# HUMAN RIGHT IN PERSPECTIVE: INEQUALITIES IN ACCESS TO WATER IN A RURAL COMMUNITY OF THE BRAZILIAN NORTHEAST[1]

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## 1 Introduction

Ever since the International Drinking Water Supply and Sanitation Decade in the 1980s, and in light of the Millennium Development Goals (MDGs) and the post-2015 Sustainable Development Goals (SDGs), universalizing access to water and sanitation services has been a major challenge facing the sector. In Brazil's case, the National Basic Sanitation Plan (*Plano Nacional de Saneamento Básico* - PLANSAB) constituted an important step forward in the universalization planning process. The corresponding legal framework contained in Act Nº 11.445/2007 sets out a strategic vision for the future and is based on the premise that the progress in access registered in the last few decades has taken place in a manner that has consolidated the existing inequalities. Namely, the

1. The authors wish to thank the Cristais community residents for their receptivity and participation in the research and the anonymous reviewers for their suggestions and contributions to this paper. We also thank the European Union (EU), the Brazilian National Health Foundation (FUNASA) and the Minas Gerais Research Foundation (FAPEMIG) for funding the research.

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deficit is concentrated in groups with certain common characteristics, i.e., low income families mainly residing in the Brazilian North and Northeast macro-regions, and, above all, in rural areas and the poor outskirts of big cities (BRASIL, 2007; 2014).

Currently there are 750 million people in the world without access to improved sources of water[i], mainly in developing countries. There is a real need to combat the sanitary exclusion of minority groups, mainly represented by rural inhabitants and, in general, the poor. Inequality is even more intense in the Sub-Saharan countries of Africa, emblematic of this situation insofar as two in every five people living there do not have access to drinking water (WHO; UNICEF, 2014).

Against that background, the SDGs were elaborated considering access to safe drinking water, basic sanitation and hygiene to be a human right. The post-2015 development agenda aims to universalize access to safe drinking water, sanitation and hygiene so that, among other objectives, by 2030, the goal of "progressively eliminating inequality of access" would be achieved (WHO; UNICEF, 2014: p. 42). The most notable difference between the MDGs and the SDGs is that the latter place greater emphasis on reducing inequalities and are based on the premise that the process of democratizing access does not consist of merely obtaining improvements in the sector, as it did in the past, but is guided by the idea that improvements in service access conditions should take place primarily among the socially excluded groups, thereby contributing towards a reduction in inequality.

Another vision of inequality in access to water conditions permeates the idea of environmental injustice which, in the words of Acselrad *et al* (2009, p. 41), involves:

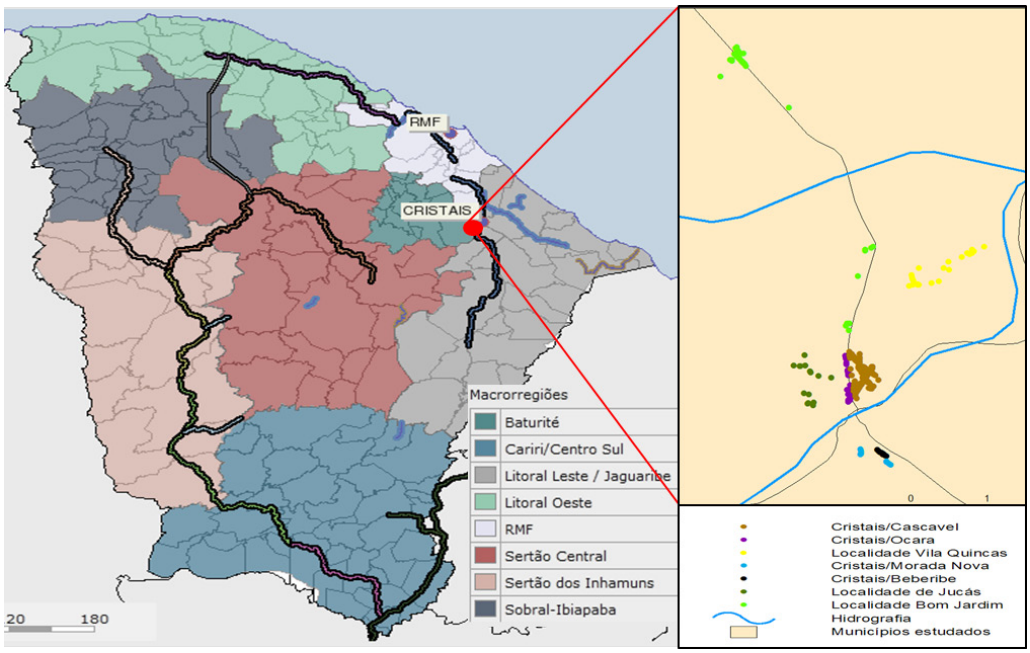
> The mechanisms by which societies that are inequitable from the social and economic point of view, direct most of the weight of environmental damage stemming from development to low-income population groups, racially discriminated groups, traditional ethnic peoples, working class neighborhoods and to marginalized and vulnerable population groups.

In that sense, environmental injustice can be understood in two ways: the first would be related to policy implementation – or non implementation – placing those most lacking financial and political resources at disproportional risk; and the second would represent the unequal access to environmental resources manifest in both the production and consumption of such resources (ACSELRAD *et al*, 2009). Thus, another approach to tackling inequalities in access to water involves an understanding of their relationship to aspects related to environmental injustice.

