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Sustainable Social Technologies In The Semiárido Of Rio Grande Do Norte – Brazil

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ABSTRACT

Along the Brazilian history, the federal government has invested in the construction of large-scale water works in the Northeastern region, aiming to fight drought in the *Semiárido* and to finish with the scarcity of water by means of public policies. However, the climatic context makes drought a natural characteristic of the Northeastern region and cannot be fought against, as it is a natural phenomenon in the area. The objective of the present paper is to investigate how social technologies implemented in the *Semiárido* have contributed to the strengthening of women's production capacity in the Hipólito community located in the Mossoró municipality, (State of Rio Grande do Norte, Northeastern Brazil), with the implementation of fertilized cisterns, aiming at gender equality and sustainable agriculture as preconized by Agenda 2030. As a methodological procedure, a qualitative research was carried out, adopting the participatory observation and the focal group techniques. Twelve women who integrate the *Mulheres em Ação* group participated in the study. It was observed that women positively perceive the impacts of the social technologies of the *Um Milhão de Cisternas* (P1MC) and *Uma Terra e Duas Águas* (P1+2) programs in the Hipólito community. Moreover, agriculture practices involved in the construction of the water reuse technology in their yards yielded positive expectations regarding production by the addition of another social technology that will make a larger volume of water available to the community. It is concluded that social technologies coexisting with the *Semiárido* have contributed to a new territorial development model, consonant with the *Semiárido* characteristics.

KEYWORDS: Sustainable Development. Social technology. Group of women.

1. INTRODUCTION

Social Technology is a means to concretize the paradigm of coexistence with the *Semiárido.* It is an alternative to technological practices adopted in the fight against drought in Northeastern Brazil, where technologies not adapted to the reality of the *Semiárido* were transferred to (GUALDANI; FERNANDÉZ; GUILLÉN, 2015). For a long time, technology has been taken as a neutral solution, with no implicit interests and applicable to any region and culture.

Dagnino (2014) shows how technologies were thought to serve an excluding development model, once science and technology were subordinated to the system's interests, with no real concern regarding minor cultural groups.

From the 1980's, under strong impact of the neoliberal system and consequent increase of social and environmental problems, a spreading of the concern about technologies that would promote a more sustainable development has been observed, taking into consideration the knowledge and experience of the social actors involved in the matter, in order to find solutions to local problems. According to Social Technology networks (RTS, 2010), social technology can be conceptually understood as any products, techniques, and methodologies developed with the interaction of scientific knowledge and with social experiences that represent effective solutions for social transformation, thus finding solutions by knowledge interchange.

Social technologies comprise practical solutions to problems, guaranteeing, among other advantages: free information flow, connectivity and cooperation, deliberate human action, and the participation of the community in planning, implementation, and assessment of the results (RTS, 2010).

According to Costa (2013), one of the first experiences that illustrate social technology is known as Alternative Gutter. It is a gutter created by a 16-year-old student that is made of PET bottles. By analyzing the problem caused by prolonged rainfall to the soil in his community, he designed a gutter made of easily available, recyclable material. The gutter made of PET bottles was ten times cheaper than the conventional ones. Using such technology, rainwater was

directed to reservoirs, thus preventing soil erosion and guaranteeing a water source for future use.

Simple solutions for big problems can come from many actors who are in daily contact with such problems. They are acquainted with the local reality and with what is available in terms of resources to encourage the solution of problems. The concept of social technologies is that community members can participate in the solution of their own problems.

Another widely known example of social technology is the cistern. As shown by Gualdani, Fernandéz, and Guillén (2015), it was idealized by a brick layer who built swimming pools in Southeastern Brazil. When he arrived in Northeastern Brazil, he used his experience to build a structure capable of storing rainwater and guaranteeing water quality for future use in places where water was scarce. The cistern is one of the most widespread social technologies in the Brazilian *Semiárido*. After changes and adaptations along the years, social technologies do not focus only on water storage. At present, their uses are varied, such as: access to potable water (household cistern and desalinator), food preparation (e.g., *cisterna calçadão* and *cisterna enxurrada*), handling of renewable energy sources (*ecofogão* and biodigestors), and social technologies of multiple uses (*poço cacimbão*, *tanque de pedra*, underground dams, and *plantação de palma*).

