THE SUSTAINABLE CONTRIBUTION: CONSUMPTION AND ACCESS TO FRESH WATER

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ABSTRACT

The study sought to calculate the sustainability index for consumption and access to fresh water in Brazil/Sergipe. Knowing how its dynamics in all municipalities and the discrepancy between them, in order to contribute with the management after diagnosis of reality enabling decision-making. In this perspective, requires a balance between demonstrating protection of the physical environment and its resources, and the use of these resources in order to allow the planet continues to support a decent quality of life.

INTRODUCTION

With the complexity of the problems of modern societies, thinking about development sustentável to think about the welfare of the population, is thinking about production without degradation, is thinking about environmental conservation, is thinking of the needs of society and nature of articulated and integrated manner with a balanced and fair design.

However, during the last decades, fresh water scarcity became evident concern to society; becoming a threat to the sustainable development of human society. So, the question is discussed in the world context, and increasingly there are expected emerging actions on the part of public managers regarding the forms of use and reuse of water.

Thus, the study sought to find the sustainability index about the issues arising from the fresh water as a way to show the reality in Sergipe. For this defined variables and adapted the methodology based on studies of Malik, et al. (2008); Waquil, et al. (2007); Sepúlveda, (2005).

In this context, the variable can be positive or negative. Is understood as positive when contributes with the dynamics of exploitation and consumption of correct form for the water, the negative is used when the variable presents aspects that don't value the dynamics of use and water consumption of balanced and sustainable, better saying within the standards determining by the UN (United Nations Organisation).

However, what refers to development patterns were placed on the scale, represented by colors, according to the local sustainability scenario. The closer to 1 is the index value, greater sustainability. Thus, the identification of the State of each dimension crafted in Sergipe are based on study: critical, alert, acceptable and ideal.

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So, we used the comparative method across the data obtained through the calculation of development indexes between the municipalities Sergipe and its bottlenecks between the variables through the intersection of the same that have been extracted from the information found: in the IBGE (Brazilian Institute of geography and statistics); the SNIS (National Sanitation Information System) and other sites in the public domain about the situation of each municipality.

AREA OF STUDY

Covers the State of Sergipe, located in the western part of Northeastern brazilian Region, between Parallels 9° 31 ' 54 "and 11° 34 ' 12" South latitude and meridians 36° 24 ' 27 "and 38° 11 ' 20" West longitude. With a land area of 21,094 m2 is the smallest Brazilian State in territorial dimensions, limiting to the North with the State of Alagoas; to the South and the West with the State of Bahia in the North and East by the Atlantic Ocean. The State occupies a coastal strip with 120 km wide and 163 km long (ATLAS, 2013). The State consists of 75 municipalities, grouped into three geographical mesoregions: Backwoods Sergipe; Wild East and Sergipe, Sergipe where Aracaju, the capital.

Figure 1 - Political Map of Sergipe
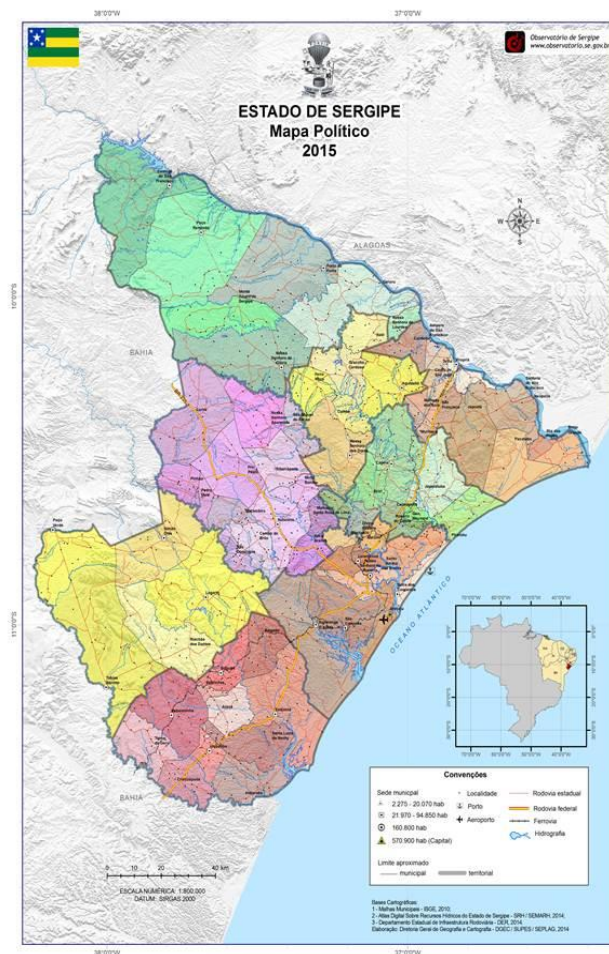
Source: Observatory of Sergipe, 2015.

