



The water Resources Challenges in Gabes Oasis

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Abstract

Living conditions of oasis suburban agriculture in the city of Gabes are closely related to its water resources, however the current situation of these resources and their uses have several issues: Limited and widely exploited resources to meet the increasing needs along with a situation of competition between sector uses, growing commercialization, mismanagement and conflict between the different managers. All these factors reinforce the tensions around water and the problem becomes not only a deficit of scarce resources, but also a crisis of governance of this resource in its territory.

Keywords: Gabes oasis, water resources, competition, commercialization, governance.

Introduction

Water is a precious vital resource, it is essential for any socio-economic development. No society in the world can today ensure its growth, or even guarantee its sustainability if it does not have this natural wealth¹.

This close relationship between development and availability of water resources is even more marked in the agricultural societies with high water consumption such as the case of Tunisia and basically the region of Gabes.

For centuries, Gabes society has successfully made the best use of water resources to which it had access. These waters were very useful for local agriculture and have helped to ensure self-sufficiency in various agricultural products of the region². However after the independence, a socio-economic change has occurred such as a quick population growth and diversification of economic development projects, which are increasingly oriented towards new activities such as industry and programs of urbanization in general terms³. Water reserve of Gabes gradually began to feel its weaknesses and eventually show its inability to provide for all new applications without failure⁴. Surface and ground water are being mobilized, they were submitted to intensive overexploitation, supply tends to reach its limits and the safety margin between supply and demand will completely diminish or disappear⁵.

This new situation has created towards water resources, a serious threat to the oasis in its existence as a production system. Therefore the sustainability of the oasis closely dependent on water availability is challenged.

In spite of the efforts of public authorities to solve the problem by the introduction of a new irrigation system and water saving

projects, we find that water deficit problem is still debated by all local agents. Various and multiple concerns are seriously exposed by all uses and a basic question repeats itself: the challenges of water resources in the oasis of Gabes, is it really a failure of reserve or is it a government problem of this natural resource in its territory?

As part of this work we will try to answer this question based on an analysis of the current situation and on the basis of the examination of the characteristics and performance of the water system of the oasis of Gabes.

Material and Methods

The oasis of the city of Gabes is located in the southeastern of Tunisia and belongs to the natural area of Jeffara. It covers an area of about 700 hectares⁶ and runs along the northern edge of the city and then extends over 6 km inside the departmental land. Both oasis of Jara-Chott esselem and Menzel-Nahal represent the downstream part of this oasis.

Water resources of the region of Gabes: Surface water: The region of Gabes is characterized by a marked climatic aridity. It is classified in the bioclimatic zone "lower arid Mediterranean"⁷ and distinguished by an average annual rainfall of no more than 150 to 220 mm / year⁸.

Ground water: Ground water is presented in two types: i. Surface or ground waters are numerous and valued at 44 million m³ and represent the only renewable ground waters⁹. ii. Deep waters: These are the ground waters of the intermediate continental and the ground water of Jeffara, which represent the main deep aquifers in the region and facilitate 86% of the mobilized waters⁸.