In this sense, it is worth mentioning that when the effectiveness of social technologies is asserted and the context in the political and economic ambit is favorable, these technologies can be incorporated to public policies and financed by the State. In the Brazilian *Semiárido*, for example, it is possible to observe the triggering of public policies coexisting with the *Semiárido*, in particularly from the 2000's on.

Considering the importance of social technologies to the sustainable coexistence with the Brazilian *Semiárido*, a research was carried out via the development of the project entitled: "*Cisternas fertilizadas: construindo a autonomia das mulheres no semiárido*" (Fertilized cisterns: strengthening women's autonomy in the *Semiárido*), financed by the National Council for the Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPq), by means of Note 36/2018 – A – Development and Technology, Process 443489/2018-1. It is a partnership between *Centro Feminista Oito de Março* (*Oito de Março* Feminist Center – CF8), University of the State of Rio Grande do Norte (UERN), and the Rural Federal University of *Semiárido* (UFERSA). As part of this major project, the subproject: *Tecnologias Sociais Sustentáveis e Desenvolvimento Territorial no Semiárido Potiguar: perspectiva de alinhamento com a Agenda 2030* (Sustainable Social Technologies and Territorial Development in the Potiguar *Semiárido*: perspective of alignment with Agenda 2030) was developed.

The objective of the present study is to assess how social technologies implemented in the Hipólito community in the Mossoró municipality, State of Rio Grande do Norte, have contributed to the strengthening of women's production capacity with the implementation of fertilized cisterns, aiming at gender equality and sustainable agriculture, as recommended by Agenda 2030.

2. DROUGHT, PUBLIC POLICIES AND EMERGENCE OF A NEW PARADIGM OF COEXISTENCE WITH THE *SEMIÁRIDO*

According to the *Superintendência do Desenvolvimento do Nordeste* (SUDENE, 2017), the new perimeter of the *Semiárido* encompasses 1,262 municipalities, totaling 1,128,697 km² of territorial area and 27,870,241 inhabitants. Northeastern Brazil constitutes 18.27% of the Brazilian territory and the annual rainfall index in the *Semiárido* is 200 to 800 mm, making the drought a cyclical and natural phenomenon.

For centuries the preconceived idea that drought merely meant lack of water and that the Brazilian *Semiárido* was a territory doomed to failure has been predominant. Thus, public policies were characterized for not being efficient in the solution and mitigation of the effects of such phenomenon and the majority of these policies ended up increasing the vulnerabilities of the local population. According to Melo, Pereira, and Dantas Neto (2009), there are moments that should be highlighted when it comes to the role played by the Brazilian State in the "fight" against drought.

It was only in the 20th century that more consolidated policies have been implemented, starting with the creation of the *Inspetoria de Obras Contra a Seca* (Inspectorate for Works against Drought – IOCS) in 1909. It was transformed in the *Departamento Nacional de Obras Contra a Seca* (National Department for Works against Drought – DNOCS) in 1945, agency responsible for large-scale projects, such as drilling of wells, building of dams and weirs, and the development of the first studies on the local geography. Until then, the drilling of wells in the crystalline basement yielded brackish water of very limited quality (ANDRADE; NUNES, 2014).

The building of weirs and dams has become a standard measure to fight drought. However, the distribution of the stored water has not been planned. An estimative exists that more than 70,000 units have been built, storing ca. 30 billion m³ of water, making the Brazilian *Semiárido* an area of great capability to store water artificially (MELO; PEREIRA; DANTAS NETO, 2009).

It is worth mentioning the creation of the *Superintendência do Desenvolvimento do Nordeste* (Northeast Development Superintendence – SUDENE) in 1959, agency with the mission of promoting social and economic development of Northeastern Brazil. From the creation of this agency, DNOCS has lost its autonomy, being controlled by SUDENE. One of the most common criticisms against SUDENE was that it was an agency that favored those least affected by social problems, reaffirming the "invisibility" of the marginalized population who needed help (ANDRADE; NUNES, 2014).