Its climate is influenced by the tropical climate that characterizes the whole Brazilian Northeast, featuring three climatic zones without limits very defined: the semi-arid with great water deficiency; the climate of semi-arid transition, which corresponds to what is called of wild and transitional climate subúmida, located next to the coast and susceptible to dry spells.

Sergipe relief is characterised by the presence of low altitudes, with approximately 86% of its territory below 300 m and by morphological framework centered on three main units: the alluvial plain of San Francisco that runs along the border of Alagoas to the coast; the sedimentary trays which are clusters of low elevation separated by valleys and the pediplano that predominates throughout the western portion of the State, showing a slightly undulating topography with the presence of isolated peaks..

Hydrography, in turn, is marked by two large basins: the of San Francisco, with great potential and hydraulic Northeast, formed by rivers of downloaded highlighting the Real rivers, Piauí and Sergipe Barrels out (BIRTH, 1997). The vegetation presents great contrasts as if enters into the interior of the State, so there are remnants of the rain forest and mangroves in the coastal strip and the Eastern State; the wild in central portion and the caatinga dominating the western portion.

As regards the economy, Sergipe presents a strong agricultural base with emphasis on the production of Orange; sugar cane, cassava, destined mainly for local consumption, as well as beans, corn, rice, cotton tree and smoke. Presents significant weight temporary crops and livestock in the agreste and sertão Sergipe (LEE, 2003). In addition, stands out as one of the largest domestic producers of coconut Bay (BITENCOURT, 2008).

According to IBGE (2010), Sergipe presents a population of 2,068,031 inhabitants and a population density of 92.22 inhab/km2, also features a mostly urban population. Its GDP is R$ 12,536.45 (IBGE, 2011), one of the largest in the regional context, although far below in relation to the national average.

THEORETICAL FRAMEWORK

In 1987, the World Commission on Environment and Development (WCED), coined the definition of sustainable development that would become classical to conceive a development model that considers the three dimensions: economic, environmental and human.

In this perspective, the environmental dimension of sustainable development requires a balance between protection of the physical environment and its resources, and the use of these resources in order to allow the planet continues to support a decent quality of life especially when:

> Sustainable forms of development represent a different attitude because they can raise the standard of living of the present generation, without destroying the natural resource base and environmental which depend, ultimately, all economic activity. What threatens the sustainable development is not the technology per se, but the conditions under which these new technologies are created and used (TIENTENBERG, 1994, p. 94).

From the RIVER-1992, the concept of sustainable development emerged as a discourse that reflects the demands of society. Although conceptually still inserts a complex and ambiguous context marked by differences and limitations, was consolidated as an important model to think about the economic, social and environmental growth on the planet, mainly from the moment that emphasized the notion of sustainability as a key concept in the idea of development support. For Roberts and Scott,

> the sustainability of development is the ability of the territory, the ecosystem and human systems group (environmental, economic and socio-cultural), involved in this process, to ensure its functioning with effectiveness and efficiency so that they can mobilize the potential on which support the processes of development and individual and social needs (RODRIGUES; SILVA, 2010, p. 76-77),

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Thus, the United Nations Conference on sustainable development, Rio + 20, held in June 2012, had as goal to renew and reaffirm the commitment of the leaders of countries with respect to sustainable development. Set up a species of second stage of the Earth Summit (ECO-92) which occurred 20 years ago in the city of Rio de Janeiro.

The Conference discussed, among the main themes, the balance sheet of what has been done in the last 20 years in relation to the environment; the importance and the processes of the green economy; actions to ensure the sustainable development of the planet; ways to eliminate poverty and international governance in the field of sustainable development. Unfortunately the outcome of the RIO + 20 was not expected because the stalemate, mainly between the interests of developed and developing countries, have played for years the definition of practical measures to ensure the protection of the environment.

The understanding of Sachs, "[...] sustainable development follows the double ethical imperative of solidarity with present and future generations, and requires the explanation of criteria for social and environmental sustainability and economic viability "(2008, p. 36). Thus, for the author the economic growth should generate positive responses on the social and environmental side, only then he considers there to be development. In other words, the sustainable development results in favorable results of all action combining culture, economy, environment and social aspects with the living conditions of citizens so locally.

In this sense, by quoting the National Research Council, Camargo (2003) ensures that the reflection on sustainable development is the understanding of what must be developed; What must be sustained, the type of relationships developed in these processes and the future extension that should be considered.

Ratification, so the idea that there is an interlacing between processes that promote human development in all its spheres and the sustainability perspective necessary for maintenance of life on the planet. This makes it more intense the complex interaction man-nature, especially the relations between human and environmental systems. In this way, the issues that are born of this discussion should consider "[...] human welfare, the environment and the future "(CALDWELL, 2003, p. 81).

