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Saõ Francisco Water Transfer

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SAO FRANCISCO WATER TRANSFER

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The Sao Francisco River, the longest river in Brazil with a length of 2,900 km, originates from the state of Minas Gerais in the Serra de Canastra at an elevation of about 1600 m. Thereafter, it winds 2,700 km north and east through humid and semi-arid lands of the drought polygon of the country and provides a lifeline to the region, before reaching the Atlantic Ocean.

The area of the river basin is about 640,000 km^2, or about 7.5 percent of the total area of Brazil. The basin includes the Federal District and five states in the northeast of the country: Alagoas, Bahia, Minas Gerais, Pernambuco, and Sergipe. Geographically, 61.8 percent of the basin is in the northeast, 37.5 percent in southeast, and 0.7 percent in the central-west parts of the country.

The annual discharge of the Sao Francisco River at its mouth in the Atlantic Ocean is over 90 billion m^3/s. The river is perennial in nature, as are its primary tributaries in Minas Gerais and the western part of the state of Bahia. The basin is divided into the upper, middle, lower middle, and lower sub-basins. Tributaries in the arid and semi-arid regions of the middle and lower middle sub-basins are primarily intermittent, although flood flows in these streams may cause localised problems of flooding, erosion and sedimentation which affect the entire lower portion of the river system and the coastal zone.

The main economic activities in the Sao Francisco River Basin are electricity generation and irrigated agriculture. For electricity generation, CHESF operates plants with approximately 7,800 MW of installed capacity in the Sao Francisco River Basin and its tributaries, with a planned future capacity of over 26,000 MW.[2] In terms of agriculture, there has been significant public and private sectors support which has resulted in a strong economy for the region. According to Simpson (1999), the original development of irrigation for high-value crops in the basin can be attributed to the development of public irrigation projects located in the states of Bahia and Pernambuco. This development provided the foundation for irrigation, and the market potential for the crops produced has attracted substantial private investment.

Other land-based activities in the basin include mining, and industrial and urban development, which have resulted in economic development, but also in pollution of the

[1] The comments of Prof. Benedito P. F. Braga are gratefully acknowledged.

[2] CHESF is the energy company of Sao Francisco. It is responsible for the development, operation and maintenance of hydroelectric generation and the bulk energy distribution throughout the northeast of the country.

coastal zones and the river system. Unfortunately, some of the environmental deterioration is irreversible. This is the case for Belo Horizonte metropolitan region where some of the environmental impacts of the primary, secondary and tertiary economic activities in and around the area are irreversible. In Bahia, the main problems are associated with large dams, deforestation for cattle ranching, and discharge of raw sewage into the river. In Pernambuco, desertification is a serious problem, and in Alagoas, most of the problems have occurred in the area originally covered by the Atlantic rainforest, 95 percent of which has already been destroyed. Finally, in Sergipe, the problems are related to wastewater disposal from most municipalities and the resulting impacts on public health and the environment (Romano and Cadavid, 1999).

The semi-arid climate in the northeast of Brazil, having an area of approximately 1.5 million km^2 and 14 million people, have suffered historically from regular droughts, many of which have lasted for 3-4 years. According to the International Research Institute for Climate and Society (2005), during the 20^{th} century, there were severe droughts in this region for a total of 28 years (1990, 1903-1904, 1915, 1919, 1931-1932, 1942, 1951-1953, 1958, 1966, 1970, 1976, 1979-1983, 1987, 1990-1993, 1997-1999) (http://iri.columnia.edu). Water scarcity has thus seriously constrained the socio-economic development of the region and the quality of life of the people living in the area.

Over the past 100 years, the possibility of transferring water to this drought-prone region has received considerable attention. Only during the last 20 years, however, socio-economic and technical studies have been carried out analysing the benefits and costs of the water transfer to this area. In 1981, the National Department of Reclamation Works (DNOS) performed a series of studies with detailed field investigations. In 1984, at the request of the Government of Brazil, the World Bank financed the preparation of an action plan for the Sao Francisco Transbasin Project. The main recommendations of this plan included the full development of local and state water-related institutional capacity before the construction of the Sao Francisco diversion works; establishment of irrigation pilot areas in the plateau of Jaguaribe in Ceará and Apodi in Rio Grande do Norte; establishment of a multisectoral entity to develop detailed plans and implement the project; and the requirement that institutional constraints to efficient water use at both the state and federal levels be resolved prior to the project implementation (Simpson, 1999).