The drought hazard, in certain instances of the local policy of Northeastern Brazil, has become an invaluable tool for the maintenance and perpetuation of power in the hands of a few (MELO; PEREIRA; DANTAS NETO, 2009). Besides, water transport by means of water trucks configured a practice that ensured political power of several local agents. This historical background shows how the vulnerability of the *Semiárido* population was not generated by drought only, but was constructed socially. Thus, the majority of the consequences relative to drought result from the social context of Northeastern Brazil.

The "fight against drought" has reflected in the public policies developed in Northeastern Brazil, as if the problem was simply lack of water. In this period, it was up to foreign

technicians and specialists the solving of problems of the Brazilian *Semiárido*. After these policies were put in practice, the occurrence of droughts has shown how these measures were insufficient to face the problem.

In this sense, Costa (2013) attributes this failure to embarrassments in the ambit of the implementation of policies, such as lack of resources, corruption that took place when these resources were made available, difficult coordination among the states, and the fact that the starting point of these policies was the erroneous formulation of the problem. A redefinition of the ideas conceived in the ambit of the public policies was therefore necessary. From civil society actions, the paradigm of coexistence with the *Semiárido* emerges in the 1990's. Such paradigm consists of attributing a new look to and old problem, assuming that drought is a problem that can be handled.

Conti, Schroeder, and Medaglia (2014) point out that the paradigm of coexistence with the *Semiárido* is based on five premises: the people from the *Semiárido* are citizens; drought is not fought against; it is possible to live (well) in semi-aridity; the *Semiárido* is viable, and the contextualized education is fundamental in this process. According to these authors, some policies of concretization of this paradigm would be: promotion of the agrarian reform and land regulation, planting of adapted species, raising of adapted animals, education contextualized to the conservation of the *Semiárido* and the development and implementation of social technologies focusing on water storage.

Therefore, in order for this paradigm to be included in government agendas and to be concretized in public policies, the emergence of new actors and entities in the civil society was necessary. One of the major entities was the *Articulação do Semiárido* (*Semiárido* Articulation – ASA), constituted by a variety of social movements. The formulation of ASA, as shown by Silva (2018), occurred in two instances: from the occupation of SUDENE in 1993 and the publication of the *Declaração do Semiárido* (*Semiárido* Declaration), document that resulted from the 3rd Conference of the United Nations Parties. ASA was a key entity for the paradigm of coexistence with the *Semiárido* to enter the government agenda from the form of a public policy.

In this context, it is worth mentioning that in consonance with this new paradigm regarding the understanding of the Brazilian *Semiárido*, Agenda 2030 – instituted by the United Nations (UN) in 2015 – presents seventeen Sustainable Development Goals (SDG), and among them it is possible to point out goals 2, 5, 6, and 10, which are aligned with the perspective of discussing the new *Semiárido*. This paper is in accordance with SDGs, more specifically Goal 2: Zero Hunger and Sustainable Agriculture – in order to eradicate hunger, food security and improved nutrition shall be achieved and sustainable agriculture be promoted (UN, 2021); Goal 5: Gender Equality – empowerment of all women and girls; Goal 6: Clean Water – ensure the availability and sustainable management of potable water and sanitation for all, and Goal 10: Reduced Inequalities, which includes two targets aligned with the present research: Target 10.3, which aims at guaranteeing the equality of opportunities and reducing the results of inequalities, if necessary by eliminating laws, policies, and discriminatory practices, and the promotion of legislation, policies, and actions adequate to this matter, and Target 10.4, which highlights the adoption of policies, in special fiscal, wage and social protection to progressively achieve greater equality (UN, 2021).

