Evaluation of water quality of the Meskiana area on human consumption and determination of its effects on land irrigated.

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***Abstract*— Meskiana plain, located in the North-eastern part of Algeria, this plain has hydrous resources relatively limited consist of underground water of the Mio-Plio-Quaternary aquifer. In recent years a high level of water demand was felt due to remarkable increase water for agriculture use. On one hand, this has contributed in a shortage of water and a deterioration of its quality on the other.**

The goal of this research is to study the influences of the lithological parameters and the climatic factors, onto physicochemical parameters of water.

Meskiana alluvial aquifer is mainly composed of sandy, sandstone and conglomeratic materials with some passages of relatively thin clay layers. It is limited to the north east by diapiric formations, the most important part of its recharge comes from the carbonate formations of the borders.

Meskiana plain characterized by simple tectonic structure, the general direction of folding is South-west North-east, as to the climatic predominant in the area is semi-arid

The chemical quality of water is poor resulting from the strong salinity influenced by the lithology of the aquifer and the climatic factors (precipitations and the temperatures). Pollutants originating from agricultural activities and urban wastes are also present. The results obtained from this study agree perfectly with the questions raised in the problematic.

Key-Words— Meskiana plain, lithological, semi-arid

I. Introduction

The water chemistry is defined as the knowledge of the chemical characteristics of the water, the process of acquisition and laws describing the interaction between water, soil and subsoil. It is linked to the lithology of the land crossed, climate and human activity. It compares the waters between them, establishes a hydrochemical mapping of certain chemical elements, interpret analytical data charts.

II. THE LOCATION OF THE STUDY AREA

The study area occupied a small basin of Meskiana. It is located between the geographic coordinates are shown in table I.

Table I: The coordinates of the study area

Coordinates of the study area				
X min	X max	Y min	Y max	Z
933	963	260	276	921

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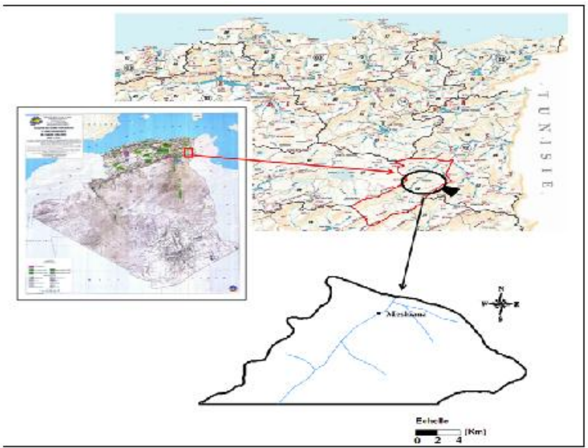

Fig 1: The location of the study area.

III. MATERIALS AND METHODS

The physical parameters such as conductivity, pH, dissolved oxygen and dissolved CO2 should be measured in situ to avoid being wrong.

The measurements were performed by a multi-parameter cell Consort C535 T which measures six parameters: pH, temperature, conductivity, resistivity, salinity.

A. Measurement techniques in the laboratory

The analysis of major elements was performed by spectrophotometer DR 2000, Na^+, Cl^- Flame Photometer.

Fig 2: Multi-parameter

Fig 3: Spectrophotometer DR 2000

Fig 4: Photometer

The network of water points was chosen allow for acquiring data representative of the spatial variability for the quality of groundwater. This network consists 33 sets of water points (fig. 5) and which are intended for the water supply drinking, irrigation and other uses servants.

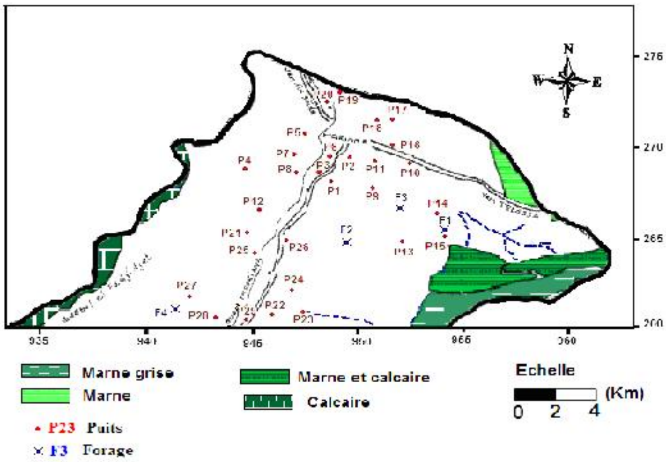

Fig 5: Map inventory of water points

IV. RESULTS AND DISCUSSION

A. The electrical conductivity

Low concentrations recorded at the upstream of the water (Fig 6), where the water is slightly mineralized and diluted when runoff water gradually become loaded with salts and spend 80µS/cm the Southwest Valley to 13200 µS / cm Northeast. This increase in conductivity due to high salinity in the direction of water flow attributed to chemical exchange between banking and collected as a result of fine, heterogeneous lithology with evaporite inclusions associated with the concentration water.

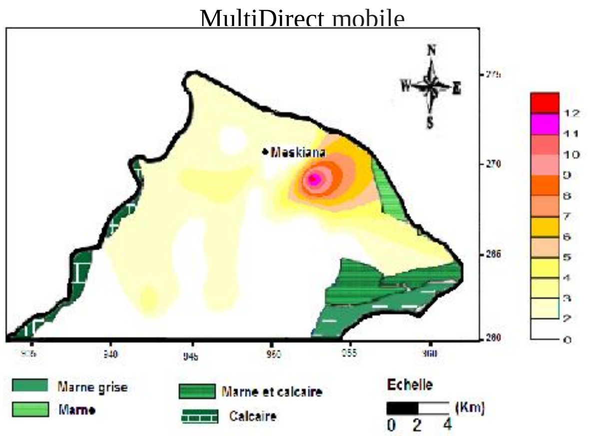

Fig 6: Map iso-content of the electric conductivity

B. The hydro-chemical facies

Chemical facies changes of calcium sulfate in the South to the North of sodium chloride-water through the chlorinated lime water in the center of the plain. This facies transition is due to geology, climate and anthropogenic pollution, especially in the northern plains where the waste water of Meskiana are collected by the main effluent in this case which is the Meskiana wadi.

