



# THE URUGUAY RIVER

## A Permeable Border in South America

### INTRODUCTION

The Uruguay River is an important watercourse in South America. It begins with three minor rivers, the Pelotas, Canoas and Peixe, whose sources are located in the Serra Geral highlands, around 1,800 meters above sea level (Marcuzzo 2017: 1). Today the Uruguay River serves as the international frontier between Brazil and Argentina and between Uruguay and Argentina. It also marks the border between the Brazilian states of Santa Catarina (SC) and Rio Grande do Sul (RS). At the end of its approximately two-thousand kilometers course, it flows into La Plata River, a major estuary close to Buenos Aires in Argentina and Montevideo in Uruguay. The importance of the Uruguay River can be evaluated by the size of its hydrographic basin (fig. 1), formed by dozens of affluents, covering a total area of roughly 349,843 square kilometers (Marcuzzo 2017: 4).

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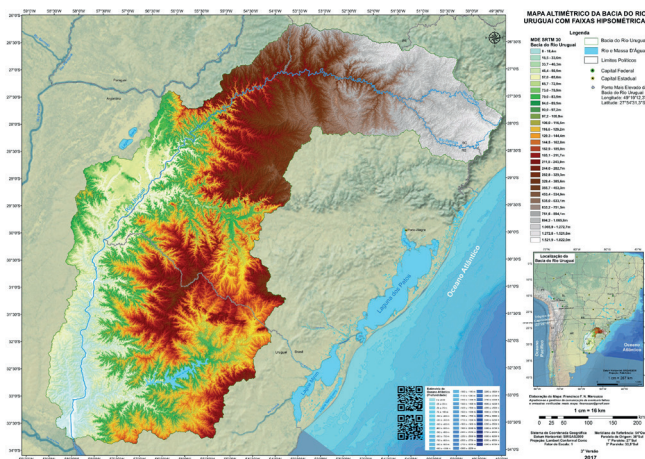


Fig. 1. Uruguay River Basin. Source: Francisco F. N. Marcuzzo, Uruguay River drainage basin: altimetry and areas. *Anais do XXII Simpósio Brasileiro de Recursos Hídricos*, 2017.

This article discusses the social, cultural, environmental and economic importance that the Uruguay River has had for diverse social groups living within its drainage basin from the eighteenth century to the present, considering different forms of interaction with the river and nearby areas. It also discusses the significance of the Uruguay River as a permeable frontier, a place of circulation for merchandise, people, and ideas in the border zone between Brazil, Argentina, and Uruguay. Finally, it discusses the profound socio-environmental transformations that took place in the Uruguay River basin over the nineteenth and twentieth centuries and the attempts to preserve and restore regional environments and landscapes linked to the river.

As research sources, the article uses travellers' reports, the records of employees of the Brazilian State, reports and correspondence by governors, documents relating to the nature conservation units and implanted economic exploration projects. It interprets these sources through environmental history, which includes human societies, but also recognizes the historicity of natural systems, constructing "an open and interactive reading between both" (Pádua 2010: 97).

The environmental history of Brazilian rivers has received the attention of diverse researchers, highlighting Gilmar Arruda (2008), Victor Leonardi (1999), Haruf Espindola (2005), Eunice Sueli Nodari (2019), Janes Jorge (2006), Marluza Harres and Fabiano Q. Rückert (2015) and Bruno Capilé (2018), among others, who have researched human interactions with the river and its surrounding areas.

#### FIRST INTERACTIONS

The archaeological research showed the presence of indigenous populations belonging to the Tupi-Guarani linguistic subfamily in the valley of the Uruguay River from approximately two-thousand years ago to the present. They were "horticulturists and made their swiddens in a slash-and-burn system, also known as *coivara*." These populations settled in places "with access to rich sources of water and dense forests, where they could reproduce their lifestyle." They chose fertile lands ideal for agriculture, gathered molluscs, and fished in the rivers and lakes, and hunted animals in the forest. Through these activities "they were able to capture

the necessary proteins and fats, as well as bones, hides, feathers and shells” (Ferrasso and Schmitz 2013: 128).

The accounts of voyages and letters on the apostolic works of the European priest Anton Clemens Sepp of the Company of Jesus provide us with important information on the Jesuit missions established in the drainage basins of the Uruguay, Paraná and Paraguay Rivers in the seventeenth and eighteenth centuries. On his voyage to South America in 1691, the priest Sepp described the rivers as navigable paths to the interior of the continent and was impressed by the abundance of fish, “none of which look like our European varieties,” he wrote. The volume was such that “the water tingled with so many fish.” In his Christian comprehension of American nature, “this is caused by the fact that since creation of the world nobody has fished here yet” (Sepp 1980: 111).