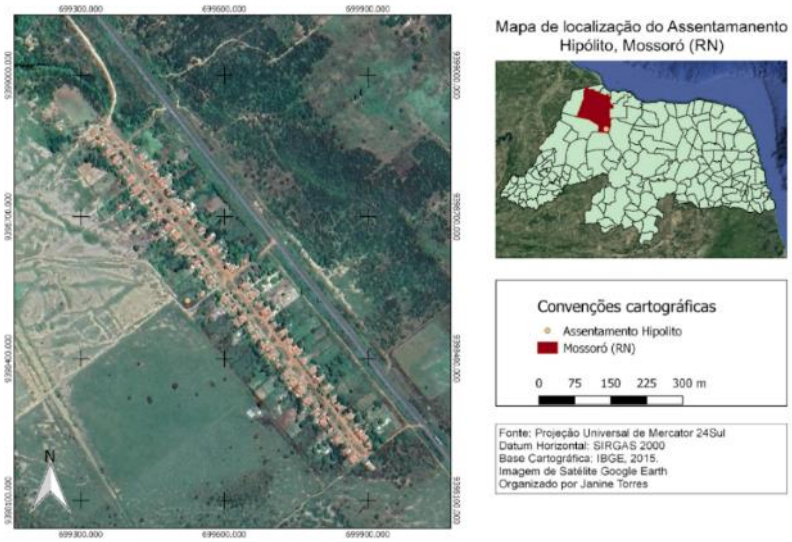
3. METHODOLOGY

3.2 Characterization of the study area

This research was developed in the Mossoró municipality, located in the western region of the State of Rio Grande do Norte, having as empirical unit of reference the rural community of the Hipólito Settlement. According to the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics – IBGE, 2021), the estimated population of Mossoró in 2019 was 297,378 people.

According to Torres (2020), the *Projeto de Assentamento de Reforma Agrária Hipólito* (Hipólito Settlement Agrarian Reform Project), which extends for two agro-towns, is located 29 km far from Mossoró and 242 km far from the state capital Natal. The access to Hipólito is via BR 304 highway. Hipólito occupies an area of 6,685.24 hectares, being one of the first settlements of the State of Rio Grande do Norte and the first of Mossoró municipality (Figure 1).

Figure 1 - Location of the Hipólito settlement in Mossoró (State of Rio Grande do Norte), 2020



Source: Cartographic data obtained from IBGE (2015), organized by Torres (2020).

The settlement was created after the expropriation of the Hipólito Farm on 10th October 1986, when the *Plano Nacional de Reforma Agrária* (National Plan for Agrarian Reform) was in force during Brazil's president José Sarney's government. Thus, it was after legal procedures that Decree 94331, dated 14th May 1987, established the basic structure of the *Instituto Nacional de Colonização e Reforma Agrária* (National Institute for Colonization and Agrarian Reform – INCRA). The Hipólito Farm ownership was emitted and the *Projeto de Assentamento de Reforma Agrária da Fazenda Hipólito* (Settlement Project for the Agrarian Reform of the Hipólito Farm) was created on 9th July 1987. According to Pereira (2005), in order to implement the settlement project, an area of 4,864.60 ha was expropriated and distributed. Each family received 30 ha, of which 15 ha should be used for family production and 15 ha for community production. 137 plots were initially distributed in Hipólito. At present, circa 170 families live in Hipólito (TORRES, 2020).

3.2 Methodological Procedure

The qualitative approach was adopted for this research. Firstly, a bibliographic and documental research was carried out with the objective of reviewing the literature related to the themes pertaining to this research. In parallel, group discussions took place, mostly involving the *Grupo de Estudos em Gestão Ambiental* (Environmental Management Study Group – GEGA) and the *Laboratório de Ecologia Aplicada* (Laboratory of Applied Ecology – LEA) of the Department of Environmental Management of the State University of Rio Grande do Norte – DGA/UERN. Among the themes discussed during the meetings, the following are highlighted: United Nations (UN) Agenda 2030 and the Sustainable Development Goals (SDG); social technologies and the coexistence with the *Semiárido*, territorial development, public policies, and sustainability. The meetings took place from August to November 2019.

Visits to the Hipólito community followed, in order to present the actions predicted in the project, to listen to the women's group and jointly define who would receive the social technologies. Not only the implementation of the social technologies of water reuse and fertilized cisterns was discussed with the group, but also the identification of the social technologies existing in the community.

A meeting with the *Mulheres em Ação* (Women in Action) group also took place, in which four researchers of the State University of Rio Grande do Norte (UERN), 12 *Mulheres em Ação* group members, and a representative of the *Centro Feminista 8 de Março* (8th March Feminist Center – CF8) participated. Thus, 17 people formed the focal group. During this meeting, the observations of the participants were recorded for later analysis (Figure 2).