In 1989, the Master Plan for the Development of the Sao Francisco River Valley (PLANVASF) was finalised with the assistance of the Organisation of American States. The objective of this Master Plan was to encourage the participation of both the public and private sectors for the development of the basin. It included proposals for the development of natural and water resources, increased food production through irrigated agriculture, increased hydropower generation for the national network, improved water and sanitation services, improved river navigation, and enhanced environmental protection. This plan was adopted as a part of Federal Law 8851/94, within the Plan of Economic and Social Development of Northeastern Brazil (OAS, 1998).

In 1995, the states of the northeast, in cooperation with the National Secretariat of Water Resources, formed a group with representatives of the water sector of each state to foster cooperation throughout the northeast, including the Sao Francisco River Basin and to assess the potential impacts of the water transfer (Simpson, 1999).

In 2000, the Federal Government decided to implement the water transfer from the Sao Francisco River to Ceará, Rio Grande do Norte and Paraíba outside of the basin, and to Pernambuco, within the basin. This decision was taken because of the droughts that have constrained the development of this region as well as due to its overall benefits from the social and economic viewpoints.

The transfer of water will be carried out through two main routes. The north route will provide water to the Jaguaribe, Apodi and Piranhas/Açu Rivers, as well as the Brigida River. The east route will deliver water to the Paraíba River and Moxotó River and the Agreste Pernambucano area. The maximum volume of water that can be transferred through the north canal will be around 89 m^3/s, and 10 m^3/s through the east route. This amount is equivalent to what is used at present in the irrigation projects within the Sao Francisco River Basin at present. Additional 28 m^3/s will be transferred to the state of Pernambuco. The expected peak flows to be transferred (128 m^3/s) represents about 7 percent of the average flow of the Sao Francisco River. Since water will not be pumped during low flow periods, average flow at the end of the project is estimated at 67 m^3/s. The flows of water that will be transferred to each state are shown in the following Table.

Flows to be transferred to each state (m^3/s)

State	North Route (m^3/s)	East Route (m^3/s)	Total (m^3/s)
Paraiba	10	10	20
Ceará	40	-	40
Rio Grande do Norte	39	-	39
Total	89	10	99
Pernambuco	10	18	28
Total	99	28	127

The feasibility study estimated the cost of the project at R$2.7 billion (around US$1.18 billion, exchange rate on 17 December, $1.00= R2.297)

The main objectives of the transfer include provision of water for drinking and irrigation. Almost 14 million people (4.8 million people in 89 municipalities in Ceará; 977,000 people in 74 municipalities in Rio Grande do Norte; 2.5 million people in 136 municipalities in Paraíba; and 5.6 million people in 98 municipalities in Pernambuco) are expected to be the beneficiaries of the project.

The proposed transfer includes some innovative ideas. Under the Law 9.333/97 on water policies of the country, this project will be one more user from the many who have access to water from the Sao Francisco River Basin. Accordingly, the allocation of water will depend, like with the rest of the users, on the willingness to pay for the transferred water by the states and by the private investors for agricultural production.

In order to discourage waste of water, economic instruments will be implemented. The principle of full cost recovery will be applied and water will be delivered only if the states pay for its total share of the cost. For drinking water, the tariffs include a so-called social rate for the rural population. In terms of irrigation, the volume of water delivered will depend on the implementation of demand management practices and water-saving technologies by the farmers.

Private investors for agricultural development are considered very important, since they represent the basis of the financial sustainability of the overall project. Hence, their economic commitments must be assured if the transfer is to take place. Project-wise, it will be possible to deliver reliable and precise volumes of water. The project design includes "water bags" in the reservoirs which can later on be diverted to the state, or states, that pay for them. The energy cost of the project has also been considered: water will be transferred by gravity, avoiding the need for energy for pumping.

