THE ROLE OF CULTURE IN NATURALIZATION OF UNEQUAL WATER ACCESS IN CAMPINA GRANDE, NORTHEAST BRAZIL

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This work presents results of a research carried out on the users' perceptions on the impacts of the water rationing in their household routines, in Campina Grande, located in the Brazilian semi-arid region. Data were collected from October 2014 to June 2016. The field research revealed the influence of a regional culture on the naturalization of restrictive water access experienced by the low income strata of the population and suggests that it may influence on the acceptance and resignation about the structural water scarcity the population have faced for a long time without claiming for their rights.

Key words: water supply, water rationing (Campina Grande), drought, users' perception, naturalization

Introduction

The unequal water access in Campina Grande city is just one more example of how the different social strata in Brazil experience urban water supply in different ways. The Brazilian sanitation service performance indicators are available through an online national database (*SNIS*)[1]. The "urban water supply index (IN023)[2]" for the municipality of Campina Grande increased from 95.7% in 1996 to 100% in the available reference years 2005 to 2014. This data should indicate that the entire urban population of Campina Grande has been totally served by the water supply service provided by the regional sanitation company (*CAGEPA*)[3]. Similarly to the previous water rationing that occurred in Campina Grande, which lasted from 1998 to 2000, according to historical accountings (Rêgo et al. 2001; Rêgo et al. 2000) and through the research carried out on individual water-use-related household routines (Grande et al. 2016), the actual water rationing has been occurring in an irregular and uneven way, but it is not shown in the indicators of the *SNIS*.
The relative short history of Campina Grande manifests itself through habits and practices in the daily water-use-related household routines derived from either living in rural environments marked by water and other resources restriction, and/or

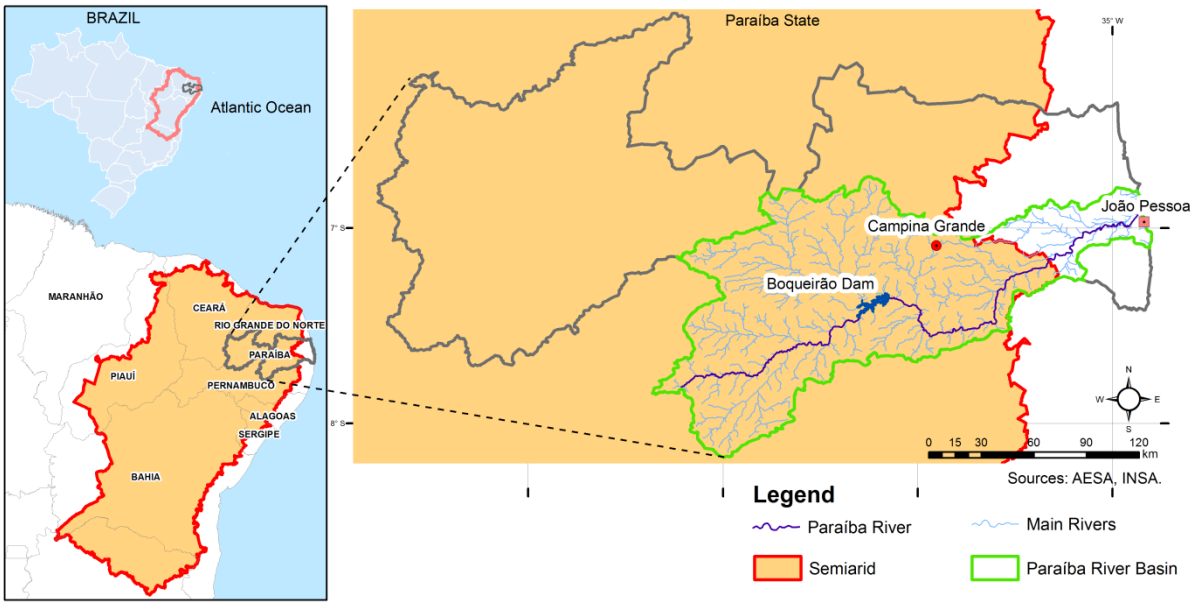
[1] *Sistema Nacional de Informações sobre Saneamento* (SNIS)
[2] *Índice de atendimento urbano com água* (IN023) from SNIS
[3] *Companhia de Água e Esgotos da Paraíba* (CAGEPA)