Figure 2. Focal group in the Hipólito Settlement in Mossoró (State of Rio Grande do Norte), 2020

Source: Project File, 2020.

The focal group meeting took place in the first week of March 2020 in the São Francisco church, where the *Mulheres em Ação* group usually meets. The focal group meeting was divided in four instances, when the following themes were presented: (a) the insertion of social technologies in the Hipólito settlement; (b) the importance of technical assistance; (c) female farmers' perception of these technologies, and (d) questions related to women's participation in the group.

According to Trad (2009), this technique of data collecting is based on the interaction of individuals within the group, which promotes the problematization of a specific theme. Thus,

group meetings encourage the exploration of the participants' points of view from insights on certain social phenomena. The participants use their own vocabulary, formulate their own questions, and together search for answers pertinent to the questions under investigation.

To validate the research, the signing of the Contract of Adhesion (CA) was required, as well as of a Term of Free and Clear Commitment (TCLE) and a Consent for Audiovisual Recording and Image Use (TAGAUI), as recommended by the UERN Research Ethics Committee.

In order to direct the group discussions, an guide was prepared with provocative questions made by the researchers, so as to encourage the participants to give their impressions and opinions.

4. RESULTS AND DISCUSSION

4.1 Role played by women and social technologies

Mulheres em Ação is a group composed of 35 women; however, not all of them are active participants. During the discussions, it was clear that some have been in the group much longer and were more active during the activities of the meeting.

According to data obtained during field work, 170 families live in the Hipólito Settlement. Three types of social technologies were identified in the settlement: P1MC, P1+2, and water reuse.

Field observations showed that the social technologies implemented in the community focus on the sustainable reuse of water and the ecologically-based family agriculture. Family agriculture is the financial support of the family. In the majority of the houses the activities are directed to agroecological practices.

Women's perception revealed that social technologies have a major role in facilitating the access to water. The main change in the community regarding the social technologies was the beneficial use of water in household chores. Implemented in 2003, the objectives of the program financed by the Federal Government entitled "*Um milhão de cisternas"* (A million cisterns – P1MC) was the implementation of cisterns for catchment and storage of rainwater for human consumption. The program has changed the reality of many Brazilian men and women living in the *Semiárido*. Because it is a technology that enables the implementation of an easily accessible water reserve, it helped families coexist with the reality of the droughts. Specifically for women, this technology brought a real revolution with it. According to Nogueira (2017), drought increases the burden of work labeled as "women's task", once they are supposed to walk for long distances to get water that is not always potable and that contributes to increase the insecurity of water transmitting diseases to children and other members of the family (NOGUEIRA, 2017).

Another important element pointed out by women referred to agroecological practices that started to take place in the community from the implementation of cisterns. The objective of *Uma Terra e Duas Águas* (A Land and Two Waters – P1+2) program that started in 2007 was to widen the offer of water for food preparation and raising of animals. According to the focal group, the development of agricultural activities was not easy before the implementation of the technologies, because water scarcity was a limiting and defining factor for an activity to take

place. Women reported that there was no water for human use and animal watering, and even for other activities, such as agriculture. With the implementation of program P1+2, cultivation in productive yards was possible in the community. Women started to produce fruit, vegetables, etc., and to raise animals in their own yards. These activities have significantly contributed to the generation of income in the community and are at present activities exerted by the majority of the community, mainly by women.

For an issue to get on the political agenda, at least three flux must encounter: the problem, the alternative or solution, and the political will. Around the 2000's these three flux types can be noted: the problem – when it is perceived that how much the previously adopted policies have not solved the problem in Northeastern Brazil and the drought issue gains more prominence; alternative/solution – it started with the creation of ASA, the emergence of the paradigm of coexistence with the *Semiárido*, and its defense by several social actors; and political – it takes place when ASA gains strength and relevance from the established relationships (COSTA, 2013).

In the Hipólito community, the first public policy was P1MC, whose main actors were ASA, the Ministry for Social Development and the families that received the P1MC technology. This program was created with the objective of constructing a million cisterns of 16,000-liter capacity. Parallel to P1MC, P1+2 was created. As P1MC, P1+2 is a program of social formation and mobilization for the construction of technologies that promote the coexistence with the Brazilian *Semiárido*.