The elements underlying inequalities in access to water must include the demographic, socioeconomic, political and cultural aspects of the macro context and also reflect micro-contextual characteristics intrinsic to the local dynamics and the relations that are routinely established locally regarding the way in which the resource is made available and used. Bearing in mind the increasing inequity in access to water and the concentration of the water deficit in certain population groups, this paper seeks to contribute towards gaining a better understanding of the multiple forms of inequality in accessing water

that can co-exist within a single community that does not have a Water Supply System (WSS). To that end, we assess the inequalities in water access conditions that exist in the community of Cristais, located at the confluence of the municipalities of Cascavel, Ocara, Beberibe and Morada Nova (FIGURE 1), in the state of Ceará (Brazil), in order to typify and understand the peculiarities of the excluded population groups.

**Figure 1 – Identification of the Cristais Community – Ceará. Source: Ceará State Water Resources Department (*Secretaria de Recursos Hídricos do Ceará* - SRH/CE (2015).**




Legend: RMF= Fortaleza Metropolitan Area; Macrorregiões= Macro-regions; Localidade= locality Hidrografia= Hydrography; Municípios estudados= Municipalities studied.

The hypothesis adopted for this research is that inequalities in water access conditions are not only visible between population groups with and without water supply systems (WSS) but also in the differing conditions to be found within a single community without a WSS.

Data collection took the form of administering a questionnaire to all households in the community, whose heads of households were willing to participate in the survey, and by direct observation. 232 questionnaires were administered in the period from May to July 2014. The questionnaire was designed to obtain information that would make it possible to: i) typify the household and the person responsible for it (identification of the location and the characteristics of the household infrastructure – especially the hydro-sanitary infrastructure – and of demographic aspects and the socioeconomic profile of the family) and ii) obtain a description of the local population's acquisition, use and

perceptions of water (access conditions, cost of acquisition, time consumed in accessing water, various forms of use and water quality). Using the available data, an assessment was made of the: i) quantity used (liters per inhabitant per day) – information based on the weekly consumption of water from the sources used by local residents[ii]; ii) physical accessibility, measured by the amount of time spent each time water was collected; and iii) economic accessibility of water measured by the percentage of the family income that was committed to accessing it.

It must be underscored that this paper considers Water Supply Systems for human consumption to be those that distribute drinking water by means of domestic (piped) water supply connections[iii]. Thus the sources of water existing in the community (FIGURE 2) represented by solutions that do not offer direct connection to the household, such as rainwater, public fountains or cisterns, water tankers, river basin integration canals and other solutions that intermittently distribute untreated water from the Pirangi river are not considered here to be WSS but, instead, alternative solutions.

**Figure 2 – Identification of some of the sources of water in the Cristais community: a) community cistern; b) public fountain; c) river basin integration canal; d) rainwater reservoir**

It should also be mentioned that this study is part of one of the evaluations of the Democratization of Water and Sanitation Governance by Means of Socio-Technical Innovation Project – DESAFIO – (*Projeto Democratização da Governança dos Serviços de Água e Esgotos por Meio de Inovações Sociotécnicas*)[iv]. In this context, the choice of the Cristais community took into account the opportunity of conducting an evaluation before and after the implementation and operation of a water supply system based on a rural water supply and sanitation management model. The choice also took into account: the fact that the community was about to receive a water supply system, the number of families residing there, and the existence of a nearby community with similar characteristics but, which already had a WSS in operation, and could serve as a control to test our hypothesis.

This paper is structured in four parts. Apart from the present introduction, we contextualize the inequalities in access to water resources by going beyond aspects related to the rural water supply and sanitation profile of this particular region of Brazil, and examine the more general demographic and socioeconomic factors conditioning inequality in access to water. Thus, the discussion starts off with the broader regional contexts, which, in spatial terms, constitute a sequence of nested structural realities with commonalities that are susceptible to comparison: Latin America and the Caribbean, Brazil and the State of Ceará. The discussion based on the secondary information collected, elucidates the reality that is expected for a rural community in Brazil. An analysis of the water access--related variables at the macro level anticipates the reality of the community of Cristais, which, in spite of presenting its own peculiar singularities, is representative of a common situation among such communities, given the hierarchy they have occupied in the course of the historical processes they have undergone. Thus, we present a brief contextualization of inequalities in Latin America and the Caribbean, followed by a description of the corresponding panorama in Brazil and more specifically in the State of Ceará. Then certain aspects of environmental injustice in the State of Ceará are addressed with a view to obtaining a more general vision of the context of environmental injustice to which the Cristais community is subjected. That is followed by a discussion on how the expansion of the concept of access articulated by the UN definition of the Human Right to Water (HRW) can contribute towards gaining a better understanding of inequalities in access. The case study results are then presented and followed by the concluding remarks.

## 2 Inequalities in access to water

### *2.1 Access to water: an overview*

The most recent reports on progress towards achieving the MDGs confirm the fact that there is still a long way to go with regards to the universalization of water supply and basic sanitation services worldwide. Although progress has been made and the MDG target of halving, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation has been met by 116 and 77 countries, respectively, the challenges facing the sector remain daunting (WHO, UNICEF, 2014).

