

Editorial

Combating drought and living with the semi-arid region – New paths in the pursuit of sustainability

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The Brazilian semi-arid region covers 980 thousand square Kilometers and has a population of approximately 22.5 million people. This large area corresponds to just over a fifth of the Brazilian territory, and is larger than France and Spain combined, for example.

This extensive region contains great cultural and natural diversity, and is widely known for the long-lasting dry spells that affect it. Despite these periods of droughts, the Brazilian semi-arid has more rainfall than most around the world, although this rain is concentrated in space and time, with highly impermeable soils. Of all permanently available water sources in Brazil, only 3% are in the semi-arid region. Furthermore, the region has a large deficit in the balance between rainfall and evapotranspiration, creating a scenario of water scarcity that affects mainly the inhabitants of scattered rural areas.

Historically, the Brazilian Semi-arid has been the target of government initiatives aimed at fighting the effects of periodic droughts in the region. In this context, the approach has been mainly focused on construction of large water catchment and distribution infrastructure works, such as dams, large-scale irrigation systems and other multi-million dollar investments with limited results.

After decades, many of these interventions – often based on clientelism – have resulted in centralized developed areas with high investment and technology levels, little social and economic viability, negative environmental impacts and low levels of access and benefits for the local populations, especially the nearly 1.7 million smallholder farmers living in the region.

This model of “**drought combat**”, markedly between the 1960s and 1980s, and still present in several government actions, programs and policies, generated, in addition to large amounts of wasted public money, more profound social crises at the local level, income concentration and negative impacts for the region’s development process as a whole.

Consequences, worsened by the climate change process, include increased rural exodus and social vulnerability. This vulnerability affects a large portion of the local population and is marked by difficulties in accessing basic services, dependence on aid policies and difficulties in developing inclusive productive activities.

To reverse this situation of vulnerability and change old paradigms in the region, the local population, led by movements and various local social organizations, became aware that, in order to ensure their ability to remain in their homeland, particularly the rural areas of the Semi-arid, it would be necessary

to embrace a new development model. This new proposal would have to be based on appreciation of the region and its people, while respecting the limited availability of natural resources and local climate conditions.

Thus, a true “social revolution” was started, facing the centralized and clientelist model, in search of sustainability and harmonious living with semi-aridness. New paths were widely discussed in social movements and organizations, based on principles such as cooperation, resilience and social innovation.

Currently, *Sertanejos* (inhabitants of the Semi-arid), have shown an ability to deal with complex problems in a manner that is simple yet effective for their reality. Several social technologies and local organization models have become public policies with positive impacts, such as construction of rainwater catchment and storage cisterns, implemented in over 1 million properties of the region. It should be noted that many of these structures are constructed in community bees, with participation of the beneficiary families.

Therefore, the new paradigm for the region, namely **Harmonious Living in the Semi-arid**, was constructed throughout the years, based on traditional knowledge and existing experiences, impacting one of the largest social movements in the country and giving rise to extremely effective public policies with high capacity to mobilize people.

These initiatives are aimed at demonstrating that, under certain conditions, the Semi-arid can become a viable region, where policies that enable *Sertanejos* to live in harmony with their environment can provide for a sustainable development model that is economically, environmentally and culturally adapted to its context.

This paradigm of **Harmonious Living in the Semi-arid**, resulting from demands by the local population, is experiencing an important period of surging social innovations. These innovations, along with efforts in favor of technical and scientific knowledge generation by important institutions with local activities, knowledge exchange actions and programs, and policies that are better adapted to the local context, have been experimenting and demonstrating new knowledge. Some examples include several water storage and power generation techniques, integrated production models, identification of products from local sociobiodiversity, cultural appreciation, and social participation and protagonism processes.

It is within the scope of this discussion involving models and paradigms for the Semi-arid that this special edition of the **Sustainability in Debate** magazine was proposed, with the topic of “**Combating drought and living with the semi-arid – New paths in the pursuit of sustainability.**” Its content includes 14 scientific articles, two reviews, an interview with Professor Nicola D. Coniglio and a debate that took place during the Second International Living in Harmony with the Semi-arid Seminar, held in the *Centro Xingó*, in the state of Alagoas, in 2015.