Increasing water storage capacity, P1+2 envisages the construction of 52,000-liter cisterns so that families can use rainwater stored for human and animal consumption and crops. P1+2 also predicts the construction of 52,000-liter cisterns in schools, that is, the *Cisternas nas Escolas*. With different modalities, Chart 1 lists the main implementations and specificities of P1+2.

Chart 1. Modalities of Program P1+2 implementation, 2020

FAMILY USE	COMMUNITY USE
• ***Cisterna-calçadão/sidewalk cistern*** **–** It is a 200-m² cement sidewalk built on the ground to collect rainwater. By means of pipes, rainwater that falls inside the sidewalk runs to a cistern. 300-mm rainfall is enough to fill the cistern.	• ***Tanque de pedra*** or ***caldeirão*****/Rock tank** or **cauldron** – it is a technology common in hilly areas or where rock slabs serve as rainwater catchment. They can be large trenches, grouts or natural holes, usually in granite. The stored rainwater is used as drinking water for animals, plantations, and household chores.
• ***Barragem subterrânea*****/underground dam** – It is built on lowlands and brooks and streamlets that form in winter, which is the rainy season in the *Semiárido*.	• ***Bomba d'água popular*****/Popular water pump** – It makes use of inactive tubular wells to extract groundwater via a manual equipment operated with a steering wheel. When turned, the wheel extracts large volumes of water with little effort. It is of community use, low cost, and easily handled. If well cared of, it can last for up to 50 years. The pumped water is of multiple uses: food preparation, drinking water for animals, and household chores. In general, each bomb serves ten families.
• ***Barreiro-trincheira*****/barrier trench** – Long, narrow and deep tank excavated in the ground. From what the families know about the region, they are built in flat terrain and close to the production area. With the capacity of storing at least 500,000 liter of water, they have the advantage of being narrow, which reduces the effects of the sun and wind on the water.	

• ***Barraginha*/little dam –** It is 2 to 3 m deep, with a diameter of 12 to 30 m. It is built shell-shaped or semi-circular and stores rainwater for two or three months, maintaining the moist in the soil for a longer time.	
• ***Cisterna enxurrada*/runoff cistern** – It has the capacity of storing up to 52,000 liters of water and is built buried in the ground. Only the conic-shaped roof remains visible above the ground. The terrain is used as catchment area. When it rains, rainwater runs on the ground and before reaching the cistern, it runs through two or three small decanters disposed in sequence. Pipes help to drain water into the reservoir. With the function of filtering sand and other debris that may remain in the water, the decanters retain these residues to prevent accumulation at the bottom of the cistern.	

Source: ASA, 2020. Prepared by Torres (2020).

According to the focal group, the first reuse cisterns arrived in the Hipólito community in 2014. It was a "real blessing" for the local population, but only two families of the 170 families living in the community have focused on the reuse of water. This reuse potential will surely be explored with the implementation of the project: *Cisternas fertilizadas: Fortalecendo a autonomia das mulheres no semiárido* (Fertilized cisterns: strengthening women's autonomy in the *Semiárido*).

The *Mulheres em Ação* group pointed out that the importance of the group resided in knowledge interchange, active participation of elderly women, information and experience exchange among women, and most of all the construction of a conscience of collectivity and partnership among women.

Still regarding social technologies, it is important to stress out that ASA has already implemented in Northeastern Brazil 626,791 drinking water cisterns and 103,528 cisterns focusing on production (ASA, 2018), out of which 68,027 plate cisterns and 11,397 production cisterns were built in the State of Rio Grande do Norte (TORRES, 2020). The local context regarding the implementation of cisterns is reported in Chart 2.

Chart 2 – Social technologies implemented in Mossoró (State of Rio Grande do Norte), 2020

Program	Social technologies	Number cisterns
Um Milhão de Cisternas (A Thousand Cisterns - P1MC)	Plate cisterns (16 thousand liters)	3,175
Uma Terra e Duas Águas (A Land and Two Waters - P1+2)	*Cisterna-calçadão* (52 thousand liters)	164
	Barreiro-Trincheira (52 thousand liters)	47
	Cisterna-Enxurrada (52 thousand liters)	185

Source: ASA, 2020, organized by Torres (2020).