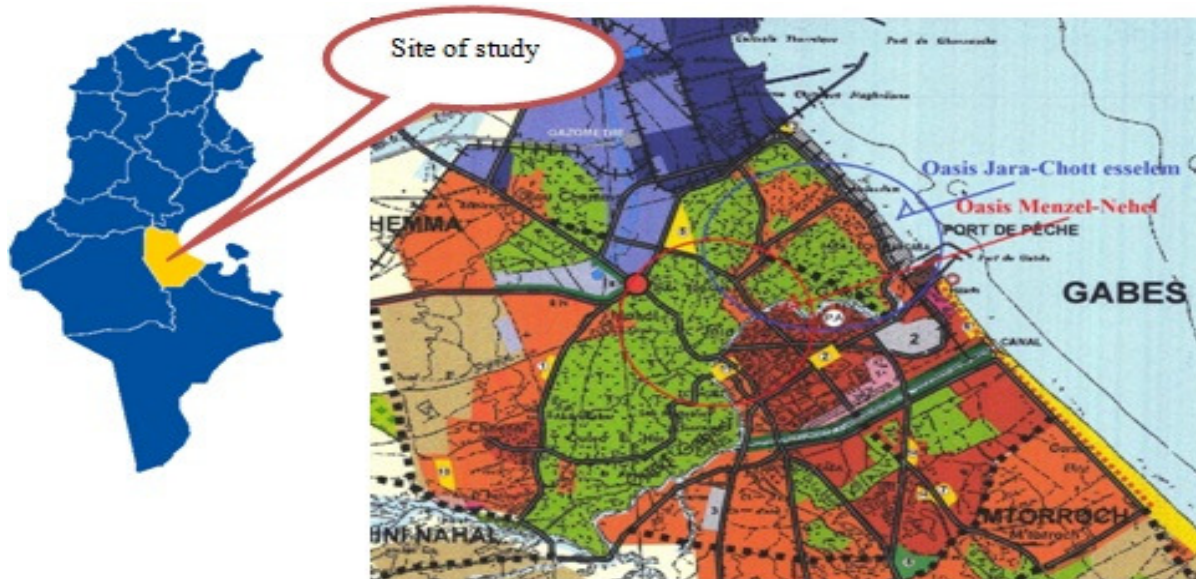


Figure-1

The location of the oasis of Menzel-Nahal and Jara-Chott esselem (master plan of development of Gabès; scale: 1/50 000)

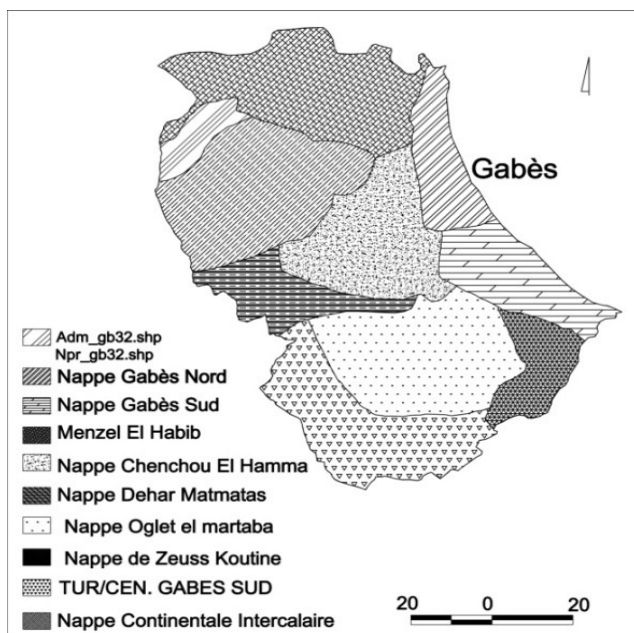


Figure-2

The map of deep ground water on the scale of the province of Gabès⁶

The irrigation system operated in the oasis of Gabès: The irrigation system currently operating at the oasis of Gabès is based on water pumping of the drilling bottom by means of electric power pumps of all water points, around which are located the oases, the depth of which is varying from 70 to 300 m, and a flow rate of 430 l/s. In fact these irrigated perimeters are divided into sub-units each perimeter consists of several areas that are irrigated directly from the waterhole to which they are attached.

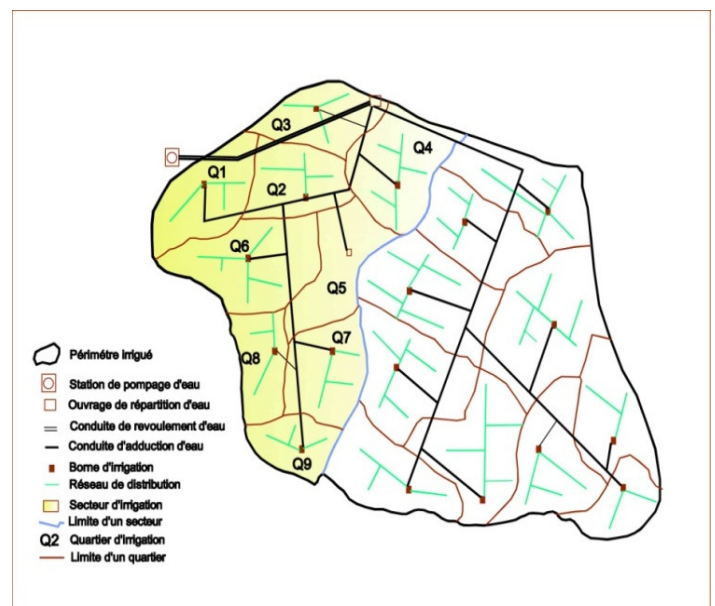


Figure-3

Type Schema of piecemeal distribution according to irrigation network in the oasis of Gabès¹⁰

Their respective areas vary between 30 and 35 hectares and they generally serve as rotating units. Moreover, each sector is divided into quarters from 3 to 8 hectares in area and is served by a water supply or an irrigation terminal¹⁰.

