

## COMPARISON OF VULNERABILITY TO IMPACTS OF CLIMATE CHANGE IN DIFFERENT HYDRAULIC SECTORS CASE SOUK-AHRAS, ALGERIA

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### ABSTRACT

The study of the vulnerability to impacts possible of climate change became a frequent use tool to inform decision-makers who are called to order priorities in plans of action global and therefore to anticipate all unbalance in strategies and programs tracings.

In Algeria, the study of the vulnerability will find its justification in the level of development of the country, on the one hand and in the motor activity link to resources in water notably agriculture on the other hand. Increase in temperature ranging between 0.65 and 1.45°C and a fall of precipitations ranging between 5 and 13%, in relation to the year 2000 (Climate change in Mediterranean, 2008).

Uncertainties certainly subsist, but these uncertainties must not be taken like a pretext not to anticipate a diagnosis serious of the place state, especially for a country in such development of Algeria.

In the present work we tried to compare the hydraulic basin vulnerability this is done by applying it to the water system in the region of Souk-Ahras (East of Algeria) to impacts possible of climate change. We focus on sectors that seem to be the more touched by the impacts possible of climate change, notably water resources and related activities (Drinking water, industrial use, irrigation), the rained agriculture.

A matrix of ordering of hydraulic basin vulnerability lives to screw of impacts possible of climate change has been established in order to describe a real situation of basins and give previsions of impacts of climate change in the future.

**Keywords:** Vulnerability of sectors, Climate change, Hydraulic basin

### INTRODUCTION

The economic development and social of a country is largely related to its hydrous potentialities knowing that the problems of water are in dissociable sustainable development insofar as water must make it possible to meet the needs for the present

generations without mortgaging, by effects little or no reversible, the capacity of the future generations to satisfy theirs.

Thus, to make this water available in quantity and quality to the various uses and the various generations requires knowledge, an evaluation and a management perfect of this water resource.

The strong common run of the socio-economic sectors to the water resources, fact study of vulnerability in Souk-Ahras face impacts possible of the climate changes need to circumvent impossible. Moreover, the level of development of the country and the limitation of the means oblige the manager to give sets of priorities to the actions carried out to face, according to the vulnerability in the country.

## **CONCEPTS OF VULNERABILITY**

Research in the field of vulnerability finds their roots in social sciences, and more particularly in the geographical literature. Indeed, the vulnerability was defined like "a potential of loss" (Luers et al., 2003).

Several sociologists adopted the term of the "vulnerability" like an alternative means allowing characterizing dimensions of the poverty, not usually explained by monetary indices (Alwang et al., 2001).

The sociologists generally discuss "the vulnerability social" like opposite of the "vulnerability economic", for example, Loughhead and Mittai (2000) identify the vulnerable groups like "children under risk", the women responsible for households... etc., the economic literature generally conceptualizes the vulnerability like a exit of process of risks response of the households, with conditions given that the vulnerable households are those which evolve/move or likely to evolve in a state of poverty or shortage, continuation of the following cumulative processes of the risk and his answer (Alwang et al., 2001).

In the environmental literature, the focal point of the discussion on the vulnerability is especially related to the vulnerability of the species or the ecosystems to damage (Alwang et al., 2001). It shows that vulnerability is basis of the ecological consequence, conversely to the other approaches which are focused especially on human aspect.

In the literature of nutrition, the vulnerability refers to the nutritional vulnerability; generally adopted like the probability of inadequate consumption subsistence to live normal and active life.

In Agriculture, the vulnerability is regarded as a measurement influenced by the capacity to take anticipatory actions, like planting a varieties resistant to the dryness,

cultivating in alternation, to seek other sources of returned nonagricultural... etc. (Reilly and Schimmelpfenning, 1999).

The vulnerability in the context of the climate change is a function of three principal parameters: sensitivity to the variability of the climate present, the risk an unfavorable change of the climate and the capacity of adaptation. Several impacts of the climate changes are dubious, the vulnerability is also dubious and it must be taken as a dynamic character rather than static; influenced by environmental and economic changes with large scales (Leichenko et al., 2002).

In total, we can say that is not a strict definition of vulnerability (Moss et al., 2001), it must be redefined continuously within the framework of new searches for each field, because it examine a different definition according to the context (food climate change, systems...etc. But in all the cases and in a different fields, the vulnerability must be taken like a process where the context of historic environment sociopolitical is usable, temporally and spatially, so that the strategies of reply, within the structure it sustainable development, can maintain a repertory wealthy of the political options and social, and to promote thus short replies able to face any possible modify.