In the ambit of the P1+2 program, a total of 25 cisterns were built in the Hipólito Settlement, following the same participatory model of *Um Milhão de Cisternas* (P1MC program). Torres (2020) highlights that the appropriation of social technologies as an alternative source to obtain and create new long-lasting sources for food production not only contributes to the generation of income and women's autonomy in the sustainable handling of natural resources,

but also rescues the farmers' knowledge via sustainable practices and strengthens their will to remain in the *Semiárido*.

4.2 Water reuse as social technology

Water reuse is an efficient tool, when it comes to the coexistence with the *Semiárido*. It promotes certain benefits, such as the control of environmental pollution (in particular in rural areas, where lack of sanitation is notable), and an alternative to fertilizers, as residual water contains nutrients and organic matter from this water is deposited in the soil. The reuse of water ensures agricultural production and directly promoted settlement in rural areas.

In this sense, the implementation of fertilized cisterns was conceived with the objective of using effluents in agriculture. According to Torres (2020), during the Hipólito Settlement workshop, it was observed that the participants who adopted the water reuse technology implemented fertilized cisterns in their yards, with the potential for the cultivation of bell pepper, tomato, lettuce, banana, pepper, cassava, papaya, and chives, by means of dripping from a *cisterna-calçadão* (Figure 3).

Figure 3 *Cisterna-Calçadão* (sidewalk cistern), Hipólito Settlement, Mossoró (State of Rio Grande do Norte), 2019.

Source: Project File, 2019.

Santiago *et al*. (2015) highlight in their studies successful systems of reuse of grey waters, which have been a viable alternative for familiar agriculture in the Brazilian *Semiárido*. The authors also observed that this reuse system contributes to the reduction of environmental contamination of the productive yards.

According to Torres (2020), training for the construction of fertilized cisterns counted with the participation of two women from the Hipólito Settlement, who were contemplated with the pilot project. As shown in Figure 4, this training also counted with the participation of 10 women from distinct women groups from Mossoró, Apodi, and Caraúbas (State of Rio Grande do Norte). After training and interchange, it was time for the women to build the technology in their yards, as shown in Figure 5.

Figure 4. Training and interchange between the local group and CF8 for the construction of fertilized cisterns in Apodi (State of Rio Grande do Norte), 2019.

Source: Project File, 2019.

Figure 5. Construction of the reuse filter by women in the Hipólito Settlement in Mossoró (State of Rio Grande do Norte), 2020.

Source: Project File, 2019.

The perspective of developing social technologies in the Brazilian *Semiárido* points to the importance of the dynamization of rural territories and coexistence with the *Semiárido* climatic and environmental adversities. Besides, social technologies contribute to the settlement of family farmers in their place of socio-economic reproduction and strengthen the new paradigm of coexistence with the *Semiárido*.

5. FINAL CONSIDERATIONS

The implementation of social technologies can help strengthen food sovereignty, economic inclusion, and women's autonomy in communities from the efficient use of water resources.

It is expected that the implementation of fertilized cisterns can contribute to the increase of water supply in rural areas, by means of the reuse of grey waters and rainwater storage, aiming to contribute to the local sustainability.

It was observed along the study that the participation of the civil society and several agents was primordial in the change of paradigm and the construction of a new *Semiárido*, by the formulation of effective projects, such as those regarding technologies de water storage (P1MC, P1+2), aiming at the coexistence with drought and long dry periods.

The women's organization in the Hipólito Settlement has shown by means of its experiences that the development of social technologies has brought not only changes in the landscape – with the installation of cisterns, and in the territory – by the adoption of regional and territorial policies, but also another meaning to the place, to the life of the families of *Reforma Agrária* settlements, who for many years have suffered with the lack of water. Thus, social technologies have promoted significant changes in the lives of the Brazilian *Semiárido* families.

The development of activities that aid the multiplication of social technologies is of paramount importance. From the communication and dissemination of actions predicted in the

projects, reduction of social inequalities, access to water, women's empowerment, and the development of sustainable agri-food systems can be achieved, as recommended by Agenda 2030 via Sustainable Development Goals.

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