The Jesuits worked in the Christianization of the Guarani peoples in diverse missions, among them the mission of Yapeyu, situated close to the shore of the Uruguay River, “as large as the Danube near to Vienna” (Sepp 1980: 111). When he became ill in the interior of Paraguay, he was sent to the São Francisco Xavier mission, close to the right bank of the Uruguay River, where “fresher airs cooled my lungs and ended up refreshing my organism as a whole” (197). As well as the missions on the right bank, another seven missions were established on the river’s left bank, some of them dozens of kilometers from its waters. In the region of the final stretch of the Uruguay River, further south, was inhabited by the Guenoa-Minuane indigenous people, who had little connection to the Jesuit missions (Bracco 2016: 44).

Although it flowed through the large region of Jesuit missions, a long stretch of the Uruguay River was considered the southern border between the colonial domains of Spain and Portugal in the Treaty of Madrid, signed in 1750. Indigenous resistance to this colonial redivision of the territory generated the Guarani War from 1753 to 1759, involving Christianized Guarani and the troops of Portugal and Spain. Divergences in the demarcation of the territories led to the collapse of this treaty and the outbreak of other conflicts in the south of America over the ensuing years (Golin 2015: 66).

The chronicler Hemetério Velloso da Silveira visited this region of the missions close to the Uruguay River at the start of the twen-

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tieth century and observed that the Uruguay River continued to be “abundant in fish. We saw surubi, gilded catfish, flounders, stingrays, pacu, and leporinus of large sizes. Some residents of the town, poor, live off fishing” (Silveira 1909: 388). He also visited Uruguiana, where he observed the steamboat transportation service for passengers and cargo on the Uruguay River, linking towns on the Brazilian shore with towns and settlements on the Argentinean shore. As well as the steamboats, he observed that there existed, “for the traffic of merchandise and foods from the two countries, more than eighty foreign and national boats like, launches, flatboats, canoes and punts” (415). When he was in São Francisco de Borja, another Jesuit mission, he observed the existence of the Passo de São Borja settlement, a location where one could traverse the Uruguay River during the drier part of the year. However, he wrote that “the high waters on the Uruguay, when the river overflows, flood some of Passo’s streets and houses, producing intermittent fevers, vernacularly called Chucho, and sometimes typhoid” (249).

#### THE FORESTS OF THE URUGUAY RIVER AND YERBA MATE HARVESTING

Along the upper course of the Uruguay River, in the east of the South American continent, at altitudes over 600 metres (fig. 1), we find Mixed Ombrophilous Forest or Araucaria Forest (*Araucaria angustifolia*), which dominates the region’s canopy and landscape. Below this species grow many other trees and plants, inhabited by a variety of fauna, making this forest an impressive example of biodiversity. The indigenous populations and fauna obtained *pinhão* in this forest, the edible seed of the Araucaria pine which constitute an important food source in the region.

Following the course of the Uruguay River westward, at lower altitudes, another kind of forest begins to appear. In the travel report of the French merchant Nicolau Dreys, first published in 1839, the forests of the Uruguay River, still unknown to Europeans, formed one of the boundaries of the Jesuit mission territory established on the left shore of the river (1990: 72).

In 1857 and 1858 the engineer Francisco Rave coordinated an expedition that travelled through the northwest of the province of Rio Grande do Sul, visited the immense forests “that spread along

the shores of the Uruguay” and perceived the changes in the forest’s composition with the absence of *Araucaria* pine and the occurrence of angico, cedar, laurel and palm species (Rave 1858).

At the end of the nineteenth century, the chronicler Evaristo Affonso de Castro recorded the existence of this large forest on the left-hand shore, containing abundant numbers of animals and plants from which, in his evaluation, timber could be extracted. Castro transcribed the report of an exploratory expedition led and recorded by the German surveyor Maximilian Beschoren:

Filled with wonder, I contemplated these forests that line the Upper Uruguay, whose gigantic vegetation entrances the observer and is entirely unaware of the potency of the human arm, raised to hurl the trees to the ground; they are representatives of a centuries-old plant life and moreover, are still virgin forests. (Castro 1887: 249)

The surveyor’s views are similar to those described by the priest Sepp as they both believed themselves to be standing before untouched nature. Immediately, he considered the possibility of felling part of the forest as a form of economic exploration. Later in the same report, he would write:

Our joy was indescribable. In this place we made echo the roar of our guns, announcing to these centuries-old forests that civilized men found themselves there filled with jubilation at having reached the end of their explorations and astonished by so much natural beauty, were contemplating the grandiose spectacle that only the hand of the Creator of the Universe could show to man in the powerful scene in which he unveils the majestic Uruguay. If there are moments in life that a man can never forget, this is one of them! (261)

In another work from the end of the nineteenth century, Beschoren registers his own admiration for the “extraordinary vegetation of the forest of the Upper Uruguay,” particularly along the river shore, which “consists of an impenetrable tangle of spines and vines of the most diverse species. Wising to enter the riverside forest without a machete is a useless endeavour. I had never encountered a forest like that, so dense!” (Beschoren 1989: 49). Another excerpt from his narrative reads as follows:

What an immense and varied vegetation confronts us! What gigantic trees! Vines wind from one to another in multiple forms, covered by rare

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and beautiful orchids. On the ground an impenetrable tangle of ferns, thorns, reeds, vines and fallen trees. The jungle alarms and terrifies the invader due to the impact of the plants and inextricable chaos. (104)

The surveyor ends his book by reinforcing the idyllic image of the valley of the Uruguay River: "In all the Province, I know of no other place so marvellous as the valley of the Goio-En, in Nonoai. This territory, covering hundreds of square miles, is for the most part still virgin land, covered by woods, virgin forest, a ground still untouched by civilized man" (Beschoren 1989: 192).

In 1893, the Swedish traveller and botanist Carl Axel Magnus Lindman also wrote about the existence of a forest formed by large trees associated with other levels or layers of vegetation. This forest was constituted by species like cabreúva, inga, angico, camboatá, sweet cotton, açoita-cavalo, canela preta, yerba mate, laurel, guayaibi, tarumã, ipê and others (1974: 204). Yet another chronicler, Hemetério Velloso da Silveira, wrote of the variety of the flora and fauna existing in the territory pertaining to the Jesuit missions, in the basin of the Uruguay River. His book, dated 1909, contains lists of animal and plant species that inhabited the region, testifying to the biodiversity that still marked these ecosystems at the beginning of the twentieth century.

All these authors refer to the forest present along a stretch of the Uruguay River Valley, covered by Temperate Deciduous Forest, a form of vegetation belonging to the Atlantic Rainforest Biome (*Mata Atlântica*), which covers around one million square kilometers (Dean 1996: 24), to which the Mixed Ombrophilous Forest also belongs.

Among these plants of the Temperate Deciduous Forest, we can highlight yerba mate (*Ilex paraguariensis*), catalogued by the French botanist Auguste de Saint-Hilaire in the nineteenth century. The tree's leaves and branches, dried and ground, are used to prepare a drink highly popular in the south of the continent due to its property as a stimulant, since it contains caffeine. Its consumption has been a cultural practice of diverse indigenous peoples inhabiting this territory for thousands of years. Concentrations of this tree, forming the yerba forests, exist in portions of the large drainage basins of the Uruguay, Jacuí, Paraná, Iguaçu and Paraguay Rivers, which were explored economically.

During the nineteenth century, a large poor population obtained their livelihood working in the extraction and preparation of yerba mate from the forests, one of the main trade products originating in South America (Gerhardt 2013; 78). Some of this yerba mate was transported in carts or on animals to the shores of the Uruguay River from where it would continue, on boats, to the foreign consumer markets of Argentina and Uruguay. Central to this trade was the port of Itaqui, situated on the right shore of the Uruguay River, through which thousands of tons of yerba mate were exported (Linhares 1969: 105).

Diverse travellers, government employees and chroniclers warned of the damage caused by the intense exploration of the yerba forests. The Brazilian engineer Francisco Rave, among others, visited lands on the left shore of the Uruguay River in 1858 and recorded the following:

It's a pity to see the damage caused in these yerba forests, they unthinkingly cut down trees less than four years old; they sometimes harvest so much yerba that half of it remains in the woods due to the lack of transportation, and with no consideration that these yerba forests are becoming more and more impoverished, the moment perhaps arriving when this food export crop, so important to the Province, will cease to exist. (Rave 1858)

During the nineteenth and twentieth centuries, an attempt was made by the Brazilian and Argentinean governments to conserve the yerba forests (Gerhardt, 2013: 154). However, the intense exploration and diminution of the yerba trees accompanied a larger movement of exploring and reducing the once huge forest existing in the Uruguay River Valley, as we shall see below.

#### COLONIZATION IN THE URUGUAY RIVER VALLEY

In addition to the indigenous populations mentioned previously, this area also harboured a “social group called caboclo, formed by the contact between Indians and European settlers, especially the Portuguese. Recent scholars have dedicated their studies to recover the history of these peasants who were largely forgotten in the earlier literature on colonization” (Nodari 2018: 84). The caboclos can also be characterized by their way of life and social forms, linked to subsistence agriculture, fishing, hunting, yerba

mate harvesting and animal breeding, especially pigs (Gerhardt 2006; Silva 2014).

On the left shore of the Uruguay River there was a colonization or reoccupation of the lands directed, mainly, by the governments of Brazil and the state of Rio Grande do Sul during the end of the nineteenth century and the first decades of the twentieth. The public and private colonization projects divided up the lands into small rural lots, which were sold to settlers, descendants of European immigrants.