The different factors operators of irrigation water: In Tunisia, the government as a public authority is the principal holder of the implementation of management policies of resources that change according to territorial scales from the national to the local through the regional.

National scale: is structured by the Ministry of Agriculture and the various central departments dependent thereon.

Regional scale: corresponds to regional departments formed by the governor and the Regional Directorate of Agricultural Development (RDAD).

Local scale: several factors are directly involved in water management at the local level, the most important of which are Groupings of Agricultural Development (GDA) and farmers who represent water consumers.

In the governorate of Gabes there are 88 GDA of irrigation⁸ whose main function is the control of water in the scope by ensuring an appropriate and fair distribution between the different users. A homogeneous and impartial sharing of the charges between them, servicing and maintenance of water infrastructure (all irrigation facilities, part of the water source to terminator plugs of individual séguias) and the control of the irrigation time.

Results and Discussion

According to our field survey, we deduce that the problem of oasis water does not result only from the lack of water supply, but also from GDA poor management of the available resources, commercialization of irrigation water which exceeds the financial capacity of farmers and the existing conflicts between water managers in this oasis.

Limited water resources: The region of Gabes has a significant potential for ground water that has facilitated the growth of a number of economic activities. Water resources of this region constitute a complex hydraulic system based on surface and also more or less renewable ground water but the current situation announces that a large number of sources have now dried up while the ground water have seen their rates be reduced⁴.

The deficit in superficial aquifers: evolution of the number of illicit wells in the oasis: The superficial aquifers are exploited by wells whose number is always changing. In fact, despite the prohibition decisions of these illicit wells in the oasis, the number contents have increased while their lives are increasingly limited including a significant number which have already been dried. The number of wells is estimated to 750 wells⁸, 187 of which have already been identified in the oasis of Jara-Chottt esselem¹¹.

The deficit of the deep aquifers: competition between economic sectors: Deep waters in the governorate of Gabes provided 123 million m³ of water in 2005, which represent increase of about 80% compared to 1970⁸⁻⁹. The ground water of the intermediate continental provided 24 million m³ of water in 2005 and total extraction between 1970 and 2000 increased from 0.6 to 2.5 billion m³ / year, while the exploitation of the Jeffara reached 103 million m³ in 2005⁸. But despite this

situation the number of deep wells in the governorate of Gabes continues to increase. The density reached a drilling per kilometer³⁻¹² which caused the gradual fall of the rate of sources especially in the northern sector of Gabes.

Such overexploitation of ground water is justified by the effect of evolution of water demand across the region, as well as a competition for the water use between economic sectors in the city¹³. The real competition seems to be established between the supply in potable water in urban centers, whose potable water consumption for the city of Gabes totaled 7.65 million m³ / year in 2011 and water used for industry-chemical area which is estimated at one million m³ / year¹⁴ and water for irrigated agriculture as oases and irrigated perimeters newly created on the steppe.

The new irrigation system: an increased commercialization of irrigation water: The farmers of the oasis of Gabes are today confronted with a paradoxical situation towards water. If the question of the serving of irrigation water is now being resolved by recourse to the individual irrigation, access to this resource still requires new financial capacity for farmers whose needs for water increase.

In a context of irrigation system improvement, the RDAD by the hands of GDA practices commercialization of irrigation water through the payment system used in the oasis. The pricing method of the coexisting water is the charging method in two parts which present as a combination of pricing method on area and of volumetric rate method. That is a fixed part applied to the annual minimum water consumption of the irrigated surface and a proportional part applied to the volume paid per hour of irrigation. Therefore, the farmer paid for a fixed sum and for the hours of irrigation he needs.

This pricing system is very critical for farmers whose water charges have become increasingly expensive compared to less profitable agriculture. This new water sales approach applied by the RDAD, expose the farmers to new financial constraints and to new forms of dependency.