While this major project is likely to bring extensive benefits in terms of regional development, it is also expected to result in adverse impacts. The uncertainties produced by these potential adverse impacts have generated concerns and vocal oppositions from the people in the donor basin, primarily from the Bahia state. The main concern is that there might not be enough water left in the river for the social and economic activities of the basin once the transfer becomes operational, and that this will affect adversely their welfare and well-being.

The Brazilian government has assured the users that developments in the donor basin will not be restricted because of the transfer. Some of the arguments presented by the government to alleviate the fears have been the following.

The energy sector is the main user of Sao Francisco water and as such has received special attention during the project formulation. CHESF utilises large amounts of water to generate electricity in the Itaparica, Moxotó, Paulo Alfonso and Xingó dams located in the middle and lower reaches of the river. Accordingly, firm assurance had to be given that the operation of the hydropower plants will not be affected due to the water transfer. In fact, the project has very specifically considered the volumes of water that are needed to cover the present energy demands, as well as to satisfy the future hydropower generation needs for 2010 and 2015. The project ensures that there will be no adverse impacts for electricity generation even for the years 2010 and 2025, when it is estimated to increase from the present 12 MWh/hr, to 72 MWh/hr, and to 139 MWh/hr.

For agricultural-related activities, the farmers from Minas Gerais and Bahia (located before the Sobradinho Dam) have been assured that their existing water allocation will not be reduced because of the transfer. The only limitations for the use of water are, and will still be, the restrictions imposed by the navigation sector and the volumes of water needed to maintain the fluvial ecosystem of the river. The users located after the Sobradinho Dam are not expected to face any detrimental impacts either. It has been estimated that the amount of water that is to be transferred, along with whatever water that would be required for irrigation, even if the entire area of the basin was irrigated, will not need more than 3% of the water that is stored in the Sobradinho reservoir. Since the volume of water stored in this reservoir is expected to fluctuate only minimally, no variations should occur in the flow downstream. Thus, the farmers will receive their share of water for agricultural uses.

In terms of fisheries, the project is not expected to result in significant adverse impacts. There are several reasons for this optimism. First, the project will be located between the Sobradinho and the Itaparica, two reservoirs with no fish ladders; and second, because the water withdrawn will represent a minimum amount of the river flow. There may, however, be adverse impacts in the areas located next to the water intakes. These impacts have already been identified during the environmental impact assessment of the project, and appropriate mitigation measures will be implemented.

Another important consideration is the project impacts on the riverine populations. The hydropower plants in the river have regulated its flow for years, with known results. Since the water transfer will not affect the operation of the hydropower plants, the population living around the river and the estuary are not expected to face serious adverse impacts.

One of the claims from the donor States and NGO's advocating against the project, is that the water transfer project will deliver water and benefits only to the powerful landowners and not to the general population, as claimed by its proponents, which could result in increasing inequality in the northeast region (Tierramérica, n/d; The Guardian, 2005).

In spite of the arguments and the oppositions to the water transfer project, the government and the population of the donor basin agree that a permanent solution is necessary for the arid and underdeveloped northeast region. The difference of opinion, however, is how this is to be achieved. They would prefer a solution which will not affect them as much as they think the implementation of the present one will do.

Because the Sao Francisco River is under federal jurisdiction, it requires the authorisation from the National Water Agency to abstract the water needed for the project. This issue of the abstraction rights for the water transfer was discussed with, and approved by, the Sao Francisco River Basin Committee. This is a positive sign, since by authorising the water abstraction from the river, the basin committee must have considered that socio-economic and environmental impacts of the water transfer plan are unlikely to be severe and hence are acceptable.

It has been known for years that integrated management of water and natural resources in the Sao Francisco River is still a neglected and increasingly urgent issue on which depend the protection of the environment and the livelihood of millions of people. This water transfer is likely to promote the economic and social development of the region, but only if planned and managed properly. Since the region has enormous potential for additional economic growth, this could put additional pressure on the natural resources. According to the Government of Brazil, the proposed water transfer will represent an opportunity for the development for the northeast, but it should not be considered as the overall solution for all the problems of the region.

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