The Argentinean ethnographer Juan Bautista Ambrosetti, traversing the Uruguay River at the end of the nineteenth century, observed that areas close to the Brazilian side of the river were deforested and cultivated, while on the Argentinean side the same region “was still virgin, wild, with its exuberant vegetation” (Ambrosetti 1983: 106–107; Nodari 2015: 312). The expression ‘virgin’ is not adequate since it ignores thousands of years of indigenous interaction with the region’s forest and rivers. However, Ambrosetti saw the beginning of the changes that would become more intense in the twentieth century: the colonization on the Brazilian side, the deforestation for agriculture, the construction of a colonial landscape and the displacement of the caboclos to the Uruguay River Valley. The Santa Rosa colony, installed in 1914 on lands close to the river, was intended to be occupied by caboclos who wished to acquire a rural lot, altering their way of life, and converting them into settlers. The project was not as successful as hoped and as the years passed the colony became a space occupied by settlers (Gerhardt 2013: 133).

Colonization of the right shore of the Uruguay River, in Brazilian territory, was predominantly conducted by private companies. Several of these companies received lands from the federal or state government as compensation for the construction of roads or railways and sold these public lands to third parties or directly to the settlers. The largest firm to operate in southern Brazil was the Brazilian Development and Colonization Company, which in many cases ended up selling part of its land to other companies such as the *Volksverein für die Deutschen Katholiken* in Rio Grande do Sul (the People’s Association for the German Catholics in Rio Grande do Sul) (Nodari 2018: 89).



The Porto Novo colony later renamed Itapiranga, in Santa Catarina state, was settled during the second decade of the twentieth century, mainly by descendants of Germans coming from the state of Rio Grande do Sul and a small number from Germany. The lands were located between the Macuco and Pepery-Guaçú Rivers. To the south, it was bordered by the Uruguay River (Rio Grande do Sul); to the east, by Porto Feliz (later Mondai); and to the west, by the Pepery-Guaçú River, which also forms the international border with Argentina. In 1932, Carl Middeldorf described the colony in a brochure published to attract German settlers. The author of the brochure made comparisons between this new colony and Europe:

The colony of the Uruguay River appears to the visitor's eyes as a true picture of Wonderland... With great scenic charm, this colonial kingdom extends from the banks of the Uruguay River to the small rivers [penetrating] into the forest. All of them flow into the Uruguay River, which similar to the Rhine River, dominates and protects this flourishing land. Old memories of rural landscapes of the regions of the Rhine and Moselle arise when observing the river, the land, and the forest. (Middeldorf 1932: 4–5)

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Many sawmills were installed across the region of colonization, combining timber extraction, 'land clearance,' agricultural production and colonial livestock farming. The forest held an ambivalent meaning for the settlers: on one hand it represented an obstacle and a frontier between civilization and the wilderness, but on the other it was a supplier of raw materials essential to the installation of the population in the new environment (Gerhardt 2009). From the forest, timber was extracted for the construction of houses, firewood for ovens and fires, animal game that formed part of the family diet, and timber for immediate commerce, among other natural goods available. Fishing on the Uruguay River and its nearby tributaries was a cultural practice of the settlers, who adopted indigenous and caboclo techniques such as the attraction of fish with food, the 'seva,' and the use of traps, the 'pari.' Hook and net were also used. Agriculture on the shores of the river, practiced by the settlers, benefited from the renewed soil fertility in the floods and the humid and less cold climate in the winter (Onghero and Franceschi 2009: 116–119).

The Temperate Deciduous Forest, present on both shores of the initial stretch of the Uruguay River basin, admitted by the chroniclers and travellers, as well as the immense biodiversity, contained a large number of trees whose wood is of excellent quality and has a use in human activities. Species include cedar (*Cedrela fissilis*), cabreúva (*Myrocarpus frondosus*), laurels (*Cordia ecalyculata* and *Cordia trichotoma*), cangerana (*Cabralea canjerana*), angico (*Parapiptadenia rigida*), garapa (*Apuleia leiocarpa*) and guajuvira (*Cordia americana*), among many others (Ruschel, et al. 2003: 157; Giehl 2020). Some stretches of the river were characterized by Temperate Deciduous Forest on the first fifty kilometers from the shore, giving way to predominantly with Mixed Ombrophilous Forest and meadow or savannah vegetation.

In the first decades of the twentieth century, the trunks of the trees felled in the forest were transported to the Uruguay River, where they were lashed together in rafts (fig. 2) and steered downriver during the high-water season for sale in Argentina.