## **QUANTIFICATION OF THE VULNERABILITY**

To make use the concept of the vulnerability in a direct politic, it is difficult, even impossible to consider methodically the vulnerability relative of a system compared to another, without explaining a norm allowing justifying this decision (AmyL et al., 2003). In spite challenges which exist in the quantification of the vulnerability, quantitative and multi-field approaches of the evaluation vulnerability were developed to evaluate interference enters the socio-economic conditions and the environmental changes (Moss et al., 2001). Originator must define the estimation criteria of the vulnerability, which is critical in several directions (UNEP, 2001).

## **PRESENTATION OF THE ZONE STUDY**

The Telling area of Algeria is characterized by a Mediterranean climate, marked by seasonal oscillations (in summer, is a subtropical climate doing of the hot season one longest, and in winter, it's connected much more with the characteristics of the moderate zone). In the area of Souk-Ahras, this nuance combined with a relief very varied, confers on the irregularity rainfall. The origin of the rains is rather orographical. The assumption of responsibility of water problems which is a crucial factor for the development of the agricultural sector, industrialist and vital for the drinking water supply, requires the installation of means allowing hydrological approach by powerful methods.

Undertaken study seeks to compare indirectly the vulnerability of these hydraulic by targeting indicators for the sectors which seem to be the most touched, directly or, by the climate changes.

## WATER RESOURCE IN SOUK-AHRAS

Although equipped with a favorable geographical location is located north-east of Algeria. Souk-Ahras is an area with primarily semi-arid climate in the major part of its territory. The mode of precipitations is characterized by temporal and space variability. This mode varies from one area to another while remaining dominated by an irregularity in time inters and intra annual. The alternation of dryness episodes and the wet episodes is increasing outstanding character of the climatic and hydrological modes of the country (Mrad et al., 2009).

This state makes that certain basins are surplus and others are overdrawn, Table 1.

**Table 1 Needs for water in different basins**

<b>Basins</b>	<b>Needs</b>	<b>Distribution</b>	<b>Assessment</b>
Souk-ahras	18696	10000	-8696
Henancha	366	630	264
Machroha	316	411	95
Ouled driss	179	274	95
Zaarouria	403	363	-40
Taoura	1175	252	-923
Taoura (m s)	195	1100	905
Drea	296	108	-188
Kheddara	244	175	-69

Source: Arranges catchments area 2002ANRH

The positive quantitative assessment for the various basins but does not justify impact of the vulnerability, because they are prone to the problems of quality.

In the study of these data, one notes that the comparison of the vulnerability water resources between the hydraulic basins, remains a relatively delicious task, Since this one is conditioned by the combination of several factors, in occurrence the availability of the water resources of surface and/or underground, water quality, management style and exploitation... etc. In certain basins, for example, we find one with abundant of surface water resources and have a good; like the basin of Souk-Ahras or a scarcity of the water resources, the Zaarouria basin and Kheddara for example. For the reason of overexploitation; we find the risks of deficit (Basins Taoura).

In other terms, it is difficult to segment in the priority of the vulnerability since the criteria of evaluation are especially not quantifiable and not homogeneous. The management style is also very important in this question for evaluate the evaluation of vulnerability. Moreover, the lack of information, at least qualitative, concerning the adaptive capacities and the adaptations of each basin in relation to the problems involved in the impacts climate changes, in particular the dryness, complicates favors to evaluate of the vulnerability and its comparison between the basins.

Thus in face of these tonalities, we tested to tackle this question of vulnerability about water resources through study of the vulnerability for uses of water in each basin. Article was focused on the main activities directly related to the water resources, like drinking water supply (SWS), industrial use. While; we residing on importance of activity for each basin and state of his criticality as regards availability of water. We tried to give priorities to the basins in term of the vulnerability to the insufficiency of water.

## USE OF WATERS

### Drinking water supply (DWS)

Figure 1 represents the demand for drinking water of each basin. After this figure, we notice that the basin Souk-Ahras has a grant the most important part (77%), followed by the basin of Taoura (8%), the other basins have consumption are relatively low. These shares are more or less corrivals with the density of the population and industrial level of each basin.