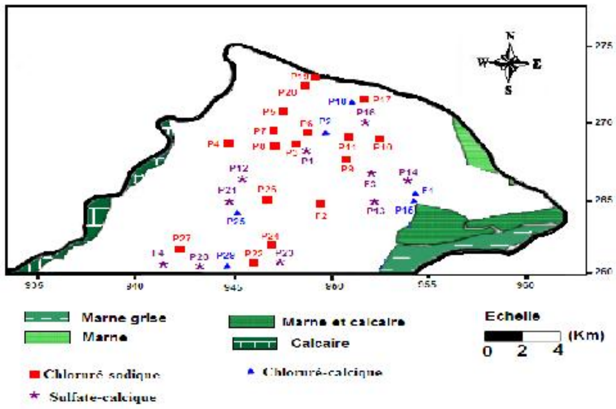

Fig 7: Map of hydrochemical facies

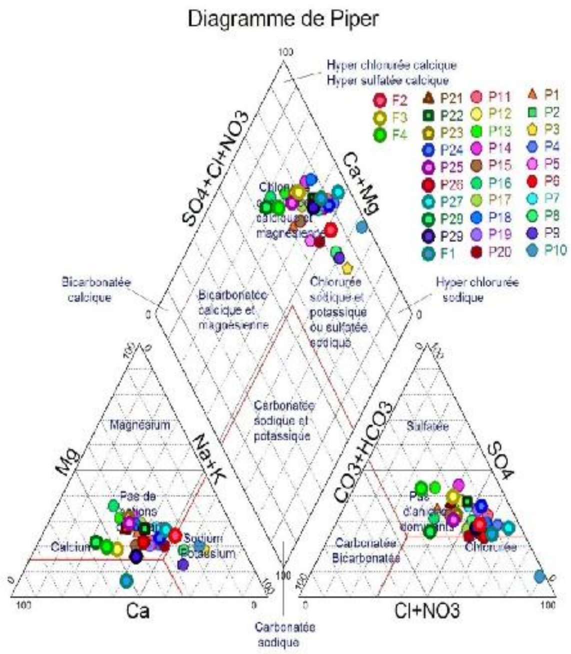

Fig 8: The representation of hydrochemical facies by Piper diagram

C. Piper diagram

This method is based on the representation of the results of chemical analyzes on the Piper diagram that is used to classify and compare the waters between them. Scatterplots show a sodium cation dominance reflecting emschériennes gypsiferous marls which form the bedrock of the nappe, and some calcium points. For anions, scatter show a dominance of chloride and the presence of a weak trend towards sulphate anions they are located close to limestone borders.

D. NITRATE

Range from 9 mg / l and 105 mg /, low concentrations recorded south of the plain, as this region is characterized by low permeability where levels recorded do not exceed 50 mg / l, as the clay roof fixed ions nitrates and protects the water. North-east of the plain concentrations recorded are very strong, because this area has a high permeability and much more exposed to pollution, because nitrate ions infiltrate quickly and there records levels exceeding 100 mg / l.

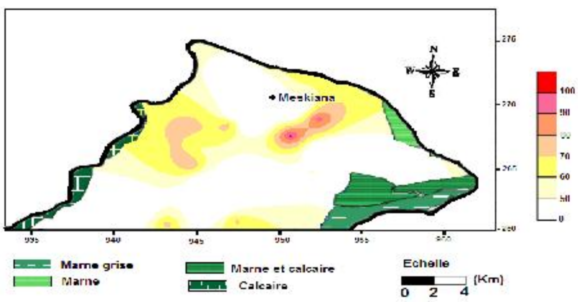

Fig 9: Map of the distribution of nitrate

E. Ability of water for irrigation mapping according to the classification of Riverside

The observation of the map shows that the majority of groundwater quality has degraded; it gathers the waters which lie in the central and northern plains. They undergo degradation in the direction of flow and submit to evaporation, which has the effect of increasing concentrations of dissolved elements, arguably groundwater, showing the effect of lithology on their quality (Fig10).

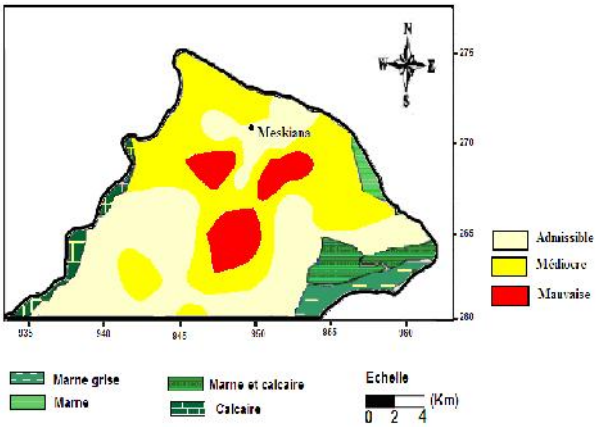

Fig 10: Map of suitable waters for irrigation

V. CONCLUSION

Amplification of salinity over time causes the abandonment of contaminated wells and sterilization of these mineralized waters irrigated land, for it is said that the waters of the water unsuitable for irrigation or human consumption because they exhibit conductivities exceed the standard, this due to the high spread of sewage from urban waste in the city.

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