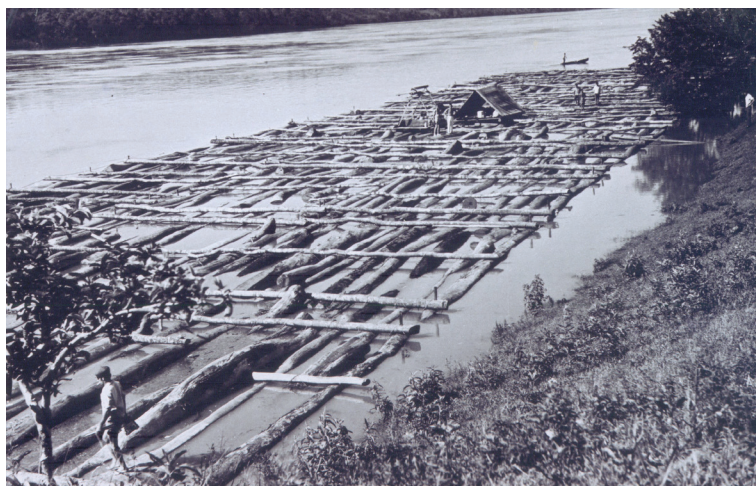


Fig. 2. Wooden raft in Mondai, Brazil. Source: Archive of the Western Santa Catarina Memory Centre (CEOM) of the Chapecó Region Community University (Unochapecó).

The journey lasted five to eight days and represented risks for the workers who steered the rafts (Bellani 1991: 222–230). Sometimes the timber was processed in sawmills before being transported on the river, principally the trunks of Araucaria pine

extracted from the Mixed Ombrophilous Forest, which was not abundant in areas near the Uruguay River.

#### CONSERVING BIODIVERSITY

The activities of yerba mate harvesting, timber extraction and the deforestation promoted by the colonization projects focused on agriculture rapidly transformed the environment and constructed a new landscape in the Uruguay River drainage basin. There was an accentuated loss of biodiversity during the nineteenth and twentieth centuries. It is estimated that the Temperate Deciduous Forest is one of the most devastated environments of Brazil with just around 3% of the original area remaining, distributed in small fragments that still suffer constant anthropic pressures (Nodari 2017: 50). Some government initiatives resulted in the creation of conservation units, specifically two fully protected public parks close to the Uruguay River, which we discuss below.

The Turvo State Park was created in 1947, in the municipality of Derrubadas, RS, on the left shore of the Uruguay River, has a surface area of 17,491 hectares and aims to conserve an important fragment of Temperate Deciduous Forest, inhabited by species under risk of extinction like the collared peccary (*Pecari tajacu*), the tapir (*Tapirus terrestris*) and many other species of reptiles, amphibians, birds, mammals, insects, plants and fungi. Also living in the Park are jaguars (*Panthera onca*), a large feline that “belongs to the *Panthera* genus, like the lion (*Panthera leo*), tiger (*Panthera tigris*) and leopard (*Panthera pardus*).” The jaguar “is the only panther of the Americas” (Franco and Silva 2020: 4) and is threatened with extinction. In this Park, on the course of the Uruguay River, is the Yucumã Falls, called the Moconá Falls by the Argentineans, which is one of the world’s largest linear waterfalls (Sema 2005: 1). The falls are visited by tourists during the dry season when they become more visible.

At exactly the same point of the river but on its right shore is located Moconá Park, part of the Argentinean Selva Misionera or the Bosque Atlántico del Alto Paraná, an enormous tract of forest that extends from the Uruguay River many kilometers into the interior of Argentina as far as the Iguazú National Park and is home

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to diverse forms of wildlife. There are around 914,823 hectares in areas of relatively continuous forest (República Argentina, 2007: 35). Currently, this forest is threatened by illegal timber extraction. Due to its importance for the conservation of biological diversity, especially the jaguar, the World Wide Fund for Nature (WWF) included it on the list of priority ecoregions for global conservation (FVSA 2020; WWF 2020). The wildlife in the Turvo State Park would be less abundant and diverse if the immense Selva Misionera did not exist on the other side of the river, a permeable frontier between the two countries. The circulation of animals and genes between the two forest areas is of fundamental importance for the conservation of biodiversity.

An important biodiversity place is the Espigão Alto State Park, situated in the municipality of Barracão, RS, very close to the Uruguay River, has existed since 1949 and has an area of 1,325 hectares, composed of Mixed Ombrophilous Forest and Dense Ombrophilous Forest. It is classified under a full protection category, allowing environmental education projects, and is home to an important regional fauna at risk of extinction. However, its small size hinders the conservation of some larger species of birds and mammals. The Park's vegetation includes species characteristic of the Upper Uruguay River, like pineapple guava (*Acca sellowiana*), xaxim (*Dicksonia sellowiana*) and jaborandi (*Pilocarpus pennatifolius*), among others. The presence of invasive exotic plants (*Pinus* spp., *Eucalyptus* spp. and *Hovernia dulcis*) and the lack of public employees to tend and manage the area were identified as problems in this Park (Defap 2004: 40, 79, 122, 152).

The Fritz Plaumann State Park is a conservation unit situated along the Uruguay River, in the municipality of Concórdia, in the Brazilian state of Santa Catarina, with an area of 741 hectares. It was created recently, in 2003, as a compensation measure for the environmental impacts caused by the completion of construction on the Itá Hydroelectric Plant in the year 2000.