The poor continue to be marginalized from many of the improvements that have been documented in recent years. Thus, the inhabitants of developing countries, those living in rural areas, the poor, ethnic and religious minorities and women are more likely not to have access to improved water sources and to basic water supply and sanitation services (WHO; UNICEF, 2014). As Shaheed *et. al.* (2014) have noted, there are notable differences, over time and space, in terms of the availability, safety and accessibility of drinking water services worldwide, even among WSS that are considered safe.

In terms of spatial inequalities**,** there is a stark contrast in access to WSS according to the region of the world one inhabits: while there is virtually universal coverage in the developed world, the coverage drops to 74% in urban areas and 25% of the rural areas of developing regions and reaches only 33% in urban areas and 4% in the rural areas of the world's least developed countries (WHO; UNICEF, 2014). Furthermore, access to drinking water is greater in urban than in rural areas, so that of the 750 million people without access to an improved drinking water source, 616 million (approximately 83%) reside in rural areas (WHO; UNICEF, 2014). Similar dynamics can be observed in Latin America and the Caribbean (LAC), where a significant portion of the population remains without adequate access to water and sanitation services. In 2012, around 36 million people worldwide who still relied on unimproved sources of drinking water lived in LAC (around 6% of the region's total population) (JMP, 2014). There are also substantial disparities in access to safe drinking water between urban and rural areas, not only in terms of the size of the deficit but also in terms of the accessibility of the available sources: the deficit in coverage in the region's rural areas, is six times greater than in urban areas; and only 66% of the rural population, in contrast with 95% of urban dwellers, get their drinking water through pipes in their homes (JMP, 2014). This picture is even direr if we take into consideration the availability and safety of the WSS offered, which are often characterized by intermittent supply, low pressure and high water losses. Some studies have estimated that around 60% of the population with access to drinking water in LAC do not have continuous access (Rojas et. al. 2005). Furthermore, although the official statistics assume that the use of improved drinking water sources implies having access to safe drinking water, it is increasingly evident that not all improved sources provide drinking water that is free from contamination and thus, safe for human consumption. In fact, 12% of the LAC population with a piped connection at home consume water contaminated with excreta (WHO; UNICEF, 2014).

In Brazil, the Institute of Geography and Statistics *(Instituto Brasileiro de Geografia e Estatística* – IBGE) produces information that makes it possible to quantify and, to a lesser extent, qualify the ways in which water supply and sanitation services are provided in the country. However, it is difficult to ascertain on the basis of that data alone whether the solutions adopted and the services provided satisfy the ideals established in Act Nº 11.445/2007 (BRASIL, 2007), namely, the principles of universal access, equity, integrity and sustainability of the WSS solutions. It is possible to identify the forms of access to the service provided or the adopted solution but not their quality, efficiency or effectiveness and that makes it difficult to offer suggestions directed at stimulating various kinds of action to be undertaken by the public authorities, by non-governmental organizations or

by individuals themselves. Such suggestions deserve attention insofar as the structure of the research conducted to better understand the characteristics of the country's water supply and sanitation situation and, the questions they seek to answer, explicitly denote the existing inequalities.

The 2010 Demographic Census (IBGE, 2011) collected information about water supply services using three categories: water supply network, well or spring and other forms of supply. Table 1 presents data concerning the forms of supply considered to be most adequate from the point of view of meeting the population's water needs in Brazil and in the State of Ceará, which is the site of our case study. These adequate forms are analyzed with regards to their spatial dimension (rural and urban households), socioeconomic dimension (aggregate household income and schooling level of the head of the household) and demographic dimension (sex and skin color of the head of the household). The characteristics of the head of the household are presumed to be determinant variables for the water supply and sanitation situation of the household in question.

Generally speaking there are marked differences between Brazil and the State of Ceará with the latter consistently showing lower rates of coverage than those observed at the national level. There are also notable discrepancies between rural and urban household coverage, revealing the peculiarities of their different patterns of land use and occupation, but also revealing the bias of the actions undertaken by the public authorities towards meeting urban demand and conditioned by the prevailing vision based on the concept of economy of scale.

The socioeconomic characteristics displayed in Table 1 reflect the extent to which differences in household income levels and in the schooling level of heads of households are key determinants in the household's water supply situation. In turn, the demographic variable skin color of the head of the household indicates a greater presence of improved forms of water supply for whites, a tendency related to the less favorable socioeconomic conditions of brown and black-skinned people due to the historical-cultural conditions that sustained this pattern in Brazilian society. Higher percentages of coverage of more adequate forms of water supply in households headed by women, both for Brazil and for the State of Ceará, underscore the much-vaunted proposition that women are more inclined to use the income brought in by household members to the collective benefit of them all.

### *2.2 The case of Ceará: there is water to see but not to drink*

According to Ioris (2009, p. 389):

> the importance of the concept of environmental justice stems from the observation that the increasing scarcity of natural resources and the destabilizing of ecosystems affect different social groups or geographic areas in an unequal and frequently unfair manner. That is, to a greater or lesser extent, society's relations with nature mirror political, social and economic asymmetries that are specific to a given historical moment or a given spatial configuration (just as much in the local and