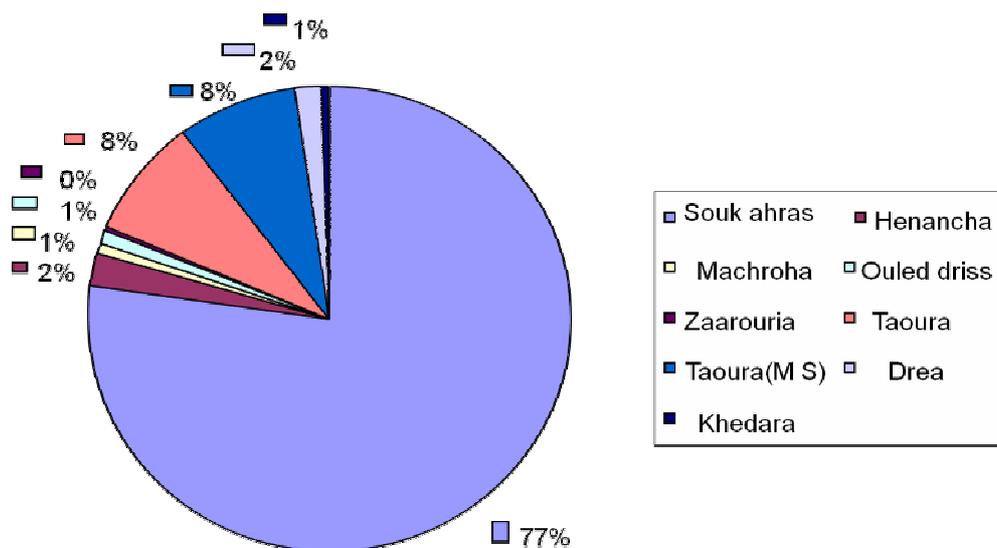


Figure 1. Drinking water supply (DWS)

## Population

Figure 2 shows that the basins Souk-Ahras concentrate the most important population.

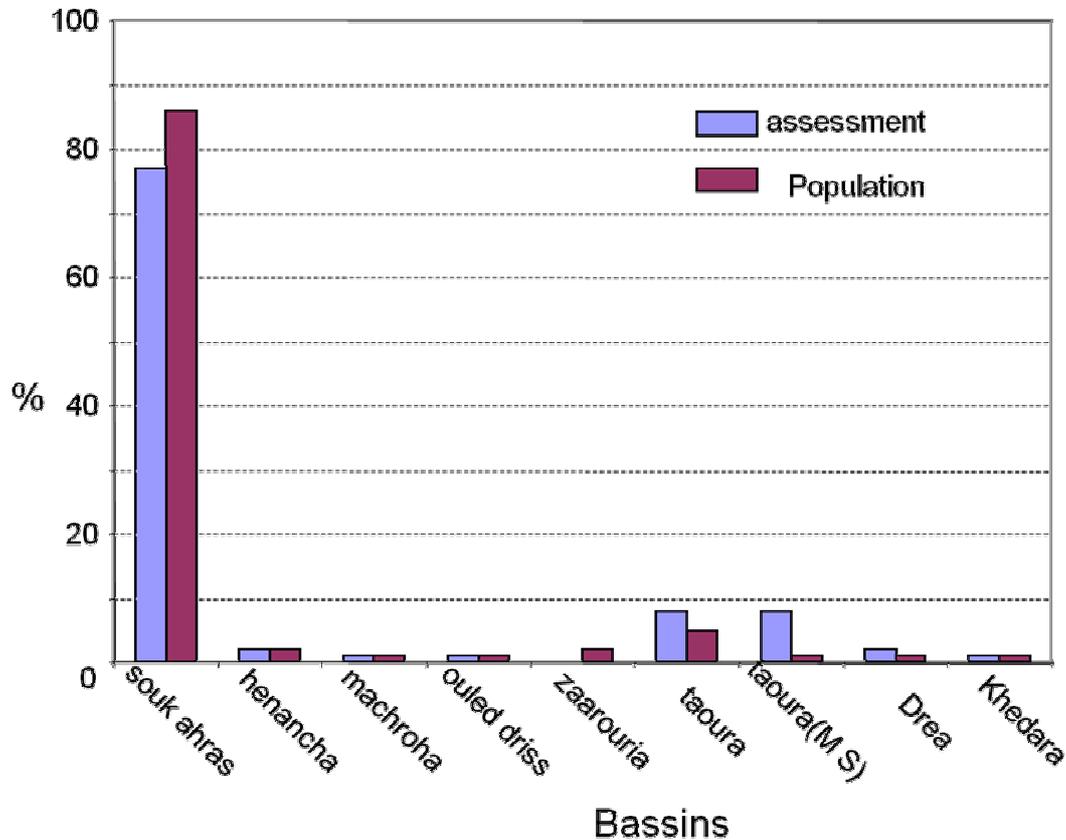


Figure 2. Population and assessment in different basins

## CONCLUSION

It is difficult to give "sets of priorities authorities" in term of vulnerability in the hydraulic basins case of Souk-Ahras with respect to the impacts of the climate changes, share of the complexity of vulnerability notion itself, which does not mean only one simple sensitivity of the medium, but also its capacity to face, and which makes describe physical and social characteristics.

Another way, heterogeneity of the data through the basins and exploitation of this data are relatively hard active. The present study aims to give possible approaches, allowing to classify the actions as regards vulnerability of the sectors which are likely to be touched; either directly or indirectly, by the possible impacts of the climate changes.

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