This became the only conservation unit of Temperate Deciduous Forest existing on the right shore of the Uruguay River. Although the park contains a small conserved fragment of this forest, its creation allows the regeneration of the forest vegetation and functions as a refuge for the region's fauna. One problem is the presence

of the exotic American bullfrog (*Lithobates catesbeianus*) in the area around the park (Fatma 2014: 25, 208, 213). This frog is a native of North America and was introduced into Brazil, where it adapted and now interferes in the dynamic of the communities of native amphibians (Preuss 2017: 26).

Another small portion of conserved forest land is situated a few kilometers from the Uruguay River, in the Nonoai Indigenous Land, demarcated in 1911 by the Brazilian government for occupation by Kaingang and Guarani populations of the region. This Indigenous land is 34,976 hectares in size, fifteen-thousand of which comprise a forest reserve in which Mixed Ombrophilous Forest predominates. From the 1960s to the 1990s there were conflicts over lands involving indigenous peoples, farmers and the Rio Grande do Sul state government. The result was the recent recognition of the indigenous population's right to the land and to the forest reserve for sustainable use, but the tensions and debates between the two social groups, the government and the environmentalists continue (Bringmann 2017: 179; Carini and Tedesco 2012: 55).

#### OTHER ECONOMIC AND CULTURAL ACTIVITIES

Diverse economic activities were developed in the waters and lands close to the Uruguay River. One of them is pig breeding as small-scale livestock farming for the sustenance of caboclo and settler families, for sale to local markets, or, more recently, as producers integrated with the large pig and poultry abattoirs now operating in the south of Brazil, in particular in the west of Santa Catarina state. This industrial-scale activity exacerbated the problem of contamination of soils, surface waters and subterranean waters by animal waste. Some of this contamination reaches the Uruguay River via the affluents in the drainage basin (Winckler, et al. 2017: 240–241). The flows of people and goods, between one shore and the other and between the different municipalities along the river, are known for the number of small ports, river crossing points (*passos*) and bridges that exist. In the absence of bridges, people and vehicles cross by ferryboat.

With the modernization of agriculture and the predominance of soybean monocropping from the 1960s onward, the socio-environmental problems worsened. The untreated urban and industrial

waste and the residues of fertilizers and other agrochemicals that reach the Uruguay River, further harm the quality of its waters, according to studies conducted in farming regions on both sides of the drainage basin (Ternus, et al. 2011; Fepam 2005).

As one of its solutions to the oil crisis of the 1970s, the Brazilian government provided financial incentives through the National Alcohol Program (Proálcool) to companies producing ethanol fuel for automobiles and in the 1980s, the Alpox SA company installed an ethanol plant in the region occupied by the São Francisco Xavier mission. This site was chosen because the microclimate of the Uruguay River Valley prevents frost from forming and thus enables sugar cane cultivation. Alpox SA soon closed due to financial problems and a group of small farmers from the region, organized in the Porto Xavier Sugar Cane Producers Cooperative (Coopercana), took over the bankrupt company and reactivated the plant. In 2004, after socioenvironmental studies, Coopercana obtained an operating license. The main problem of this activity is treatment of effluents and other waste generated before discarding them in the environment, since they are pollutants and are produced in large volumes (Rambo and Puhl 2005: 93; Coopercana 2004).

In 2011 Coopercana had 297 associates in Porto Xavier and neighboring municipalities, mostly small family farmers, who found ethanol production a stable source of income. In the same year they harvested about 1,600 hectares of sugarcane and maintained, in their properties, the production of soybean for market and food for self-consumption. Ethanol production in the state of Rio Grande do Sul represented, in 2011, only 0.21% of Brazilian production, concentrated in the state of São Paulo. Coopercana's production scale is small, but it has social importance, as it enables family property and generates work and income, especially in the period of manual harvesting and industrial production. Most of the associates are descended from immigrants who settled in the region in the colonization projects. Caboclos also inhabit these lands of the Uruguay River Valley, but are peripherally linked to the cooperative, usually as occasional workers (Coopercana 2004; Nascimento and Dörr, 2012).

Fishing for food, for trade or for sport is still a socially important activity on the Uruguay River, but is jeopardized by the growing

contamination of its waters. The production of irrigated rice may be contributing to this contamination since it uses chemical fertilizers, herbicides, and insecticides. The south of Brazil, Argentina and Uruguay are rice producers on the floodplains of the drainage basin of the middle and lower Uruguay River. This crop shares the same space, a strip of permeable frontier along both shores of the Uruguay River where the environmental conditions are favourable for this agricultural model.

