Chapter 1

SDG 6 and its relationship with the world, Brazil and Embrapa

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Global context

Global water issues have been a source of concern and discussion at different levels of society. The United Nations (UN) estimates that global water demand is expected to increase by 50% by 2030. Two-thirds of the world's population currently lives in areas that experience water restriction for at least 1 month a year. About 500 million people live in areas where water consumption exceeds the availability of water resources, which in turn is intrinsically linked to quality, as pollution of water sources can curb different types of uses. Increased untreated sewage disposal, agricultural waste disposal and inadequately treated wastewater in the industry pose a risk of degradation of water quality throughout the world (Progress..., 2017).

Clean, quality water is essential for human health, well-being and prosperity. Access to sufficient water is a basic human need, both for their own consumption and for the development of their economic, cultural, leisure and other activities. However, water quality can be compromised by population growth and consequent increase in demand for this resource and the generation of waste in the development of such anthropogenic activities, which tends to worsen in the face of possible climate change, which threatens the global hydrological cycle (Nações Unidas, 2017).

Access to adequate and safe sanitation facilities is also vital for hygiene, disease prevention and human health. According to a recent report released by the World Health Organization (WHO) and the United Nations Children's Fund (Unicef) (Progress..., 2017), the number of people in the world without access to safe drinking water at home is 2. 1 billion, about 4.5 billion do not have access to safe basic sanitation, and about 892 million people practice open defecation.

Because of population growth, this situation has become more critical in sub-Saharan Africa and parts of Southeast Asia. In conflict-affected countries, children are four times less likely to use water services and two times less likely to have basic sanitation compared to children in other countries. Lack of basic needs, such as clean water, hygiene and sanitation under adequate conditions, increase the incidence of acute diarrheal diseases (ADD). According to WHO (Progress..., 2017), around 88% of ADD deaths worldwide are caused by lack of water, sanitation and hygiene treatment. A global picture related to such key factors, in the year 2015, by WHO (Progress..., 2017), is summarized in the following numbers:

- 6.5 billion people (98% of the population) have access to at least one water source 30 minutes from the collection point.
- 844 million people do not have access to drinking water.
- 263 million people spend more than 30 minutes traveling to collect water from a source.
- 159 million people still collect water for consumption directly from untreated surface sources, with 58% of them living in sub-Saharan Africa.
- 1.2 billion people (two out of five) who use securely managed health services live in rural areas.
- 1.9 billion people (27% of the population) use private sanitation services connected to sewage networks that are treated.
- The current available data are insufficient to estimate the proportion of the population using septic tank and latrines, where excreta are emptied and treated elsewhere.
- 2.3 billion people still lack basic sanitation services.
- 892 million people still practice open defecation.

According to a World Bank study (Nações Unidas, 2016), Brazil, Colombia and Peru are among the ten countries of the world with the greatest amount of fresh water available in their territories, Latin America being the continent that holds the largest resource. Despite this, 106 million Latin Americans still do not have a bathroom at home, and 34 million do not have permanent access to safe drinking water. This disparity can be explained in part by the fact that regions with greater water availability are not necessarily the areas with the highest population concentration, as is the case in the Amazon region, for example. However, as in other parts of the world, there are also extensive arid and semiarid areas in Latin

America, regions with water availability, often less than that necessary for the adequate care of the population present in these environments. These situations, aggravated by social, cultural and management issues, impose on the global community challenges to bring water, in quantity and quality, to all. This is the major objective advocated and stated by the Sustainable Development Goal 6 (SDG 6).

National context

In general, Brazil has a large water supply. At the same time, however, it also shows a significant difference between its regions in terms of water supply and demand. This results in watershed situations with scarcity and water stress where there is low availability and great demand of water resources, and places where there is an abundance of water due to high availability, but low demand. Since the beginning of the 1990s, the water sector in Brazil has been organized through the approval of legislation on water resources (Law 9,433/1997 and state laws) and the implementation of integrated management systems. According to the Sistema Nacional de Informações sobre Saneamento (National Information System on Sanitation – SNIS) (Brasil, 2014), linked to the Ministry of Cities, 83.3% of the Brazilian population has access to treated water for consumption. That means that there are still about 35 million Brazilians without access to this basic service. On social issues, the very structure of the cities that mostly grow without proper planning, the dimensions and environmental and social inequalities of the country present challenges to be overcome. The issue of supply in rural areas falls within the scope of difficulties of this goal of achieving the universalization of water supply and sanitation services for all.

Also in relation to water supply in Brazil, it is important to emphasize that the conflicts over water use have intensified in different river basins of the country, partly due to variations in the rainfall regime and, consequently, in the reduction of the flows normally observed in certain regions, but also due to a territorial planning and water resources that, in recent years, has been carried out in a more adequate way. Given this scenario, it is highlighted the importance of rational water use for irrigated agriculture, which accounts for about 70% of water consumed in Brazil (Agência Nacional de Águas, 2017). It should be noted that only a small portion of this water consumed for food production competes effectively and represents potential conflict with other sectors. This analysis should be done by river basin, case by case, and not by means of global averages. However, in urban environments, it is also important to highlight the need to improve treated water

distribution systems, which have, on average, losses of 37% of water that already has a cost associated with the treatment, a value considered too high and that ends up being paid by the company without its usufruct.

