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Research Article

The Problem of Access to Drinking Water in The City of Guercif (Northeast of Morocco): Challenges and Prospects

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Abstract

In a climatic context, such as that one in our study area, water is a major environmental issue. The combination of several significant causes already explains the scarcity of water in the town of Guercif: lack of rainfall, climate change, and overexploitation of groundwater. In addition to this structural data, it should be remembered that the sustained dynamics of the area from the point of view of urban planning, demographics, as well as industrial and agricultural development accentuate the demand for a matter as vital as water. The need for water in Guercif will follow the trend of population growth and water-consuming activities. In this context, the deficit recorded during 2019 for the water supply, threatened the urban development of a city newly promoted to the status of the chief town of the province. This study was conducted in two phases: an exploratory phase marked by semi-directive interviews with institutional actors, the service concerned with the production and distribution of drinking water in Guercif, complemented by the second phase of a survey with a sample of heads of households. A mass of data from the field surveys during the summer of 2019 guided the analysis of the impacts of the water shortage in Guercif, as well as the behavior of the urban population towards water consumption and saving. This study describes the satisfaction scales of a sample of urban households based on a questionnaire. The results obtained from the surveys carried out during 2019 confirm the vulnerability of the water sector in Guercif, where the local water potential remains largely dependent on external contributions.

Introduction

No life can be envisaged without water; it is an essential material for living beings and therefore the most precious resource on earth. However, it is important to remember that water is a scarce resource, hardly renewable, and unequally distributed in the world: in effect, 9 countries monopolize 60% of the renewable natural resources of freshwater (Shiklomanov. I, UNESCO, 1996). Prospective studies on the water in the world are alarming and our country is particularly concerned. The fifth report of the Intergovernmental Panel on Climate Change (IPCC, 2013) places Morocco in the most rainfall-deficient zone for this 21st century. Indeed, urban water security in Morocco is threatened by significant challenges such as population growth, urbanization, economics, and climate change according to a World Bank report in 2017. Thus, the problem of water scarcity is not only a common general aspect but shared by the city of Guercif whose emerging urban realities have induced an inordinate pressure on water resources in perpetual regression.

The objective of this article is to stimulate reflections on the temporal scarcity of water in Guercif to establish policies to guarantee the best possible distribution of water in the urban perimeter, as well as its preservation to avoid the undesired consequences of a future of water insecurity.

Materials and Methods

To carry out this work, we first reported the observation of the areas to be surveyed (Figure. 2), then we conducted interviews with the heads of households before developing the questionnaire which allowed us to extract quantitative data relating to the issue under study. In addition, to complete this work, we proceeded to the exploitation of the documents made available to us by the technical services of the national office of electricity and drinking water-water branch.

Study area

The city of Guercif, the capital of the province, is located on a plain of the same name at 378 m above sea level. It is located in the North-East of Morocco at a crossroads between the corridor of Taourirt in the East Taza in the West (Figure.1). The continentality and the presence of a mountainous contour have resulted in pronounced aridity of the climate.

Rainfall records spread over three decades (1989-2019) at the Guercif station, provided by the agricultural advisory center show that rainfall was low and irregular. The annual average reached 161 ml and the wettest season was recorded during 2009-2010 with 211.5ml; while the driest was during the 2015-2016 season with only 63.5 ml. The Guercif basin is characterized by the presence of water tables that match the main plains (Carlier. P and Simonat. M, 1971). The groundwater from these aquifers is used not only in extensive agricultural activities but also for the drinking water supply of the city.

On the morphological level, the city is included in a transition zone of the Moulouya basin, and on the hydrographic level, it is crossed by two rivers: Moulouya and Meloullou, threatened by evaporation which amplifies the disadvantages of the climate and accentuates the regression of the water potential. The hydrological service at Guercif station estimates the amount of water that evaporates each year at around 200 to 300 ml. The hydrogeology of the area shows the presence of several water tables (Tafrata, Jal, Sangal, and Maar-ouf). Indeed, the geology of the area (Figure 2) shows sedimentary rocks that have high aquifer potential. The province of Guercif was created by the dismemberment of the province of Taza following the administrative division of 2009, and since 2015, it is part of the oriental region.

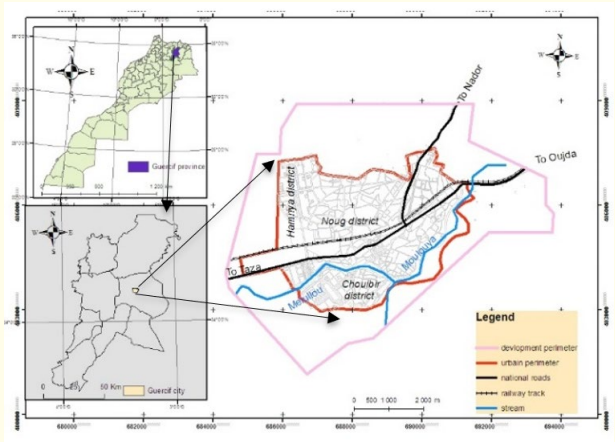

Figure 1: The Geographical location of Guercif city in the national and the provincial context. (*Sources*: administrative division and urban plan of Guercif city 2015).