The **Interview** section contains an analysis by Professor Nicola Coniglio, specialist from the Department of Economics of the Bari “Aldo Moro” University, regarding relations between climate variability and international migration. Based on studies carried out in partnership with Professor Giovanni Pesce, gathered in the article *Climate Variability and International Migration: an empirical analysis*, Coniglio presents an innovative view of the impact severe climate change has on populations. This study is known as the first to take a close look at the type and timing of severe climate change phenomena and their impact on human migration. This interesting interview was performed by Christina Kohler, Master in International Economics and International Relations from the Johns Hopkins School of Advanced International Studies.

The **Debate** section of this special issue was held during the Second International Living in Harmony with the Semi-arid Seminar that took place in October, 2015, at the Xingó Center for Harmonious

Living with the Semi-arid, in Piranhas, Alagoas. Living in harmony with the Semi-arid was analyzed as an imperative paradigm for sustainability within the context of Sustainable Development Goals. The debate, initiated with the lecture by Professor Marcel Bursztyn, from the University of Brasilia's Sustainable Development Center, was facilitated by Francisco Campello, representing the Ministry of Environment. Members of the debate included Professor Polliana Luna Barreto, from the Federal University of Cariri (UFCA); Albani Rocha, representing the Coordination in the Brazilian Semi-arid (ASA); Vitor Santana, representing the Ministry of Social Development and the Fight against Hunger (MDS) and David Pereira Jerez, Professor and Associate Researcher at the Technical University of Madrid's Center of Innovation and Technologies for Human Development (itd/UPM). The main conclusions of the debate were systematized and are included in this special issue by Ives Romero Tavares do Nascimento, with contributions from Carolina Gomes Nascimento and Adélia Alencar Brasil.

This issue also contains 14 articles related with the topic of living in harmony with the Semi-arid. Faced with a subject that inspires deep reflection, varied approaches resulted in content that allows for expanded perceptions from environmental, social, political and economic standpoints, with regards to the region and its climate conditions.

In the first article, under the title *The discourse of drought and water crisis: an analysis of the Ceará Water Belt*, authors Josier Ferreira da Silva and Francisco Willian Nobre argue that the discourse involving droughts in Brazil has, throughout history, influenced development of public policies that are not connected with semi-aridness in the region. In this context, the article analyzes the controversial works for the Ceará Water Belt, considered a definitive solution to water scarcity in the state.

Two articles, *Climate variability, agricultural livelihoods and food security in Semiarid Brazil*, by Patrícia Mesquita, Hannah Wittman and José Aroudo Mota, and *Evaluation of the impact of desertification on environment and populations of the Brazilian Semi-arid using a geographical database*, by Rita Márcia da Silva *et al.*, discuss the controversial topic of local vulnerability to climate phenomena. Along general lines, the study by Mesquita *et al.* about food security provides an argument that high levels of social vulnerability in the semi-arid region of Brazil, along with forecast climate events, can have negative effects on subsistence crops and cultivation areas, with grave consequences on rural food production. The article by Silva Pinto Vieira *et al.*, in turn, analyzes the impact of desertification and presents a tool capable of integrating physical, environmental and socioeconomic information in maps with different scales and resolutions, to facilitate and expedite analyses by decision-makers regarding degradation and desertification in the Semi-arid.

The three following articles discuss the challenges presented by new social technologies that are understood as procedures, tools and practices aimed at solving local problems. Considering these as means to make possible harmonious living in the Semi-arid, the articles take into consideration knowledge held by local populations inhabiting the Semi-arid in the Northeast and develop these techniques, among other aspects. The article *Social technologies in Rio Grande do Norte: discussions about living in the Semi-Arid*, by authors Valdenildo Pedro da Silva and Evelyn Christie de Barros, presents the main social technologies developed and utilized by populations in the Rio Grande do Norte Semi-arid.

Along the same lines of research, but focusing on the realities of social stakeholders who implement these social technologies, authors Carla Gualdani and Marli Sales, in the article *Social technologies for harmonious living in the Semi-arid and peasant rationale*, analyze the rationale smallholder farmers employ in the decision-making process with regards to implementation of social technologies in their properties, within a context of difficult access to water and crop production.

Still in the same topic, the study under the title *The contribution of Biowater to food security and sustainability in the Rio Grande do Norte Semi-arid*, authors Christiane dos Santos, Zildenice Maia,

Elisabete Siqueira and Cimone Rozendo analyze the Family Biowater Program, looking at food security and sustainability for families experimenting with this initiative.

