

# MANAGEMENT OF WATER RESOURCES IN TIOUT OASIS

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*Abstract -In the oasis areas where climate and hydrological context is more sensitive because of irregularities in water availability in time and space, water management is of vital importance.*

*Natural resources in the oases of southwestern Algeria are now in a phase of exploitation of groundwater. Indeed, the weather and the lack of a strategy for the protection and conservation of palm have produced severe damage at the same time touching the water, the palm and the local landscape. In the oases overexploitation of water resources now pose the problem of sustainability of these resources in*

*a context marked by the scarcity of the resource, lower rates of surface water due to climate hazards. Also add other causes include the introduction of new techniques such exploitation by pumping resulting in heavy drawdown of groundwater particularly in agriculture (through powerful pumps). Our article is a comprehensive summary on the management of water sources in the study area to study the impact of the contribution of modern technology on ancestral techniques*

**Keywords— Oasis of Tiout, irrigation, traditional Techniques, recommendations, sustainable development**

## INTRODUCTION

Oases are the regular subject of development projects, national or international, covering such areas as agricultural and tourism potential and demonstrating interest in these ecosystems limits of Sahara area

After the 70s, the traditional management of water resources in the oasis Algerians was fundamentally challenged, most oasis is usually related to the biophysical exogenous factors such as climate change, "desertification" The Algerian irrigation areas such as sub-Saharan Tiout region remained strong since centuries and witnessed the many civilizations that have inhabited oasis of the region. Nevertheless, the effects of modernization eventually the problem of desertification in our study area.

The Tiout city is located 87km from Naama and 10 km east of Ain Sefra on the RN 47. It is a common dependent daïra Ain Sefra counts 5247 inhabitants spread over an area of 789.5 km<sup>2</sup>, with a density of 6.6 inhabitants / km<sup>2</sup>. With an altitude of 1033M by cliffs of red sandstone it has a much milder climate. It is with that of the only two Mogharr oasis province of Naama fig1 &2).It also has features that the image of the province, exceptional in terms of ecotourism Saharan Africa



Fig1. the Tiout village contribution Naama

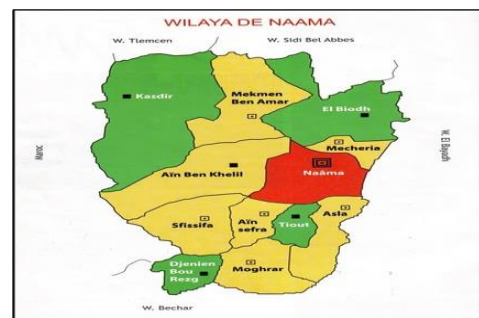


Fig2. Situation Tiout Algeria MAP

It is characterized physically by the geological syncline flat bottom, allowing local litho stratigraphic subdivisions following:

- Barremian: lower peak level and overlying
- Aptian: middle sandstone unit
- Albian: Sandstone of Maryam

The main mass of sandstone marly-Albian, presents a fairly characteristic facies, distinguishable from other sandstone floors. These are big schools of soft sandstone gray or pink, occupying the plains and depressions where they are exposed in small domes amygdaloids very low profile. Ksar of Maryam, little frequented by tourists passages, offers traditional architecture with narrow streets and very clean. A small museum in the former home of a Shahid has some interesting facts about the culture and crafts of the Ksar.

## II. CASE STUDY OF AREA

Tiout is a charming oasis in 1847 that was first discovered rock carving in the world, it is the first Oasis South Oran a traveler from the north meets along the way to the South. Administratively, the municipality of Maryam is attached to the Daira Ain Sefra. A rural character, this town has an agricultural and pastoral with crafts made from wool and alfa this oasis of Tiout extends over 60 hectares and contains more than 2,000 palm trees, irrigation water is supplied by three successive retention of dams which derives a large network of seguias (Fig3 and 2) abundant sources

### II.1. Geology

Tiout is a syncline with a flat bottom with locally litho stratigraphic subdivisions Barremian, the Aptian, an intermediate of the Albian sandstones or Tiout sandstone unit moghrar oasis .it is characterized by the Upper Jurassic consists of Maim, training dolomitic limestone sandstone and clay. Soils are divided into geomorphic features are mostly made of materials alteration of sandstone, abundant bedrock or limestone of the surrounding mountains. Soils are generally thin and contain little organic matter, those of accumulation and spreading through against areas offer better potential development land.

### II.2. Climate

It has Bioclimate arid Saharan cold winter, the winds often blow from the south-west to north-east are important especially in winter and spring with 20 to 40 days per year sirocco summer. The wet season is only three months, the average annual rainfall is 213 mm. The average annual temperature is 16 ° C, the maximum of the hottest month is 36.3 ° C and the minimum of the coldest month of -0 ° C. The average annual relative humidity is 43.33 and the average daily range is 2.14% (November, December and January). The number of frost days per year on average is 24 (December and

February). Vegetation: The vegetation surrounding the palm steppe is the dominant Saharan steppes are based Remt Hammada scoparia, Alfa Stipa tenacissima djebels on the slopes and mountain rides. The steppes are dominated by Hamada psammophytes schmittiana and silted wadis are occupied by Retama retam, Ziziphus lotus Thy nelaea microphylla. Thalwegs wadis are colonized by a few feet and Gymnocarpos decander Anabasis aretioides. By the banks against the major wadis are occupied by a Gypso-halophilic vegetation which installs a tree stratum Tamarix gallica, Salsola vermiculara, Traganum nudatum etc.. Note also the presence of Betoum (Pistacia atlantica), a protected Spezia and Rhus tripartitum along wadis claws

### II.3. Hydrological values

Needs oasis water is covered by rational use permitted by waters from the sources and sinks of groundwater by accumulating large reserves replenish aquifers, deep and superficial. Deep aquifers are exploited by drilling and surface through wells with depths generally between 4 and 30 meters [1].