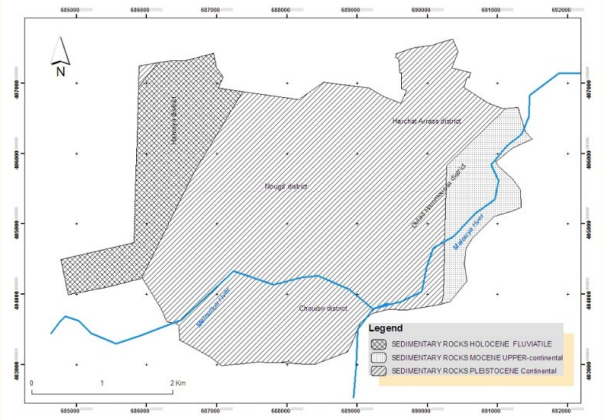

Figure 2: Geological map of Guercif.
(*Sources*: Geological map of Morocco and urban plan of Guercif city 2015).

Some characteristics of the surveyed sample

The results of the survey will allow a better understanding of the local water context and measure the state of knowledge related to the problem of water shortage in Guercif while raising awareness of the population on this subject. The survey was conducted among a sample of 240 people (heads of households) distributed according to the hydraulic sectors (Figure 3) established by the National Office of Electricity and Drinking Water in Guercif at a rate of 40 households per sector (2).

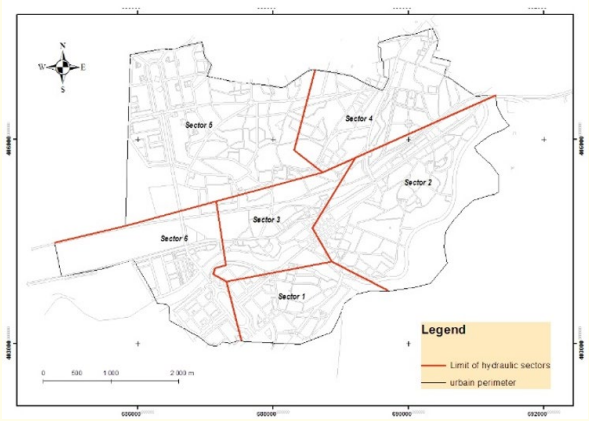

Figure 3: Distribution of households surveyed by the hydraulic sector.
(*Source*: The urban plan of Guercif city 2015).

The perimeter of the study is the city of Guercif, which in 2019 had a total population of 109.942 inhabitants (HCP, 2017). The heads of households interviewed are male and the most encountered are between 50 and 60 years old (Figure 4). The level of study of the surveyed sample varies from primary (46%), college (37%), qualifying (9%), and university level (8%). Features deemed relevant for this study relate to habitat type, water supply resources, water use and quality, and water management and saving.

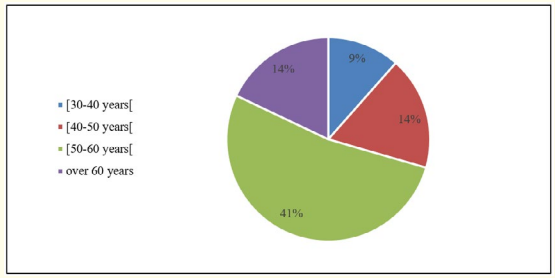

Figure 4: Distribution of respondents by age group.

The water shortage in Guercif is not felt in the same way. Indeed, the type of housing provides information on the severity of this problem, which is more important for those who occupy an apartment in a building than those who live in a house on the ground floor. The low pressure in the distribution network limits access to water. In addition, some of the respondents use a well to get water. However, the origin of the water supplied by the public network is relatively unknown to the interviewees. Water from the public network is consumed by all the respondents, even those who have wells. However, the quality of the water in some wells does not allow for consumption or use.

Results and Discussion

The results relating to the variables selected to illustrate the problem of water scarcity in Guercif will be presented in the light of the analysis of the observations drawn from the survey.

Prioritization of household water needs

In the context of water shortage, the supply of water to the population is essential. All the households surveyed are connected to the public drinking water distribution network. Those who live in a house represent 83% of the overall sample and 25% of them have a well. The quantitative analysis of the coverage of water needs does not provide elements for measuring the quality of the service. To obtain it, it is necessary to fall back on the elements which one has on the degradation of the infrastructures and the frequency of the interruptions in the water supply (Ferragina and Quagliarotti, 2010). The frequency with which households are supplied with drinking water (Figure. 5) depends on the type of housing, the density of the area, and the pressure.

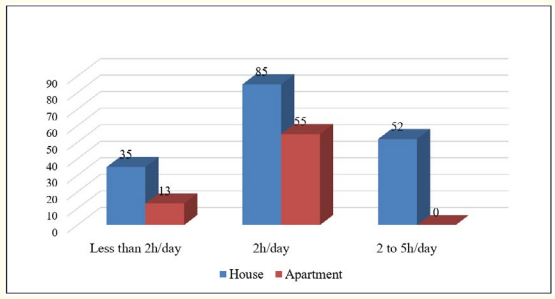

Figure 5: Frequency of water supply by habitat type.