traditions of this experience by the previous generations, which were inherited by the present generation.
The users' perceptions on the impacts of the water scarcity and the water rationing were monitored during a 21-months qualitative research as well as their forms of provision and their access to water in the household. Some results that will be discussed ahead revealed the resonances of the habits and practices of the daily water-use-related routines derived from the regional and cultural heritage on the behaviour of the population concerning water shortage and water rationing – the naturalization of restrictive water access and increased physical effort experienced by the low income strata of the population.

Study object

The study object is the water supply conditions in an intentional sample of households in Campina Grande city, and the users' perceptions on the impacts of the water rationing in their water-use-related household routines. Campina Grande is a big city of a population estimated on 402,912 inhabitants in 2014 (INSA 2012) – acording to the last national census held in 2010, its population comprises 385,213 inhabitants (IBGE 2012), and the number of people living in urban areas represents 95% of this population; a prominent economic and educational hub, located in Paraíba state. It is located in the Brazilian semi-arid region, in the Northeast, as shown in Figure 1, with high natural climatic and hydrological variability. According to historical accounts, such a location leads to intermittent water supply, which may get worse during water scarcity periods (Rêgo et al. 2000; Rêgo et al. 2012; Rêgo et al. 2001). Since 2012 this region goes through a new drought cycle. The current water supply system of Campina Grande and other 17 towns is based only and exclusively on the Epitácio Pessoa Reservoir, also known as Boqueirão Dam, located approximately 40 km distant from Campina Grande. It works since 1958 and faced its most critical situation in the period 1997-2000. It was expected that appropriate management actions should have been taken in order to efficiently manage Boqueirão Dam during the period of rainy years, from 2004 to 2011. However, the water demands for urban supply and crop irrigation increased with no control and no authorization during the rainy period (Rêgo et al. 2015). A new drought cycle began in 2012. In December 2014, the water rationing in Campina Grande and in the other urban centers supplied by Boqueirão Dam started, for 36 hours a week. In June 2015, at the end of the rainy period in the basin catchment without recharging it, the water rationing was enlarged for 60 hours a week (Rêgo et al. 2015). In November 2015, the water rationing was enlarged once more for 84 hours a week. In July 2016 Campina Grande and the other urban centers were divided into two zones, and in one of the zones the water rationing has been 101 hours a week and in the other one it has been 112 hours a week. Boqueirão Dam faces the utmost critical situation of its history with a storage of only 4,1% of its capacity (February 2017).

Figure 1 - Campina Grande location in the Brazilian semi-arid region



Source: Adapted from AESA (2014) and INSA (2014)

Tools and data

Data were collected in monthly visits carried out from October 2014 to June 2016 to a non-random sample of households stratified by household income and risk of water shortage according to hydraulic criteria.

Income has been a determining factor in environmental justice analysis, which has shown that the lower strata of population are more vulnerable to environmental risks and/or more affected by environmental damage (Cartier et al. 2009; Gomes 2010; Morato et al. 2005; Morato & Kawakubo 2007; Acselrad et al. 2009). The household income data were treated according to three intervals: up to 5 minimum wages, from 5 to 10 minimum wages, and above 10 minimum wages, referring to the minimum wage value of R$ 724.00 (seven hundred and twenty-four Brazilian Reais) at the time the interviews were performed, i.e., in 2014, about US$ 315 (three hundred and fifteen US Dollars). These intervals were adopted by taking into consideration that a household income of up to 5 minimum wages limits a family to living under restriction (the interval limit of 5 minimum wages is the value adopted in housing programs subsidized by the federal government); a household income above 5 and up to 10 minimum wages places the family in a middle-income range; and a household income above 10 minimum wages was considered to be correspondent to the wealthier population.

The hydraulic criteria consider that the higher the topographic elevation of the households in relation to the reservoirs is and the greater the distance between the household and the reservoir, the greater is the risk of water shortage. The risk of water shortage was obtained from the elaboration of a map generated in a Geographic Information System (GIS), which considered the hydraulic criteria (Grande et al. 2014). The user's position in the water supply system determines how long he/she stays without water in case the water supply is interrupted. However, it may not exactly represent the different risk levels due to the urban growth dynamics.