### II.4. Soil

Faced with a harsh climate marked by erratic rainfall, soil conditions are scarcely conducive to the development of the agricultural sector in the region. As it is not sterilized by the steppe soil salinity is often threatened by the violence of the great flood wadis or depleted by the effects of erosion include wind erosion [2].

The floors are all distributed according to the geomorphological features that contain the superficial formations on which they grow. They are of limestone or sandstone materials resulting from the alteration of the rock. They are thin majority and contain low organic matter content.

The soils are suitable for irrigated agriculture, the collection of the valley leaves little possibility of extending the scope. Thus, it would be wise to increase the crop intensification before considering the extension.

### II.5. Data and discussions

Common Tiout composed of orchards on the wadi 2rives Maryam and palm trees scattered along the wadi (limited to 1,000 feet date palm, with a coefficient of 1.4 increased, due to a major water shortage. Indeed, hill reservoir of Tiout intended to strengthen the irrigation of the oasis has undergone a substantial silting accompanied by a gradual drying of the two sources that feed and requires rehabilitation. A study was carried out in this direction, in 2007, to deal with this water deficit, direct pumping are practiced on the river Tiout when it sank.

## II.6..RESULTS AND DISCUSSION

Following précédents tables can constarer that the majority irrigation system drip almost 45% parapport gravity systems to 38% and spray from 17%.

The tree crops is about 45%, the gardening culture is being irrigated area of 38 while the large crops and fodder crops are concerned only 17% of irrigated superifice.

Potential, problems and possible improvements:

Since we are in a pre-Saharan area that causes high evaporation, it was noticed a draining two sources captured by the hill reservoir, which has led to develop irrigation pumping from the river by Tiout cope with the lack of water. Irrigators are receptive to the notion of collective water management, based on a traditional distribution system.

The major problem of sewage discharge into the river silting of the periodic hill reservoir by flooding. The supply network seguias distribution is in fair condition, however, the earth seguias promoting seepage losses. Water deficit caused by the drying of 2Sources captured make some unusableparcels

TABLE I

Area of Town	789,25 Km <sup>2</sup>
Utilised Agricultural Area	1198 Ha ( Source DSA)
Scope or existing irrigation area (excluding large areas managed by OPI) Managed by the GCA.	Number: 02 Agricultural, Area: 270 ha.
Distribution of irrigated area by type of water (TOTAL 870 ha)	
From small dams	Pastoral and 01. Area: 11,000 ha Number of small dams: 0. Number of perimeter: 0. Irrigated area: 0 ha Capacity: 0 hm <sup>3</sup> Volume harvested in 2010: 0 hm <sup>3</sup>
From the impounding	Number small dams: 01. Number of perimeter 01 Irrigated area: 15 ha. Capacity: 0.03 Hm <sup>3</sup> . Volume harvested in 2010: 0015 Hm <sup>3</sup> .
from boreholes from wells taken from the edge of the water other (please specify) Water Source	No. 152. including four public wells. Area: 760 ha Superficie : 760 ha Number: 45 area: 90 ha Number: 0. and size: 0 No.: 01. and area: 05 Ha.
Area of Town	789,25 Km <sup>2</sup>
Utilised Agricultural Area	1198 Ha ( Source DSA)
Scope or existing irrigation area (excluding large areas managed by OPI) Managed by the GCA.	Number: 02 Agricultural, Area: 270 ha.
author name	A. HADIDI. Water resource ministry [4]
title	Table 1 Overall data on existing water sources to the oasis level Tiout

The distribution of irrigated area by irrigation [3]:

The total area (641 ha):

- Gravity 108 Ha

- Sprinkling 286 Ha

- Drip 247 Ha



Fig. 3. Tiout oasis by HADIDI 2008



Fig. 1 Tiout oasis by HADIDI 2008

### III. Conclusions

- the Oasis agriculture is not only the main source of Local Populations but also a self-sustaining economy that allowed them to survive in a vast and austere territory. Management for each oasis water has managed to maintain a balance between scarce water resources and food needs Croissants. Our study was based on the oasis of Tiout and we found that the traditional techniques experiencing difficulties in management and maintenance because of their outdated look which promote modern techniques of drip-drop expression has emerged in the 2000s, was spread on a large scale irrigators, this technique involves flowing water in

successive drops at the oasis and other crops, it being 45% of the irrigated area.

- This region contains a huge amount of water, groundwater and surface. For several centuries, domestic consumption and irrigation is done by the use of traditional techniques such as water harvesting, wells and rocker foggaras. Currently, the hydraulic heritage meets technical and social problems, particularly with input from boreholes and pumps. Mention the main problems:

Folding and drying up of water sources and Degradation and abandonment of traditional techniques.

- During our investigation we took a real problem is the drying up of two sources captured by the hill reservoir due to discharge of sewage into the river recommends a capture new sources, well construction drilling with dam recharge the alluvial aquifers of the river Tiout, Implementation of pipes instead of open seguias, can strengthen systems drips.

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