**Table 1: Household coverage for adequate water sources according to spatial, demographic and socioeconomic factors – Brazil and the State of Ceará, 2010**

| **Household coverage for adequate water sources according to:** | **Brazil** | | **Ceará** | |
|---|---|---|---|---|
| **a) Household situation** | **Urban** | **Rural** | **Urban** | **Rural** |
| Water supply network, well or spring on the property (%) | 89 | 54 | 81 | 42 |
| Piped water in the house (%) | 95 | 61 | 92 | 46 |
| **b) Overall household income (in multiples of official minimum salary)** | ≤ 1.5 | > 1.5 | ≤ 1.5 | > 1.5 |
| Water supply network, well or spring on the property (%) | 86 | 96 | 79 | 92 |
| Piped water in the house (%) | 80 | 95 | 73 | 90 |
| **c) Schooling level of the head of household** | **Incomplete lower secondary** | **Higher Education** | **Incomplete lower secondary** | **Higher Education** |
| Water supply network, well or spring on the property (%) | 89 | 97 | 80 | 92 |
| Piped water in the house (%) | 86 | 96 | 75 | 92 |
| **d) Sex of the head of household** | **Male** | **Female** | **Male** | **Female** |
| Water supply network, well or spring on the property (%) | 92 | 94 | 86 | 89 |
| Piped water in the house (%) | 90 | 92 | 80 | 86 |
| **e) Skin color of the head of household** | **White** | **Black and Brown** | **White** | **Black and Brown** |
| Water supply network, well or spring on the property (%) | 95 | 90 | 90 | 83 |
| Piped water in the house (%) | 95 | 86 | 87 | 80 |

Basic data source: IBGE – 2010 Demographic Census.

> regional spheres as in the relations between countries and continents, as witnessed, for example, in the case of the greenhouse gas effect).

Manifestations of environmental injustice can be quantified, qualified and located. That being so, it is worth highlighting that one the themes that has become of concern is the problems associated water resource management and more precisely, the lack of water supply and sanitation because it is intrinsically related to the demand for the democratization of access to goods and services that are considered to be universal. Historically, in Brazil, environmental injustice has its origins in the socioeconomic asymmetries and it can be seen Table 1, specifically, that the coverage of adequate forms of water supply in households occupied by groups with brown or black skins is far lower than that registered for households occupied by white families. Similarly, corroborating the existence of social inequalities, Britto (2010) states that even though today water supply and sanitation services have been extended to regions inhabited by social strata with the lowest incomes, many residents there run the risk of not being able to use such services. This is so, because they are too poor to pay for them and so they have to recourse to alternative solutions to obtain water and to dispose of sewage in an inadequate manner, thereby jeopardizing their health and that of the environment and perpetuating the cycle of environmental injustice.

Quintsir and Britto (2014) underscore the great number of residents in the Baixada Fluminense district (Rio de Janeiro) whose right to water is not duly recognized by the public authorities and administrators because the quantity of treated water distributed to the region is insufficient to meet their demand. Instead, priority is placed on supplying the industrial districts. That situation has led to the deactivation of an expressive number of reservoirs that no longer receive any water, thereby seriously jeopardizing the lives of families connected to the system and undermining the possibility of amplifying the WSS.

The municipality of Queimados studied by Qintsir and Britto (2014) has two reservoirs in operation, one of which is mainly used to supply the local industrial district. Population groups not supplied by the WSS seek alternative ways to obtain their supply (shallow or deep wells and natural springs). Similarly, in the Campos Elíseos district of the Duque de Caxias municipality where the big Duque de Caxias refinery (REDUC) is located, there is abundant water supply for the refinery but very little for local residents and consequently the latter siphon off water from the water supply network supplying the refinery in order to meet their water needs (QUINTSLR; BRITTO, 2014).

In the Cristais community, the object of this case study, which is located on both sides of Federal Highway 116 in the State of Ceará and occupies parts of four contiguous municipalities, inequality in access to the available natural resources is readily observable as is the evidence of a development vision based on the intensive use of water destined primarily to address the industrial and urban interests of the greater Fortaleza metropolitan region, as witness by the Integration Canal built there. The 225 kilometer-long canal, which is also known as the "*Eixão das Águas*" (Grand Water Axis), consists of a complex of pumping stations, canals, siphons, water supply networks and tunnels that enable water to be transposed from the Castanhão dam reservoir and it also intercon-

nects the sub-basins of the lower and middle course of the Jaguaribe, the Banabuiú and the Metropolitan rivers. The aim of the canal is to boost water supply to the industrial complexes of Maracanaú and Pecém as well as the municipalities of the metropolitan region. It should be noted that in addition to serving the needs of irrigation projects along its course, most of the water from the canal goes straight to the Industrial Complex associated to the port of Pecém, especially because of the demand represented by the thermoelectric plant installed there. Thus, the canal fails to supply the majority of the communities located along its course and that has led to the expulsion of many local smallholders from their land[v] (Lins, 2011). In fact, considering the stretch of the canal that links the Serra do Felix reservoir to that of Pacajús, inaugurated in 2009 and which lies in the region where Cristais is located, up until December 2014, the local population was supplied by means of tanker vehicles bringing in water from a water treatment station located in the municipality of Pacajús or from the Pirangi river. The waters of both those sources have high salinity levels.

Another important aspect to note is that from the 1990s on, public water-related policies elaborated by the State Government of Ceará prioritized specific water uses and mainly favored agricultural and industrial companies to the detriment of those people who were deprived of both land and water, thereby effectively spreading environmental injustice. In spite of the provisions of Act Nº 9.433/1997, which instituted the Brazilian National Water Resources Policy and established that "in situations of scarcity, human consumption and quenching the thirst of animals is the priority use for water resources", that premise has never been put into practice (BRASIL, 1997).

