

‘MISION CIENTIFICA CROATA’ AND ITS ROLE IN THE MAPPING OF LATIN AMERICA

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Abstract

Upon the request of the governments of Chile, Brazil, Paraguay, Argentina and Peru, from 1903 onwards, brothers Mirko and Stjepan Seljan carried out diverse explorations of the lesser known and least approachable areas of Latin American hinterland with the aim of organising a network of river navigation and the building of roads and railways which would connect the coastland with the hinterland. During their explorations the Seljan brothers wrote several books and created numerous maps of unknown and unmapped areas. These maps contain completely new data about the topography, hydrography and ethnography in these explored areas. They also made several studies about traffic connections between the coastland and hinterland of Latin America. Thus they also contributed to the economic development of some countries with their exploration and cartographic works. In this paper we will represent the original maps which the Seljan brothers created during their expeditions in the countries of Latin America. We will analyse the content and accuracy of the maps, we will reconstruct the techniques of map creation and evaluate the contributions that the Seljan brothers made to the geographic research and mapping of Latin America.

With an adventure in blood

The Seljan brothers, Mirko and Stjepan, are the most well-known Croatian explorers who worked on the mapping of Latin America. Mirko (Karlovac/Croatia, 1871 - ?/Peru, 1913) and Stjepan (Karlovac/Croatia, 1875 – Ouro Preto/Brazil, 1936) were world known explorers who worked over many continents. After they returned from an expedition in Ethiopia where they stayed for the period 1899-1902 as explorers in service of the King Menelik and created the first topographic map of Ethiopia, their exploratory spirit would very soon take them on a long journey. With adventure in blood, as mentioned by Stjepan Seljan, soon after returning to Croatia, they started to plan their new journey only this time to wilderness of Latin America. This continent was only a few decades before freed from colonial government and the enterprising brothers estimated that their exploring projects could contribute to economic and social development of the young states there. Along side this; Latin America was a destination of numerous Croatian emigrants at the time who were looking for better future in this part of the world which additionally confirmed their decision. They arrived in Latin America in April 1903 and it was here that they spent the rest of their lives exploring and mapping less explored areas. That same year they established a company under the name of ‘Mision Cientifica Croata’ for the needs of exploration and via this company they negotiated numerous scientific-exploring expeditions throughout Latin America.

Through the wilderness of southern Brazil

By April 1903 the Seljan brothers had arrived in Rio de Janeiro via Lisbon, and from there they started their exploration of southern Brazil. Namely, the brothers' first exploration was carried out for the government of Brazil who ordered the exploration and mapping of the river network, in order to facilitate the organisation of navigational directions which would connect densely populated settlements along the Brazilian coast with the wider hinterland around the River Parana (Brazilian state of Sao Paulo).

The original preserved map of Brazil by Joao Coelho from 1891 which the Seljan brothers used during their Brazilian expeditions contains the marked tracks of their explorations, literally witnessing the numerous expeditions which they undertook. At the same time this map documented the grade of knowledge of this part of Latin America as well as cartographic data which they could have used on their movements through the terrain. An insight into the map, especially the area of their movements, clearly gives us a clue that the local map offered considerably little information. Most of the toponyms and rivers which they noted in their sketches were not on this map.

From their diary of the trip we can learn that they started their first Latin American expedition on 10th of May 1903 from Sao Paulo by train to the town of Itapetininga. Their goal was the River Itarare which they wanted to research specially measuring its longitude, latitude and depth. That is to say the lower flow of this river to its river mouth in the River Paranapanema was suitable for sailing, and so they wanted to explore its upper flow. They were hoping that the upper flow of Itarare would be suitable for sailing which would allow a connection to Paranapanema over Itarare all the way to the River Iguapa which flows near the coast to the important export port of Iguapa. Unfortunately, they established that the River Itarare, south of the homonymous town turns into an underground stream. In this way the idea of a river connection to the coastland across Itarare to Paranapanema went no further, but thanks to this expedition the flow of the Itarare was mapped as well as its source in karst caves which was not known before. Namely, in sake of this exploring, the Seljan brothers created a map of the southern tributaries of Paranapanema, which were previously unknown. The map was created over a coordinated grid (according to a starting meridian in Paris) with clearly noted measurements, which clearly confirms that the whole presentation was based on the original field survey which they had conducted. Beside the hydrographical grid, for the first time on the map, numerous small settlements were noted relating to plantations which before were not cartographically marked.

The second expedition in southern Brazil was related to the exploration of the area north of Paranapanema where they mapped the southern tributaries of the River Parana – the Peixe and the Aguapehu. The confluence of these two rivers was discovered by Brazilian explorers in 1896 but their flow was unknown. The Seljan brothers were the first to insert this onto a detailed map of this region. Unfortunately, these rivers were not suitable for sailing thus the Seljan brothers recommended to the Brazilian government that they build a railway in this area, but not in the rivers valley, but on the mountain slope between the rivers Aguapehu and Tiete. Later the railway was built exactly on this