In official reports on the situation of the national water situation (Agência Nacional de Águas, 2017), water quality data are usually presented as environmental indices. The water quality indexes systematize a large number of variables, classifying water bodies into quality bands. They are numbers that allow the attribution of a qualitative value to the environment, and translate a large number of complex information into simpler parameters to interpret and therefore serve as a tool in public policy decision-making. In this way, they enable the institutions responsible for water management to identify priority areas for action that deserve some form of intervention and more immediate control.

The water quality parameters analyzed reflect the environmental stress due to the human occupation and the activities practiced in the basin. In relation to water quality, there is a differentiation of polluting sources in urban and rural environments. In urban areas, where population density is highest, there is a predominance of pollutant sources related to domestic sewage and urban drainage effluents. In rural areas, diffuse loads, mainly associated with agricultural activities, represent the main source of pollution.

In Brazil, the Basic Sanitation Law, Law 11,445/2007 (Brasil, 2007), which establishes the guidelines for basic sanitation throughout the country and covers water supply, sewage, urban cleaning, waste management solid, drainage and urban storm water management) has already reached 10 years old. Although the water and sanitation sector has undergone improvements in recent decades, with significant advances, some 35 million people still do not have access to treated water, and half of the population – about 100 million – has no sewage collection. Furthermore, only 40% of the collected sewage is treated, the other 60% is released without treatment into water bodies (Rios; Sales, 2004). According to data from SNIS (Brasil, 2014), in the North region, where the situation is less favorable, only 16.4% of the sewage is treated, and the total service index is 8.7%. In the Northeast, only 32.1% of the sewage is treated. In the Southeast, 47.4% of the sewage is treated, and the total sewage service index is 77.2%. In the South, 41.4% of the sewage is treated, and the total service index is 41.0%. Finally, in the Midwest, 50.2% of the sewage is treated, being the region with the best performance, but the average treated sewage does not reach half the population. There is a great disparity within the same state, which may have cities with very high and very low rates of sewage treatment, and cities served by privatized services and others by public services. The problem is serious, and although the issue of basic sanitation affects everyone, the biggest losers

and those who suffer the greatest impact are low-income families, many living in irregular and rural areas.

The water resources management system has several instruments: granting of use rights, information system, classification of water bodies into classes of use, collection for water use and river basin plans. In general, the implementation of these instruments is more difficult and slow in rural areas. For example, information on irrigation and watering of animals in terms of demand and their impacts on water quality are the most fragmented and precarious of information systems; the water uses in rural areas are the least regularized through the rights of use guarantee; water resources plans are still timid to ensure the protection of water sources; and charging for water use still faces resistance, especially concerning potential economic impacts and willingness to pay, competitiveness and uncertainties about the benefits generated by the application of the collection resources in the basin (Agência Nacional de Águas, 2017).

Economic instruments involving payment for environmental services, a promising route for the protection of springs, are being adopted by basin committees and water management bodies, such as the Produtor de Água (Water Producer) program of the Agência Nacional de Água (National Water Agency – ANA) (Santos et al., 2010) and other similar initiatives throughout the country. Potential benefits include reduction of diffuse pollution, silting and water treatment costs, among others. The implementation of collection in the country, as an economic and financial management instrument, aims to prevent and respond to situations of conflict over water use and pollution, contributing to water security, and consequently favoring economic growth and well-being (Organização para a Cooperação e Desenvolvimento Econômico, 2017).

It is necessary, however, to advance the water governance in Brazil, which involves political decisions, greater investments, mobilization and participation of society, efficiency in management, but also for the development of research solutions for the optimization of financial and human resources, for the reduction of water losses and reuse, by treatment and disposal of effluents and effective methods for agro-environmental conservation, which directly reflect water resources.

The SDG 6 at Embrapa scope

Embrapa, as a federal government's official research, development and innovation corporation, has contributed a great deal of technological solutions to the advancement of water governance in Brazil. An important advance is to understand water no longer as an unlimited resource. In this sense, the most

efficient environmental policy is one that creates the conditions for economic agents to internalize the costs of the degradation they cause (Romeiro, 2012). The action of the State to correct this market failure consists of assigning to water use, in agricultural and industrial activities, values comparable to those attributed to the other economic inputs produced and traded on the market.

In September 2015, the UN (Nações Unidas, 2015) defined the 17 SDGs as part of a new agenda that should finalize the work of the Millennium Development Goals (MDGs), established in 2000. Embrapa plays an important role in fulfilling this new agenda through the knowledge and technologies generated that are increasing the efficiency of the use of water resources in the countryside.

As food and agriculture are related to practically all targets of SDG 6, Embrapa has aligned its work with the Brazilian commitment to the SDGs, in order to contribute with a theme as transversal as water, and thus to effectively participate with its researches and technological solutions to "ensure availability and sustainable management of water and sanitation for all" (Nações Unidas, 2015, our translation) in Brazil, collaborating with alternatives that may also be adopted in other countries.

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