Households living in houses are better served during this period of water crisis as 55.83% of respondents in 2019 reported being supplied with water for 2 hours a day, while only 11.25% of apartment dwellers enjoy the same time envelope to have water in their homes. The apartments on the upper floors are almost devoid of water, and in the rare moments of availability of this vital material, the flow is very low not allowing any other use requiring a determined pressure. Moreover, the acuteness of the shortage is strongly felt for 60% (Figure.6) of our sample represented particularly by households residing in apartments or the houses not having another water point (well or drilling). The problem is less acute for households that have a well to facilitate their access to water.

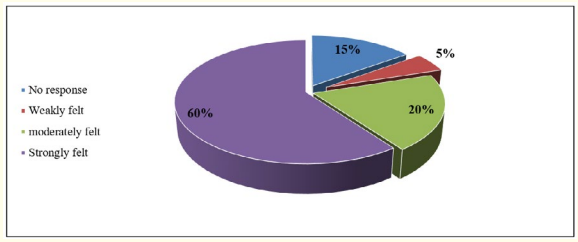

Figure 6: Perception of the acuteness of the shortage.

The water shortage is strongly felt by 60% of the surveyed public, it is mainly the residents of the apartments who cannot benefit from water at home, even during the supply time reserved for their sector. The low pressure in the public network limits their access to water. On the other hand, this shortage is weakly felt by 5% of our survey sample represented especially by households equipped with a well. Regarding the water quality assured by the public network, the satisfaction rate for the criteria evaluated shows that 85% (Figure. 7) of the respondents in 2019 stated that they were quite satisfied with the pressure provided by the drinking water distribution service. The existing network needs to be technically revised to ensure the required pressure for any new developments that may be suggested by the next city development plan.

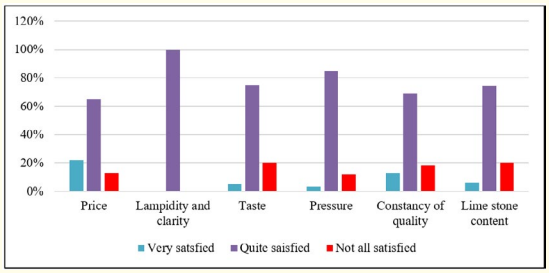

Figure 7: Water quality satisfaction ratings.

Overall, the public questioned said they were quite satisfied with 5 of the 6 quality criteria used in this study. The clarity and limpidity of the water are criteria for which all the public surveyed said they were quite satisfied. The price charged by the National Electricity and Drinking Water Office, the exclusive distributor, is considered expensive by 56% of the interviewees met particularly in sectors 1 and 5 (Figure 3), where professional activity is dominated by small businesses.

Water management and conservation

Efficient management of drinking water must take into consideration the expectations expressed by the respondents (Figure.8), of which the urbanization and extension of the city are pointed out as a deterrent to good water management in the city.

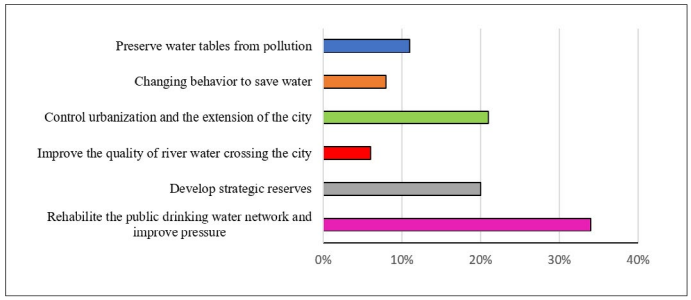

Figure 8: Respondents' expectations for efficient water management in Guercif.

Efficient water management calls for the adoption of actions and behaviors that promote water conservation. More than 60% of our survey sample claim to adopt actions against water waste, specifically the repair of water leaks in their homes.

Conclusion

The results obtained from this study confirm the water deficit in Guercif. Water scarcity is linked to the natural potential of fairly limited resources, but it is often aggravated by natural and anthropogenic factors; hence the imbalance between near-constant supply and growing demand. A prospective study initiated by the regional directorate of the National Office for Electricity and Drinking Water in 2009 predicted a deficit of 11% in 2025 and which could reach 25% by 2030 (ONEP, DR5, 2009). The sustainability of the drinking water supply depends on the ongoing developments in the hydraulic sector, in particular the investment of 37 million dirhams (NO-EDW, 2022), as an urgent measure to secure the drinking water supply in the municipality of Guercif. The realization of the "Targua Madi" dam project (90 km south of the city), the empowerment of the various stakeholders called upon to produce a strategic vision whose objective is the adequacy between the preservation of water resources and the guarantee of the various needs urgent for urban functioning, are alternatives capable of avoiding the vagaries of water insecurity in our study area.

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