balance sheet is very important. The determination of infiltration into the soil can help managers better manage the basin's natural resources, have an idea about what goes in and what comes out basin to prevent periods of drought and remedy.

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10.References

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