### *2.3 Expanding the concept of access to water and its possible ramifications*

Another important aspect that must be examined when evaluating inequalities in access to water, is the question of what is understood by the term 'access'. Traditionally the concept of access to water supply services has been related to the characteristics of the household infrastructure and its forms of water provision and, above all, to the existence or not of connections to water supply distribution networks. The Millennium Development Goals contemplated four groups of categories of drinking water: i) water piped right through to the point of consumption; ii) water stemming from other improved sources; iii) water stemming from unimproved sources; and iv) surface waters (WHO; UNICEF, 2014). Only groups i) and ii) are considered to be improved water sources.

Assessing the democratization of access to water supply based only on the forms of access to the infrastructure tends to simplify what is actually a complex reality, given the risks of intermittency of the supply and/or the distribution of water not up to the pre-established drinkability standards (GUARDIOLA *et al.*, 2010; MAJURU *et al.*, 2012). Such a perspective induces the identification of false progress towards the universalization of access and generates inaccurate evaluations of the situation of a given population group, or it may conceal inadequate or precarious service provision to the group. Furthermore, focusing merely on access to the physical infrastructure makes it impossible to check for the existence of inequalities.

A notable landmark in meeting the challenge of obtaining a better understanding of the conditions associated to water access was the UN's definition of access as a human right. It has been in force since 2010 and has broadened the concept of access to go beyond the question of connection to a system or the type of physical infrastructure involved. It is based on aspects that involve quality, quantity, physical and economic accessibility, and acceptability. In addition, the Human Right to Water (HRW) considers the processes of access and sustainability to be fundamental, and that they should be based on principles of equality, non-discrimination, accountability and the empowerment and participation of the population (UN, 2010a, 2010b; ALBUQUERQUE, 2014). This framework has influenced the logic underlying the construction and evaluation of water supply and sanitation policies. An example is the changes in the way the Joint Monitoring Programme for Water Supply and Sanitation (JMP) addresses water supply and sanitation services in the sphere of the proposals for the post-2015 goals (WHO; UNICEF, 2014).

Broadening the concept of access to water stemming from the HRW definition with its multiple approaches makes assessing inequality feasible insofar as it underscores the nature of groups that are excluded from WSS access, distinguishing them from those that do have access, not only among different populations but among groups within a single population. Some of the aspects included in the definition of the HRW such as physical and economic accessibility, and quantity and quality are not necessarily identical within a single group even when it shares similar forms of access to the infrastructure. Such differences reveal the inequalities that are intrinsic to water access given that the availability of a group of alternative technologies may generate quite different uses among the families and produce different access conditions.

In that sense, the aspects of quantity and physical and economic accessibility are emphasized in the present analysis involving the forms of water supply used by the population of the Cristais community. This is so not only because they offer a better representation of the access conditions in the context of the incipient debate that sprang up after the definition of the HRW, but also because they make it easier to identify intrinsic inequalities and their relation to the process of environmental injustice.

## 3 Inequalities in water access conditions in the Cristais community (Ceará)

Of the households that took part in the research survey, 31.0% have household incomes of less than one legal minimum salary; 37% of the heads of households are illiterate and 46.6% are retired, pensioners or agricultural workers. With regards to sources of water, the community used various forms of collective access ranging from public fountains fed by three semi-artesian wells, through three collective cisterns that were filled by tanker vehicles, to water taken from the integration Canal or the Pirangi river, both nearby. Water is taken from the canal by means of hose pipes that carry water individually to households near the canal. Water from the Pirangi river is, in turn, taken from the river and distributed intermittently to a network of 25 residences but the community considers the water to be polluted. There are also some deep wells, cisterns distributed by the Federal Government's One Million Cisterns Program (ASA, 2015), as well as various

other improvised reservoirs used to collect and store rainwater and bottled water. Most of the families living in the central part of the community have what the MDGs classify as improved sources of water (Table 2).

**Table 2 – Main sources of water used by the Cristais community**

| | River | Tanker vehicle (army /city hall) | Cistern P1MC | Rain Water | Mineral Water | Public fountain cistern | Payment for water delivery | Canal/ Shallow well/ Other sources |
|---|---|---|---|---|---|---|---|---|
| Nº | 19 | 5 | 52 | 173 | 52 | 66 | 65 | 73 |
| %* | 8.2% | 2.2% | 22.4% | 74.6% | 22.4% | 28.4% | 28.0% | 31.5% |

* Most residents identified more than one source, hence the total exceeds 100%.

With regards to the quantity of water consumed by the households, Table 3 shows that there are considerable differences in terms of *per capita* volumes. In 79 of the 193 households (40.9%), consumption *per capita* was in the range of 20 to 50 liters/inhabitant/day; a consumption level that represents a low level of risk to health according to the studies of Howard and Bartram (2003). In 55 of the 193 households (28.5%) the volume of water consumed was less than 20 liters/inhabitant/day, which may pose a considerable health risk. Based on this information, it can be stated that there is a significant percentage of families with a level of water consumption well below the reference mark of 50 liters/inhabitant/day (HOWARD; BARTRAM, 2003). In terms of quantity of water consumed, in only 30.6% of the households assessed, consumption was found to be higher than the reference level.

The analysis of physical accessibility to water is based on the trips family members have to make to places beyond the immediate surroundings of the household. The trip is assessed in terms of the time needed to obtain the resource. Although the physical accessibility is the fruit of processes that are both exogenous and endogenous to the community, the physical distance involved has been used as a proxy for the degree of water access inequality.