Frontier culture is present throughout the narratives and oral tradition of the population living on the border region shared by Brazil, Argentina and Uruguay (Hartmann 2005), in which the river is a constant presence. Both sides of the border also share a common history and memory, typified by the presence of the Jesuit reductions, extensive livestock farming, trade in yerba mate and wood, territorial conflicts, landscapes and biomes, flood patterns, and the smuggling of goods (Flores 2012). In addition, the coexistence of Brazilians, Argentines and Uruguayans developed a vocabulary that brought the Spanish and Portuguese languages closer and a cultural identity. Moreover, three music festivals take place in the border region and have the Uruguay River as one of the themes: the Barranca Festival in São Borja, the Festival of Thematic Music in Uruguaiana, both in Brazil, and the Correntino Folklore Festival, held in São Tomé, Argentina. Furthermore, the song “Balseiros do rio Uruguai,” composed by Barbosa Lessa in the 1970s and made famous by the voice of Cenair Maicá, as well other songs, adopt this river as the theme.

The knowledge, skills and tools of the ‘Balseiros,’ the wood raft men, are understood today as being part of the cultural heritage. In Itá, SC, the Balseiro Museum was created as an effort to highlight the memory and heritage of this social group. The municipality schools in connection with the Museum, promotes student consciousness of the ‘Balseiro’ activities. The aim to enhance recognition of the ‘Balseiro’ cultural heritage by tourism promoters, is an important economic activity linked to the Uruguay River (Zen and Fontanari 2019).

The memories of living with the river also include floods, especially those that caused damage to homes, plantations and other buildings, such as the flood of 1965. The sociability between

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the inhabitants on both shores of the Uruguay River has been promoted, over the last decades, through popular parties and football games. During the religious celebration in honor of The Virgin of the Navigators, held in Porto Goio-Ên, in the municipality of Erval Grande, RS, a river procession was organized, accompanied by songs and Christian prayers. The flatter shores of the river, forming beaches, are the space for leisure, rest, socializing and bathing during the summer (Onghero and Franceschi 2009: 119–122).

#### HYDROELECTRIC PLANTS

In the second half of the twentieth century various hydroelectric plants were implanted in the basin of the Uruguay River. They increased the generation of electricity for Brazil but created social and environmental problems. We highlight some of the plants that have had a major socio-environmental impact.

A consortium formed by four Brazilian public companies and seven private companies, some of them transnationals, was responsible for the construction of the Machadinho Hydroelectric Plant from 1998 to 2001. The plant's installation led to the disappropriation of the lands of small farmers and to conflicts over compensation payments for the losses or the resettlement of affected families. The Brazilian government declared the project a public utility and limited the right of defense of those people living in the flooded area. The Movement of People Affected by Dams ("MAB" or *Movimento dos Atingidos por Barragens*) played an important role in the organization of the farmers, in negotiating with the consortium of companies and in the legal disputes (Krzyszczak 2019: 26, 33, 216; Consórcio Machadinho 2020: 1–2).

Another construction, the Itá Hydroelectric Plant, was built on the Uruguay River between 1986 and 2001 following a concession of the Brazilian government for private corporations. The plant project required the relocation of the town of Itá, located in the state of Santa Catarina, and its residents in the 1990s to a new urban area constructed close to the reservoir that flooded the original town. Arable lands were also flooded, provoking the displacement of small farmers, who organized to claim compensation payments or resettlement, sometimes on lands far from those they lost. As well as the environmental problems, the Itá Hydroelectric



Plant produced changes in the landscape and cultural, symbolic and identity losses for the local populations (Klanovicz and Forcelini 2018: 176; Radaelli 2010: 52).

The Barra Grande plant was also built by a group of private companies on the Pelotas River, one of the affluents that join to form the Uruguay River and began to operate in 2005 with a regular power output of 380 megawatts. The lack formed by damming the river affected 1,516 farming families that had to leave their lands and were settled in other places. The construction of this plant is linked to the denunciation of fraud in its environmental licensing, with the omission of the existence of around four-thousand hectares of well-preserved Mixed Ombrophilous Forest and other forms of secondary vegetation. The social mobilization and legal processes were not sufficient, however, to prevent the huge socioenvironmental damage caused by the construction of this plant (Prochnow 2005: 6–14; Ruppenthal 2013: 20, 27, 64; Espindola 2015: 161).

People directly and indirectly affected by hydroelectric plants call themselves “affected by dams” and are considered, broadly, in international discussions as “environmental refugees” or “environmental migrants” (Nodari 2017), as well as “victims of development” (Renk and Winkler 2019). Whatever the term used, those affected by the dams suffer the action of the agents of economic development, which are the State and corporations, where they have low capacity for reaction and negotiation. Most of the reaction and negotiation actions can be attributed to the performance of the Movement of People Affected by Dams (MAB), which took its first regional steps in the 1980s, gradually transforming itself into a national organization active in defense of those affected. The hydroelectric plants avoid, almost entirely, the reproduction of migratory fish and decreased fishing in some parts, particularly when the water is diverted from the original river course, as in hydroelectric Foz do Chapecó (Oliveira and Aguiar 2013).