Besides the existence of subsystems, which may supply a certain area from a more distant reservoir, new network bypasses may be quickly added to the system.
Semi-structured interviews were carried out at the households. Data concerning water shortages in the households, rationing occurrences, monthly water consumption, impacts on water use routines as experienced and perceived by the users, as well as sociodemographic data about the users and information about their dwelling, household water supply, water reservation and prevention, were collected and treated. They enabled the personal interaction between the respondents and the researcher as well as the observation of water storage conditions and water use practices and behaviors in their home contexts since they might reflect different perspectives and visions (Creswell 2014).
The theoretical perspective of the Political Ecology of Water was used in order to analyse the collected data. The reflection from the Political Ecology view adds the element of the power relations to the study of the natural resources appropriation modes and the differentiating distributions modes by different strata and social groups, which leads to the consideration of the various concrete situations of access and use of the natural resources in terms of environmental justice and water justice. Water justice can be perceived as part of the global environmental justice movement that struggles against asymmetries in the use of natural resources (Alier 2013); water justice issues combine demands for a fair distribution of water access rights and water rights for decision-making (Zwarteveen & Boelens 2014).

Results and Discussion

The water storage units observed in the households varied from 250- to 3,000-liter capacity water tanks, suspended or resting on the floor, connected to the household internal hydraulic network or 'not connected' (supplied from taps or hoses and emptied with buckets); 200-liter capacity concrete barrels; cisterns with capacities varying from 2,000 to 17,000 liters; buckets with capacities varying from 5- to 20-liter; barrels with capacities varying from 100- to 300-liter; 60-liter capacity clay jars; 2-liter capacity plastic bottles. Water tanks connected or not to the general water supply network and to the household internal water network were considered as regular water storage units; users who had absolutely no water tank were considered not to have regular water storage unit (for example, those who had only concrete barrels or plastic bottles).
After water rationing implementation, users reported measures to water-saving, water consumption reduction and increase water storage capacity.
When comparing a high-income user's narrative with a low-income user's, like the ones that follow:

> We already had two 1000-liter water tanks. What we did after the official rationing announcement was the maintenance of the 16000-liter cistern, which was not in use, and we purchased a pump to transfer the water from the cistern to the water tanks ... We did not change our water-use habits after the rationing started. (Householder living in an area of *high* water shortage risk, *high*-income interval).

> We have no water tank or cistern. When there is water shortage, we use a 100-liter bucket to save water. We always used this bucket, and after the rationing started, we use it more. And we also

> purchased a smaller bucket ... Nothing changed because of the rationing, we are still saving water, as we always did. I reuse the laundry water and bath water to clean the floor inside and out [of the house] and to flush the toilet. (Householder living in an area of *low* water shortage risk, *low*-income interval).

both of them seemed to keep their water-use-related routines largely unchanged as far the high-income user said that *we did not change our water-use habits after the rationing* and the low-income user said that *nothing changed because of the rationing*, although at the same time she claimed to have purchased a smaller bucket and to use the buckets more often; she uses the expression *we are still*, when referring to water-saving habits. The discrepancy between their common perceptions that the impacts on the water-use-related routine are imperceptible may be interpreted as the naturalization of impacts by a certain type of user who, with or without rationing, keeps his/her water-saving routines. Due to the lack of regular water storage unit (water tank), to the recurrent water shortage events in the city, and to the water-saving pressures related to the water resource pricing, this low-income user seems to incorporate a water consumption style, which meets the water-saving campaigns performed by the water supply company in the city to elicit the population in this extreme situation of water rationing.

When the income variable was associated with "*per capita* water consumption" variable, data collected with some of the low-income householders indicated monthly *per capita* water consumption from 1.1 to 2.0 m^3, before and after water rationing, in households with 2 to 8 people and mean water storage capacity *per* household (based on regular water storage units) equal to 275l, values below the minimum recommended by the United Nations (UN)[4] (approximately equal to 3.3 m^3). While data collected with some of the high-income householders indicated monthly *per capita* water consumption above 4.0 m^3, before and after the water rationing, in households with 2 to 4 people and mean water storage capacity *per* household (based on regular water storage units) equal to 1,167l.