Classic studies such as those of Cairncross and Feachem (1993) and Howard and Bartram (2003) associated the reduction in a household's consumption of water to an increase in the time spent colleting it, and the former authors showed that when the time is greater than 30 minutes, domestic water consumption goes down to its lowest levels, reaching less than 20 liters/inhabitant/day. Howard and Bartram (2003) associated the lack of access to water to a time spent collecting it exceeding 30 minutes and also defined the basic access level as being that consumption associated to a water collecting time in the range of 5 to 30 minutes. When the time spent to collect water is less than 5 minutes, then access is deemed to be intermediate. The optimum collection time only exists when there is zero time spent in water collection, that is, when water is piped directly into the household[vi].

**Table 3 – Quantity and physical and economic accessibility of water in the Cristais community**

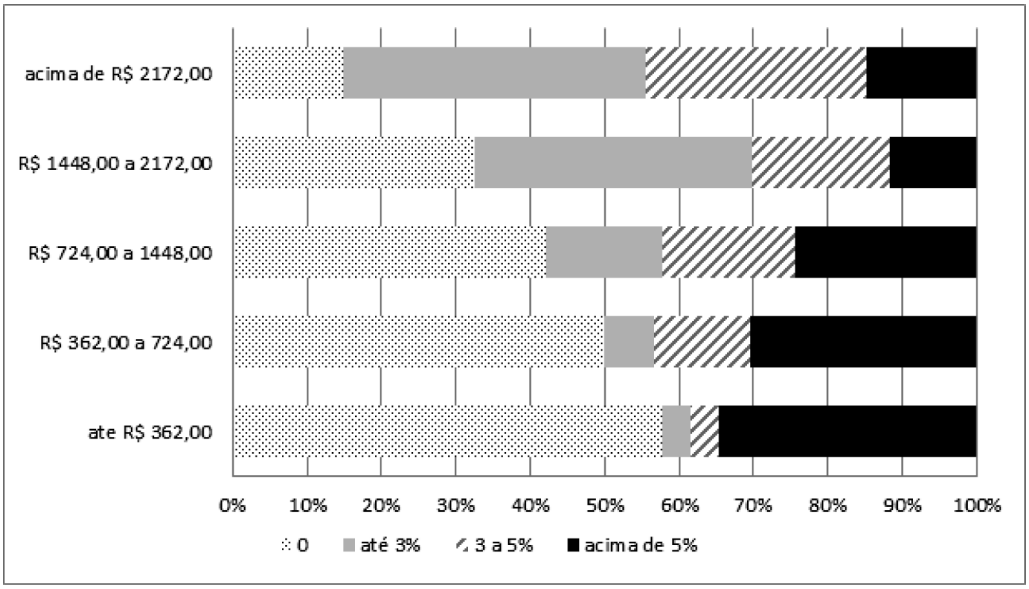
| | | | | | | |
|---|---|---|---|---|---|---|
| Quantity | Household consumption *per capita* (L/hab.dia) | 0 a 20 | | 20 a 50 | 50 a 100 | Over 100 |
| | Households | 55 | | 79 | 38 | 21 |
| | % | 28.5% | | 40.9% | 19.7% | 10.9% |
| Physical access | Residents collect water | Residents do not collect water | Distribution of the households that collect water by time consumed (going, waiting and returning) | | | |
| | | | < 5 min. | 5 to 10 min. | 11 to 30 min. | > 30 min |
| | 83 | 149 | 8 | 9 | 35 | 31 |
| | 35.8% | 64.2% | 9.6% | 10.8% | 42.2% | 37.3% |
| Economic accessibility | % Income dedicated to water consumption | 0 | From 0.1 to 1.5% | From 1.5 to 3% | 3 to 5% | 5 to 10% Over10% |
| | Households | 94 | 18 | 27 | 39 | 29 25 |
| | % | 40.5% | 7.8% | 11.6% | 16.8% | 12.5% 10.8% |

From the data set out in Table 3, it can be seen that in 35.8% of the households at least one family member travels to collect water. It can also be seen that this distribution is unequal, not only between the households that collect water and those that do not, but also internally, in the group of those that do collect. Using the parameters established by Howard and Bartram (2003), 53.0% of the households that collect water have a basic access level (insofar as they spend from 5 to 30 minutes to collect water) and 37.3% can be considered as not having access because they have to spend more than 30 minutes on their water-collecting trips.

The analysis of the proportion of income taken up to access water (Table 3) shows that a significant portion of households (40.5%) adopts solutions that do not involve any financial expenditure. The other households spent part of their overall income accessing it: while in 19.0% of the households water expenditures consume 3% of their income – which is in alignment with the recommendations of the 2006 Human Development Report (HDR) (UNDP, 2006) –; roughly 40% of the households dedicate more than 3% of household income to the same end. There are also inequalities in the extent to which household income is spent on accessing water in the community, as those families with the lowest incomes are the most affected because they spend a percentage far higher than that recommended by the HDR. To gain a better understanding of the dynamics of the phenomenon and its possible implications, it is worthwhile analyzing the extent to which income is dedicated to accessing water, according to income brackets[vii] (Figure 3). It can be seen that in most of the families with a household income equivalent to one legal minimum salary or less, one of two extreme situations exists: either the family spends more than 5% of its income to that end or it spends nothing at all to gain access

to water. In contrast, households with incomes of more than two legal minimum salaries are most prevalent in the group that uses up to 3% of its income to that end (52% of the families in that income bracket). That situation reinforces the inequality in access to water inherent to the reality of the community studied.