Recently, the construction of the Garabi-Panamby Binational Hydroelectric Complex on the border between Argentina and Brazil came into debate. The complex would be built with public and private financial resources from both countries (Rocha and Nunes 2017; Eletrobras 2013). The construction of the two projected hydro-

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electric plants will affect the territory and population of dozens of municipalities in Brazil and Argentina. Several public, religious and community institutions on both sides of the river have mobilized against the project, which threatens fundamental human rights. One of the points of tension for the environmental movements refers to the Salto do Yucumã and “the Turvo State Park, which also corresponds to the Core Zone of the Atlantic Forest Biosphere Reserve, which would be affected by the Panambi hydroelectric plant.” In 2015, after social pressure, the Brazilian Federal Court suspended the environmental licensing of the project (Nodari 2017: 60–61). In 2016, was created the Movement of People Affected by Hydro-Dams (MAR) in Latin America, which goes beyond national borders in defense of populations that have common problems. On the other hand, in 2019, the governments of Brazil and Argentina again discussed the resumption of the Garabi-Panambi hydroelectric project, with a risk of worsening socio-environmental conflicts in the Uruguay River basin.

The arguments of the companies are based on the demand of energy for industrial activities and also of the lower economic, social and environmental relative cost of hydroelectric energy. Private companies that invest in the construction of hydroelectric plants are also the main consumers of the energy generated. Compared to thermal and nuclear power, hydroelectric power is considered clean and cheap by investors; however, social movements defend another model, decentralized and based on alternative forms of generation, such as solar, wind power and small hydroelectric plants (Oliveira and Aguiar 2013). Currently, alternative ways to thermal, nuclear and hydroelectric plants, such as solar and wind power are increasing in the country and are the ones that causes less damage to the environment, to the culture heritage and to the people.

#### FINAL CONSIDERATIONS

One constant over the course of the centuries is the complexity of human interaction with the Uruguay River. Different human groups relate in diverse ways to the waters and the lands close to the river, a space that includes both the landscape and the dynamic of the interactions that happen there. While

some human populations, like the Guarani and Kaingang indigenous peoples and the caboclos, established a lengthy symbiosis with the river and with the valley's forests, the settlers produced a rapid transformation marked by deforestation and agriculture.

The forests exalted within the pages of travel reports in the past and very often seen as obstacles by the immigrants lost space to industry and to commerce in the villages. In the rural areas, agriculture and livestock farming completely changed the landscape. With the modernization of agriculture from the 1960s, this process of altering the landscapes and ecosystems quickened pace. Today there remain small isolated fragments of Mixed Ombrophilous Forest and Temperate Deciduous Forest in the Brazilian territory, conserved in parks and protected areas that confront a variety of problems toward their goal of conserving biodiversity and ecosystems.

Today, farming based on monocrops, chemical inputs, mechanization, and irrigation does not promote the conservation of water resources, biodiversity, and ecosystems, or protect human health. In the words of Donald Worster, we need more than a technical vision, we "require a new form of perception, new mental frameworks, a new ethics regulating agricultural practices and policies" (2008: 38). It demands "learning to think like a river." Worster refers mainly to large-scale irrigated agriculture, practiced in the United States of America and other parts of the world. This model of agriculture is not present on the banks of the Uruguay River, but the author's argument that this and other human activities require water and must respect the limits established by hydrological cycles, applies to the region under study. Many of the actions and interactions with the Uruguay River in recent decades have been motivated by economic interests and have disrespected the dynamics of waters and ecosystems. The main intervention was the damming of the river, the interruption of its natural flow and the alteration of the way of life of social groups whose culture was linked to its waters.

The construction of hydroelectric plants along the Uruguay River has environmental and social costs that must be re-evaluated by human societies. The small amount of electricity generated by the Barra Grande Hydroelectric Plant, for example, when

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compared to other hydroelectric plants in Brazil, fails to justify the immense and irreparable environmental damage provoked by its construction. The settlers, those who settled in the Uruguay valley as small farmers in previous decades, were affected by the waters of the river, dammed to form the plant reservoirs.

Since the 1980s, several organized social movements, especially the MAB, have challenged the industrial development model based on the construction of hydroelectric dams. These movements exist on both sides of the river, in Brazil and Argentina, because social and environmental problems are common. Hydroelectric projects sometimes bring together the interests of governments and private corporations that operate beyond the national border demarcated by the river.

Over the period studied, the Uruguay River was a permeable frontier. It permitted and promoted interactions among the human societies who lived on its shores and between them and the river. More than a border between different territories and countries, it marked a space of relations and created a border zone in which the river is an essential element. Culturally, an identity linked to the river was created, a feeling of belonging to that territory, an appreciation of the landscapes of its banks and the recognition of the river as a socio-environmental heritage. This identity was formed through the long historical trajectory of coexistence and interaction of various human groups with the Uruguay River, composed of individual and collective memories related to change and continuity in the natural and built environments of this hydrographic basin.

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