Table 1 – Household income, water storage capacity and number of people in the household

Household income	Mean water storage capacity (based on regular water storage units)	Number of people in the household
Low-income	275 l / household	2 to 8
Middle-income	1,100 l/ household	2 to 5
High-income	1,167 l / household	2 to 4

Source: Prepared by the authors

The aforementioned data demonstrate how the mean water storage capacity, based on regular water storage units, is proportional to the household income, which may affect the individuals within a population. In addition, data in Table 1 show an inverse association between social class and amount of people living in the surveyed households. It also indicates an association between greater amount of people and less storage capacity, which, in turn, associated with monthly *per capita* water consumption, as discussed in the previous paragraph, may also be interpreted as potentially indicative of a water injustice situation.

[4] The daily water volume to meet the basic needs of a person, according to the UN, is 110 liters (equivalent to approximately 3.3 m3 / month).

Some users have cisterns in their households. It is worth highlighting that the cistern is an ancient form of water reserve (PASSADOR; PASSADOR, 2010). Cisterns were commonly used in Campina Grande since the city was founded. However, their use was almost interrupted when Boqueirão Dam became the source of urban water regularly supplied by CAGEPA, in addition to the sale of bottled water.
Householders who live in areas of *high* water shortage risk have occupied the same homes for more than 40 years, at addresses that already belonged to the rural area of the municipality in the past, when they were not served by the water supply service, and with wide open spaces where the cisterns were built in. Among those, a low-income householder reported that she increased her physical effort carrying water for domestic consumption and hygiene to face the current water rationing (Grande et al. 2016), as shown in the illustrative excerpt from her narrative:

> When I get home, I have to carry buckets full of water from the cistern into the house several times in order to get things done in the rationing days. My legs no longer stand it ... But it was even worse when I had to stand in line with a bucket, waiting for the water to arrive in a truck (Householder living in an area of *high* water shortage risk, low-income interval).

The cultural heritage of the use of the cistern and its coexistence with the water shortage suggest the influence of a regional culture on the naturalization of the restrictive water access which subjects this householder to accept such an unnecessary and unrealistic physical effort these days, considering the available water technologies, without claiming for her rights. Her experiences have shaped her practices.
The direct observation in the field allowed seeing that, even in non-rationing periods, there are impacts caused by water shortage, which are overruled or underperceived by users who incorporate measures in their water-use-related routines, which are required from users from other areas and other income intervals only in rationing situations. It would result from the income constraints they are subjected to, since they limit the acquisition of water and regular storage units and force them to live under a resource-underconsumption condition.
The water-underconsumption naturalization mechanism observed in the responses of low-income users may also be understood through their historical acquaintanceship with water scarcity, which is typical of the region.
The unequal water access, with or without rationing, stems from the reproduction of a typically capitalist society, in which processes of exploitation and class domination reinforce and reproduce inequalities, socially and historically constituted into natural (Viana 2013).

Conclusions

Although sanitation service performance indicators linked to the municipal scale indicate a high level of compliance, they are presented through statistical means and often mask a different reality which can be revealed through household scales.
Historical and cultural aspects related to the Brazilian semi-arid population, shaped by living with water scarcity, stand out in the results related with the lower strata of population – due to the embarrassing factors related to household income, they tend

to naturalize the water rationing impacts since their water consumption and water-use-related household routines are characterized by restriction, and they have always lived in a permanent state of resource economy and survival effort.
This finding explains the reported perceptions that "nothing changed" because of the water rationing and that “it was even worse”, which were found on the low-income users' speeches.
The field research also suggests that the regional culture may influence on the acceptance and resignation about the structural water scarcity the population have faced for a long time without claiming for their rights. Although water rationing is a management measure taken in order to ensure equitable access to water in water scarcity situations, when applied indifferently by the water managers who work detached from users’ everyday life, it considers all users as ‘equal objects’ enhancing water injustice.

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