**Figure 3 –Household income dedicated to accessing water in the Cristais community, by household income brackets**




Legend: a= to; até = up to; acima de = above

Payment for access to water that is actually available in public sources such as fountains and collective cisterns takes place in the form of payment made to third parties to transport the water to the household. The community identifies individuals providing such transport as *carroceiros* (carters) or *botadores de água* (water deliverers). Such individuals charge relatively high prices to transport water, somewhere around 4 Brazilian Reals (US$ 1.76) for every 200 liters of water, which represents a cost of 20 Brazilian Reals per cubic meter of water (US$ 8.82). This is an extremely high value compared to the residential tariff operated in those municipalities where the WSSs are operated by the Ceará Water and Sewage Company (*Companhia de Água e Esgotos do Ceará* - CAGECE), which charges around 2.15 Brazilian Reals (US$ 0.95) per cubic meter. Furthermore, if we compare the price charged by the *carroceiros* to the more favorable social tariff charged by CAGECE, which is 79 cents of a Brazilian Real (US$ 0.35) per $m^3$, then it can be seen that the amount the community pays for a cubic meter is 25 times higher[viii].

Another relevant piece of information in this regard is that the amounts to be charged for transporting 200 liters of water are collectively defined by the water carriers themselves. Some residents declared that, at the best public water sources such as the

collective cisterns supplied by water from the Pacajús Water Treatment Plant, the water carriers are the ones that collect the greatest volumes, thereby appropriating a source that is public and commercializing the transport of it. That fact means that Cristais residents can only make use of such sources if they are prepared to get there very early in the day, and that is especially true during the dry season. The situation contributes to maximize the inequalities in access to water in the community.

The results of the analyses of the three aspects show that the intrinsic characteristics of the local dynamics and the relations that are routinely established in the way the resource is made available and used by the community, such as, the high amount charged, are generating distinct forms of access to water and establishing patterns of inequality in access. In that sense, the environmental injustice observed may well be aggravated by other endogenous factors, in addition to the exogenous aspects such as the injustice associated to a person not being served by a WSS even when living close to a canal designed for that very purpose. These endogenous elements suggest that there are local dynamics that contribute towards inequality in access to water consumption, affecting some individuals and groups more acutely than others.

## 4 Concluding remarks

Significant progress is expected to stem from the new global directives on the Human Right to Water, which are far more sensitive to factors related to water access vulnerability. Assessments involving the forms of inequality inherent to a group considered to be excluded from access to basic essential services, such as water supply, can contribute towards gaining a better understanding of the issues that are intrinsic to vulnerability, thereby calling for the prioritization of actions in those places with the worst conditions of access. Following the findings of the JMP Report on Water and Sanitation provision around the world, especially in the Latin American and Caribbean countries and Brazil – where the data is corroborated by the IBGE – and, more importantly, in the case of the State of Ceará, it is obvious that the influence of exogenous aspects such as regional factors (country, state, urban or rural area), socioeconomic factors (income, schooling level), demographic factors (sex and skin color) and cultural considerations (religion) are determinants of access (or lack of) to water. The JMP data also make it possible to state that other factors, apart from the existence or non-existence of a WSS, can contribute towards generating inequalities in access thereby reinforcing those environmental injustices that affect certain specific groups.

In the case of the Cristais community, the varied levels of inequality are glaringly obvious and they stem from the various forms of vulnerability found in the community. These range from structural causes, with similar dimensions to those referred to for the larger territorial domains such as the different regions of the world and the Brazilian macro-regions, to micro-regions and localities. Despite being located close to a perennial watercourse and a large pipeline, the Cristais community has not been given the right to access water from these sources, mainly in view of the polluted condition of the Pirangi River and given that the purpose of the integration canal is to supply the metropolitan

area of Fortaleza. However, some families collect water from the canal without any kind of official approval, and others supply their homes with the polluted waters of the Pirangi river through their self-built systems of mini pumping stations, tubes and hosepipes.

Most of the local population has access to water from sources considered to be of the best quality, namely, that of a water treatment plant that supplies the community cistern, or from deep wells or cisterns and other improvised containers designed to collect and store rainwater. Nevertheless, these water resources tend to become scarce insofar as there are all kinds of impediments so that not all families have access to cisterns to store rainwater. Furthermore, not all families have the same access to the public sources of water given that the presence of "water deliverers", who serve a considerable portion of the population by transporting water from the public sources to homes and charge a relatively high price for the service, imposes a high cost to access water. Thus, it can be ascertain that the environmental injustice affecting the community of Cristais stems from the fact that there is a canal nearby that does not attend the community's needs and that the particular local forms of access are creating internal injustices as they are generating patterns of unequal access to the resource among the community residents. These findings reveal that there are inequalities in the conditions of access to water in relation to quantity and physical and economic accessibility within the community of Cristais, so that even in a place with no WSS, it is possible to have groups with different conditions of access. In that sense, it is necessary to go beyond considering the inequalities in access to water as a sole feature of excluded groups such as rural populations and the urban periphery. Understanding how these inequalities in access occur and function within an excluded group can contribute to the development of more effective public policies to tackle this problem.