It should be noted that this concept allows a macro analysis both as micro;

which allows you to speak in local sustainable development. Second Furtado et al (2010, p. 11), he "[...] incorporates the territorial court on approach and seeks to set conditions of development in small scales of the territory ". Thus, this concept allows you to analyze the processes of changes in local realities that promote economic dynamism combined with sustainability, promoting so, economic efficiency, fairness and improvement of living conditions of the population and environmental conservation.

So, to the local sustainable development to occur, Furtado et al. (2010) points out that it is necessary to consider both the endogenous factors which consist in the ability of the actors articulate potential and local advantages with the conditions of the external context, impacting directly on the transformations of reality. As the exogenous factors which refer to factors and external conditions under which local actors have no control, but which have a strong influence on the transformation of local reality.

In this perspective, the results of local development projects reside, so, in the capacity of actors and local authorities involved to absorb the impact of these factors, optimizing their positive influences. However, the complexity of variables involved in this process often complicates the measurement processes for the monitoring of these projects and their effective effect on transformation of local reality. For this reason, the use of indicators emerge as a fundamental tool in the complex task of measuring a social phenomenon as comprehensive, allowing observing it under its various aspects and dimensions, tangible and unreachable.

To this end, Farfus et al. define the indicators such as "[...] essential instruments to guide the action and support the monitoring and evaluation of progress achieved "(2010, p. 104). And still have a vision "[...] more details about the diagnosis and identification of coordinates for decision-making. They point to the direction of displacement of a point "(SILVA; WIENS, 2010, p. 58) between dimensions. Thus, by means of indicators we can ascertain alert situations between the variables in order to make decisions and effective actions of the reality of a given municipality.

To verify the level of sustainability of municipalities, the indicators make it possible to diagnose and validate aspects while an evaluative instrument to monitor, assess and set goals for improvement of the real situation. Van Bellen "[...] the complex problems of sustainable development require interconnected, interrelated indicators or the aggregation of different indicators "(2002, p. 32). So performed calculations indicated in the methodological path to indicate the levels of sustainability.

MATERIALS AND METHODS

In the survey used the comparative method, which allowed the hard data and analysis of similarities and differences of constant elements, abstract and General, resulting in investigations between the municipalities. Second Fachin, "[...] consists of investigating things or facts and explain them according to their similarities and their differences "(2001, p. 14).

So, by applying the methodology for analysis and calculation of the index of sustainable development and the adaptation of the classification proposed by Malik and Candide, by means of sustainable development indexes between the municipalities of bottlenecks by crossing of variables extracted. Follows Table 01 below with the variables used, the research source and year made available

by collecting bodies and their relationship with the context searched.

Framework 01 – variables

VARIABLES	SOURCE / YEAR	RELATION SHIP
WATER QUALITY (%)		
Compliance index of the amount of Residual chlorine sample	SNIS/2011	POSITIVE
Incidence of residual chlorine analysis nonstandard	SNIS/2011	NEGATIVE
Compliance index of the amount of samples-turbidity	SNIS/2011	POSITIVE
Incidence of non-standard turbidity analysis	SNIS/2011	NEGATIVE
Compliance index of the amount of total coliform samples	SNIS/2011	POSITIVE
Impact analyses of total coliforms nonstandard	SNIS/2011	NEGATIVE
AVERAGE PER CAPITA CONSUMPTION OF WATER (l/ inhab./day)	SNIS/2011	POSITIVE
ACCESS TO WATER SUPPLY (%)		
General distribution network	IBGE/2010	POSITIVE
Well or Spring	IBGE/2010	NEGATIVE
Another	IBGE/2010	NEGATIVE

Source: Secondary Collection

Therefore, after the definition of the variables, data collection, tabulation using Microsoft Excel software, became the variables collected in indexes, for presenting different measures unit.

The calculation for construction of sustainability indices, based on the studies of Malik, et al. (2008); Waquil, et al. (2007); Sepúlveda, (2005), which focused on development dynamics check a multidimensional perspective by adjusting the values of variables between 0 (zero) and 1 (UM), to transform in indexes and showing the positive or negative relationship, as picture 02:

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Table 2 - Presentation of the relation

POSITIVE RELATIONSHIP	NEGATIVE RELATIONSHIP
How much > Better indicator index.	How much > Worst the index indicator.
How much<Worst the index indicator.	How much < Better indicator index.

The variable is seen as positive when helps with recovery and growth dynamics of the municipalities, since the negative is used when the variable presents aspects that don't value the growth dynamics of the studied municipal districts. The formulas used below:

Positive relationship:

$$I = (x - m) / (M - m) \qquad (1)$$

Negative relationship:

$$I = (M - x) / (M - m) \qquad (2)$$

Onde:

I – index calculated for the municipality examined;

x – value of each variable to the municipality;

m – minimum value of the variable identified in the State;

M – maximum value of the variable identified in the State.