With emphasis on social capital and protagonism in communities, the four articles that follow seek to demonstrate the importance of community-based actions and initiatives for appreciation of local resources in construction of sustainable living in the Semi-arid. The study *Living with water scarcity: the importance of social capital in areas susceptible to desertification in the Semi-arid*, by Jennifer Faustino, Patrícia Lima, Francisco Casimiro Filho and Maria Ivoneide Rodrigues, presents an analysis of how social capital indicators are related with perceptions by leaders of rural communities regarding their ability to live with water scarcity resulting from periodic droughts in the semi-arid region.

In the article *Coopercuc: pathways to appreciation of local resources and living with the Semi-arid*, authors Chiara Gentile and Andrés Burgos examine the meaning of living in the Semi-arid, based on the experience of the Canudos, Uauá and Curaçá Family Farmer Cooperative (Coopercuc), in the state of Bahia. According to the research, social and cultural processes in the Cooperative are capable of reversing the effects of some historic and sociopolitical processes associated with the main fragile aspects of the semi-arid region.

Authors Môngolla de Abreu, Verônica do Nascimento, Adélia Brasil and Daniquele Andrade, in the article *Social protagonism and its contributions to sustainable rural development: a case study in the municipality of Cariraçu – Ceará (Brazil)*, reflect upon social protagonism and sustainable rural development, based on the accounts of a peasant family living in the municipality of Cariraçu, Ceará. For their methodology, a descriptive qualitative approach was used.

Focusing on women's protagonism, authors Tatiana Brandão, Janice Borges and Luciano Barbosa, in their study *Women's Protagonism: a case of sustainable living in the Semi-arid of the Brazilian Northeast*, describe and analyze strategies for socio-productive inclusion used by members of the "Rescuing your History" Women's Association, located in the village of Lagoa da Volta, municipality of Porto da Folha, in the state of Sergipe's semi-arid region, while discussing agroecology as a strategy for living in harmony with the Semi-arid.

Environmental management and conservation of the Caatinga are the topics in the next three articles in this special issue. The article *Conservation of the Caatinga in different arenas of the Brazilian Semi-arid*, by authors Amanda Silvino, José Eduardo Viglio and Lúcia da Costa Ferreira, identifies and discusses different arenas that influence Caatinga conservation in the Brazilian Semi-arid. As a discussion thread, the authors place emphasis on science, in addition to Economy-State and Sustainability.

In the article *Sustainability of settlements in areas surrounding conservation units: the case of Mata da Pimenteira State Park in Serra Talhada, Pernambuco*, authors Alessandro Bilar, Rejane Pimentel and Maria do Socorro de Araújo evaluate the sustainability of the Lajinha Settlement, located in the areas surrounding Mata da Pimenteira State Park in Serra Talhada, Pernambuco, by means of application of a sustainability index that takes into consideration environmental, social, economic and institutional aspects of the settlement.

Anny Feitosa, Júlia Barden, Camila Hasan and Odorico Konrad, in the article *Habits of the population in management of household waste: a case study in Juazeiro do Norte, Ceará*, analyze the habits in handling and final disposal of household waste in the town of Juazeiro do Norte, state of Ceará. To achieve this, interviews were conducted in 53 households located in neighborhoods classified according to their socioeconomic strata.

Lastly, authors Shana Sieber and Ramonildes Gomes end the "Articles" section with their study under the title *The municipal plan for harmonious living with the Semi-arid as a discursive instrument: a*

case study in the Pernambuco, Brazil Semi-arid, in which a reflection is presented regarding the process of legitimation of the harmonious living with the Semi-arid paradigm, by means of an analysis of construction of the Municipal Plan for Harmonious Living, in the municipality of Serra Talhada (Pernambuco state semi-arid region).

The **book review** section includes two parts. The first, under the title Discussing autonomy and sustainability in the Brazilian Semi-arid, written by Carolina Milhorange, analyzes the book *Participation, Women's Protagonism* and *Living in Harmony with the Semi-arid*, by authors Suely Chacon, Verônica do Nascimento and José Ferreira Lima Jr.

The second book is *Vast Hinterlands: history and nature in science and literature*, by organizers Sandro Dutra e Silva, Dominichi Miranda de Sá and Magali Romero Sá. It was reviewed by Silvana Gino Fernandes de Césaró, with the title *Knowing the history and characters of the Brazilian Hinterlands*.

We wish you all an enjoyable reading experience!

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