## Notes

i The MDGs classify sources of water for human consumption under two categories: improved sources (tubular wells, protected dug wells; protected springs, protected source waters, rainwater, public fountains or spigots, water piped to the point of consumption) and unimproved sources (surface water, unprotected dug wells, unprotected springs, unprotected source waters, vehicles with small tanks or drums, bottled water).

ii The number of cases analyzed with relation to per capita consumption was reduced to 193 because 93 of the 232 households declared that they were unable to measure the volume of at least one of the sources they used and so they were excluded from the analysis.

iii In the ambit of the Sanitation Act nº 11.445/2007 and edict nº 2914/2011, which set out provisions regarding the standards of drinkability for water for human consumption, WSS are considered to be essential structures for drinking water supply and they include water catchment, treatment, distribution and connection to buildings.

iv The DESAFIO project seeks to contribute to efforts to eradicate structural and social inequality in access to the essential services of water supply and sanitation. The project has received funding from European Union's Seventh Framework Program for research, technological development and demonstration under grant agreement nº. 320303. The information set out in this article merely reflects the authors' opinion and the EU cannot be held responsible for the use which may be made of it.

v According to the International Consortium of Investigative Journalists (ICIJ), since the beginning of the 1990s, projects to combat the effects of drought, implemented in Ceará and financed by the World Bank, have targeted 4,625 families but the projects' benefits have not always been effectively delivered to them (Barros et al., 2015).

vi Although the situation of physical accessibility is the fruit of exogenous and endogenous processes, the distance to the source has been used here as a proxy to measure inequality.

vii The values employed are: R$ 362.00 (US$ 159.65) = half legal minimum salary; R$ 724.00 (US$ 319.31) = one legal minimum salary; R$ 1,448.00 (US$ 638.62) = two legal minimum salaries; R$ 2,172,00 (US$ 957.93) = three legal minimum salaries (The dollar exchange rate used is for 31/07/2014).

viii The figure R$ 2.15 (US$ 0.95) per $m^3$ refers to the regular tariff for households with a minimum demand of 10 $m^3$ and R$ 0.79 (US$ 0.35) per $m^3$ refers to the social (subsidized) tariff. CAGECE began charging those amounts as of July 06, 2014 (ARCE, 2014).

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Submitted on: 30/05/2015
Accepted on: 19/12/2015
http://dx.doi.org/10.1590/1809-4422ASOC150125R1V1912016

# HUMAN RIGHT IN PERSPECTIVE: INEQUALITIES IN ACCESS TO WATER IN A RURAL COMMUNITY OF THE BRAZILIAN NORTHEAST

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***Abstract*:** This paper aims to contribute to the debate on the increasing inequalities in access to water and the concentration of the deficit among certain population groups. In particular, it seeks a better understanding of the multiple inequalities of access to water that can exist within a community that lacks a water supply system. Data collection took place in the community of Cristais (Ceará) and included the application of 232 questionnaires to all of the community's heads of household between May and July 2014. The findings reveal that the conditions of access to water in relation to quantity and physical and economic accessibility are not uniform within the community of Cristais and these inequalities derive from the various forms of vulnerability found in the community. Understanding how these inequalities in access function within an excluded group can contribute to the development of more effective public policies to tackle this problem.

***Keywords*:** water access; human right to water; inequalities, vulnerability.

***Resumo*:** Este trabalho propõe-se a contribuir ao debate sobre o aumento das desigualdades no acesso à água e a concentração do déficit em determinados grupos populacionais. Em particular, busca uma melhor compreensão das múltiplas desigualdades de acesso à água que podem existir no interior de uma mesma comunidade que não conta com Sistema de Abastecimento de Água. A coleta de dados se realizou na comunidade de Cristais (Ceará) e compreendeu a aplicação de 232 questionários no universo dos chefes dos domicílios entre maio e julho de 2014. Os achados revelam que as condições de acesso à água nos aspectos da quantidade, acessibilidade física e econômica da comunidade de Cristais não são uniformes e são decorrentes das diversas formas de vulnerabilidade encontradas na comunidade. Entender como se dão as desigualdades de acesso ao interior de um grupo excluído, pode contribuir para a elaboração de políticas públicas mais eficazes para enfrentar este problema.

***Palavras-chave*:** acesso à água; direito humano à água; desigualdades; vulnerabilidade.

***Resumen*:** Este trabajo busca contribuir al debate sobre el aumento de las desigualdades en el acceso a agua y la concentración del déficit en determinados grupos de la población. En particular, busca una mejor comprensión de las múltiples desigualdades en el acceso a agua que pueden existir al interior de una misma comunidad que no posee Sistema de Abastecimiento de Agua. El articulo se basa en datos recogidos en la comunidad de Cristais (Ceará), que incluyó la aplicación de 232 cuestionarios al universo de los jefes de domicilio entre mayo y julio de 2014. Los hallazgos muestran que las condiciones de acceso a agua con relación a los aspectos de cantidad, accesibilidad física y económica de la comunidad de Cristais no son uniformes y son resultado de las diversas formas de vulnerabilidad encontradas en la comunidad. Entender como se dan las desigualdades de acceso al interior de un grupo excluido puede contribuir a la elaboración de políticas publicas más eficaces para enfrentar este problema.

***Palabras clave*:** acceso al agua; derecho humano al agua; desigualdades; vulnerabilidad.