Then applied the calculation to find the index of each variable by using the arithmetic mean between the variables by municipality. Being thus demonstrated the performa in relation to classification and representation of indices in sustainability levels (Figure 2).

GRAPHICAL REPRESENTATION

The data relating to development patterns were placed on the scale, represented by colors, according to the local sustainability scenario. The closer to 1 is the index value, greater sustainability. Thus, the identification of the State of each dimension crafted in Sergipe are based on study: critical, alert, acceptable and ideal. As shown in Figure 02:

Figure 2 - Classification and representation of indices at levels of sustainability

| Critical 0-0,2500 | Alert 0,2501-0,5000 | Acceptable 0,5001-0,7500 | Ideal 0,7501-1 |

Source: adapted Martins and Candide (2008).

ANALYSIS OF THE DATA

However, the issues related to water quality, access to the water system, the average per capita consumption (l/hab/day), refers to a set of information present in the municipalities in order to understand the real situation of the use and consumption of water in the cities, contributing to a better performance of public policies for a better life quality level for population.

And to understand that the environment is "[...] the result of the interaction between natural ecosystems, cultural, local, global dimensions, biosphere reserves and the development style adopted by human beings in their development "(LIRA, et all, 2007, p. 31) present in the social and environmental context.

Thus, with regard to water, much-debated issue in the global context and its forms of use and reuse. There are to be expected emerging actions on the part of the population with regard to forms of use not to miss in the future, even with all forms of efficaciousness in which researchers have viable alternatives to the use of the water and exposing research findings about the sewer (General sanitation) and residual treatment.

Becoming something very present in the media and in the context of the policies they publish social investments (distribution and tank installations), calling for shared responsibility for the valuation of its use and its benefits.

On water quality, the Brazilian legislation ensures their availability in appropriate standards and their use in a rational way, by the Ordinance of the Ministry of health no. 1469 of December 2000. Thus, the quality of the waters, as Macedo and Cândido (2011) represent a group of indices related to measurement of residual chlorine, turbidity and the presence of total coliforms, on data relating to compliance and their incidences of sample off the charts.

In the State of Sergipe was found that more than 64% of the municipalities demonstrates critical regarding the compliance index of the amount of residual chlorine, sample presenting health risks of individuals and 36% acceptable compared to the standard established by the indexes, which compromises the life quality of the population.

Already in relation to the residual amount of chlorine off the charts about 20% of the municipalities exhibit indexes between critical and alert, showing that the use of chlorine is above the allowed for the human being. The remaining 80% acceptable level for human use, which does not care-free to be used.

Access to the water supply system in Sergipe presents a good index in the general context, showing some critical situations, like the townships: Pacatuba, Pebbles, Tomar do Geru and Umbaúba presenting 0.000 indexes in relation to water supply. This supply type is considered one of the most suitable, due to the treatment of water before reaching the households for consumption.

Already in relation to the consumption of water in springs, wells, rain, rivers become worrisome for consumption due to the lack of information on some kind of contamination existing domestic waste it, industrial and agricultural. Thus causing various types of diseases such as cholera, worms, bacteria, hepatitis among others.

According to UN report in 2012, an estimated 884 million people do not have access to clean water which it is estimated that 14% of the world population consumes water with the minimum necessary qualities.

In addition to the quality of water, the average per capita consumption per inhabitant is a variable that must be monitored, even in Brazil. Regarded as a world power in freshwater reserves and its global membership is of 12% on the planet, there is a demographic advance international concern. Concerned with this advance, the United Nations presented a report on the VII World Water Forum (FMA), held, in South Korea, describing that water scarcity will affect two thirds of the world's population in 2050 due to overuse of water resources for food production.

In Sergipe, the municipalities exhibit good average per capita consumption rates, getting 73% with 20% and 7% and critical. Already, in the municipality of Carmopolis found a big discrepancy, a city with small patterns, features an index 0.000, where consumption per capita is 176.4 liters inhabitants day, well above the national average which is 166.30 and State of Sergipe that is 123.00 liters inhabitants/day (data published by the National System of information of basic sanitation of the Ministry of cities).

CONCLUSION

However, the indexes of Sergipe in municipal sustainable consumption, access and healthy conditions of fresh water consumption, still has some warning signs that society must get collect effective actions of managers, on the results you can see models of managements closed without worrying about local demands.

Given this scenario shows the need to set up a model important for sustainable local development process, enabling the integration management-society-environment, while open space in search of a better living condition.

Knowing how the dynamics of consumption and water access in all municipalities and the discrepancy between them, the aim is to contribute with direct action of the Manager with the diagnosis of reality and possibility to make decisions throughout the process through shared management, based on the principles of social responsibility and to promote sustainability of the municipality.

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