The increasing cost of water production: The irrigation system implemented in the oasis of Gabes requires the energy to supply the plots with water. Thus the consumption costs of electric energy of the pumping wells come first of the expenditures. Ground water witnessed a continuous decline, which results in a more difficult pumping and therefore more expensive and requires more investment for the same volume of water. Thus the amount of the electricity bill continues to increase, given the continuous increase in its base price.

It is worth noting that costs related to energy, which represented only 8% of water production costs in 1978, had increased to 58% in 2005¹⁵ and to 72% in 2011¹¹. While annual maintenance costs of hydraulic installations (parts replacement, usury of pumping systems and others) represent 10.3% of total

expenditures in 2011¹¹. The consequence of the substantial increase in cost was reflected in the financial deficit of most of the GDA, the inability of farmers to assume their expense and orientation of multiple users to search for other ways to access to water.

Conflicts of water managers in the oasis: The relationship between the various scales of water management in Gabes (national, regional and local), is a vertical relationship which corresponds to “Top-down” model. Despite the political speeches for decentralization, we note that the policy applied has a clear domination of the State on the decisions taken, through its different directions. This policy of management results in a difference between the strategies of the factors of the oasis territory.

RDAD (Regional Directorate of Agricultural Development) strategies: The role played by RDAD is increasingly limited to advisory, supervision and follow-up actions of agricultural development groups (GDA) and /or farmers, the orientation of agricultural incentives for small hydro and maintenance of pumping stations. The management has a monitoring strategy, without any desire for sustainable development and control of the existing situation. This role is therefore increasingly brief and cannot meet the expectations of farmers.

GDA strategies: Geographical location as a suburban oasis and the special feature of urban / rural farmers, made the role of GDA difficult. Indeed these associations are formed by very few available farmers, since 85% of its farming practice agriculture as a secondary activity. Furthermore members introduced into these associations do not always have the objective of protecting the interests of all farmers, instead they aspire to having a favored position to defend their own interests and those of groups to which they belong, which accentuates the conflict between GDA and farmers and limits its action for the sustainability of oasis agriculture.

Farmers strategies: Farmers are not involved in water problematic in their oasis. They consider that water resources management is not really their business and that the problem is beyond them. In fact, they do not participate in meetings of the GDA in order to take the decisions necessary to the proper management of available resources, the time necessary for public powers, maintenance of the irrigation network and the regular presence and equitable distribution of irrigation water. Farmers do not therefore react as agents responsible for the management of water, but they are doing as ordinary consumers who suffer the consequences of the dramatic situation of the oasis.

In fact a continuous tension is rooted among the different members of the GDA, between GDA and local authorities (National Water Distribution Utility, Regional Directorate of Agricultural Development) and between GDA and farmers (the most common).

Conclusion

According to this study, it is concluded that the problem of hydraulic scarcity manifesting in the oasis of Gabes, does not express an availability crisis of water resources, but sets out a local crisis of governance of these resources. In fact, three points can be highlighted: i. In a greater context on the environment, today we are witnessing a deep-exploitation of ground water and a rise of competition in the form of what is commonly advanced, a competition for the use of water. It does not fall within relationship between farm operators but of competition between economic sectors. The real competition seems to be established between potable water supply for urban centers, water for industry-chemical area of the city and water for irrigated agriculture in general including irrigated areas newly created on the steppe region. ii. The presence of mismanagement at the level of GDA agents which results in an increase in production cost of irrigation water and the eruption of the commercialization of water at very high prices. In fact, water is no longer a social benefit, to become a public benefit, which the farmer has to pay to get his land irrigated. This situation is thus reflected by an increasingly clear depletion of farmers who can no longer ensure the costs of water purchase and therefore have many opportunities to exploit their plots. iii. In addition the conflicts between the different water managers such as RDAD, the GDA and farmers, has led to the destruction of the social relationship between consumers and the oasis becomes a group of agricultural parcels without any life or social ties.

In conclusion, we deduce that the management of water in the oasis is not only sharing a diminished water more expensive to produce and distribute in a network both complicated and strange for oasis communities, but also provide the requirements of a diverse and changing area, both in terms of its occupants as their mode of operation and their social practices.

Facing such a complex situation, water management in the oasis of Gabes should be viewed in wider evolutions, which responds to backup strategies of a natural resource increasingly scarce.

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