considerably explored, its lower flow was not quite known (according to this on a map of Brazil in 1891 the whole flow was drawn with a dotted line). Over 21 days the Seljans travelled 367 km of the river flow in the boat all the way to its mouth establishing that the river was not very suitable for the sailing. At the time they measured air temperature, rainfalls, the wind, the river's depth, the speed of the river's tributaries, mapping the flow of the river and islands and measuring the latitude. Besides the mentioned above, in their diary, they also carefully noted the landscape's appearance, flora and fauna, soil characteristics as well as the possibilities for cultivation. When they arrived in Parana, they continued their travel further to the north, on the River Ivinheim mapping its tributaries. They established that Ivinheim unlike the Paranapanema was suitable for sailing without any extra regulation but the conditions of intense heat, humidity and the invasive insects were very unfavourable and were at the edge of endurance. They finished their journey at the important river port of Corumba from where they took a steamboat on the River Paraguay to Asuncion, the capital city of Paraguay which meant the end of their first expedition whilst in the service of the Brazilian government. Upon that occasion Mirko Seljan created a map of this part of the river and in September 1904 personally took it to Rio de Janeiro with all additional materials. The existence of this map is only known about from their diary but it is not known whether the map is preserved in some Brazilian archive.

Expedition along the Paraguay and exploration of the Salto del Guayra falls

A further expedition took the Seljan brothers to the neighbouring country of Paraguay. There they had the common support of the governments of Paraguay, Brazil and Argentina and during 1904 they explored the widespread hydrographical network of the Paraguay and Parana rivers and they mapped the famous falls of Salto del Guayra. For this the brothers undertook a comprehensive exploration and they created more cartographic representations which were published in their book under the title 'Salto del Guayra' (Buenos Aires, 1905). Thanks to the mentioned book, the Seljan brothers received an international scientific respect and they were often invited to give presentations of their explorations as well as becoming honourable members of the Mexican Geographic Society. The purpose of exploration was economic – it was necessary to explore the possibilities of connecting the river sailing routes of Paraguay and Parana with the transversal continental route along the southern part of the state of Paraguay. In this way it would be possible to have a shorter route to connect two river sailing routes and a shorter connection of Argentina with the southern region of Brazil. They represented this idea on a map created in a scale of 1:1 850 000 which contains sailing routes of the rivers Parana and Paraguay as well as possibilities of their transversal connection.

In their movements over the terrain they used the map of Paraguay created by Carlos Beyer in 1886 where they marked the route of their own. The Paraguay expedition started in Asuncion where they took the railway to Villaricca and from there they travelled on foot or horseback. Moving further towards the northeast they recognised

numerous sources of the River Tebicuary, Monday and Acaray which were previously unmapped. On the map which shows the whole route of their journey we can see the complete hydrographical network of the Parana tributaries to the east i.e. Paraguay on the west all the way to their connection with the River Parana in the port of Tacurupuca (today Las Palmas). This map was later detailed with the results of their own measurements of the terrain, placing unknown parts of hydrographical network and locations of remote plantations which were not on the previous maps. In their exploration of Paraguay they dedicated special concern to the second section of the way between San Blas and the River Parana for which they created a detailed map to the scale of 1:200 00 which shows the mountainous regions which they passed on their way towards the east. On the map they noted the configuration of the terrain, names of the settlements, plantations and surrounding mountains as well as sources of numerous rivers on the slopes of the eastern Paraguayan mountains.



Figure 2. Map of Guayra falls made by Mirko and Stjepan Seljan

Finally, arriving at the River Parana, they came to the Salto del Guayra falls (Salto das Sete Quedas), to which they dedicated most of their attention in surveying and mapping. These are the greatest and the most beautiful falls on the River Parana and which are on the border between Paraguay and Brazil, discovered in 1755, but were never drawn on a map in so much detail before. The result of this work was the first detailed map of the falls created to a scale 1:25 000 and it shows the falls with its cascades, backwaters and islands. The Seljan brothers noted that the falls started with torrents about 800 metres south of Isla del Guayra and they measured the position of the falls at 24°4' 20" of southern latitude and at 11°6'4" longitude west from the meridian in Rio de Janeiro.

They measured that the Parana was 4 kilometres wide near the falls and it flows around many river islands and after entering in a deep and narrow canal 4,600 metres wide the water falls to seven consecutive cascades whose height and width they also measured. They place all of this data on their map, the first one which in detail represented these famous falls. The map together with the research of the whole expedition provoked great admiration from the scientific society and the Seljan brothers presented the results of their exploration in Paraguay at the conference of the Geographic Society of Argentina in Buenos Aires in 1904.

At the falls of the River Iguazu

After the expedition in the state of Paraguay and exploration of the Guayra falls, the Seljan brothers dedicated their attention to another famous falls. For six months in 1904 they spent exploring the River Iguazu and parts of the state of Parana. The base camp of the expedition on the River Iguazu was in Fort Iguazu, a Brazilian fort 25km from the Iguazu falls near the triple border of Brazil, Paraguay and Argentina. After penetrating all the way to the falls, they spent 5 days there, surveying details and creating a cartographic representation of the falls to a scale of 1:25 000. The Seljan brothers gave the following information regarding the measurements of the River Iguazu: “about 6 km above the start of the fall, the river turns into a lake 980 m wide. The main quantity of water is collected on the right (Brazilian) part of the three channels. These channels are 2 m deep and 7-10 m wide. They are separated by granite islands without vegetation. The rest of the water flows towards the left bank amongst numerous caves and more than 200 channels. Granite banks above the falls are 70-80 m high and they spread into a horseshoe shape 3,900 m long. Here the bank slopes deeply creating three magnificent falls: Salto Forian Peixto is 20 m wide and 63 m high, in the middle is Salto Union 22 m

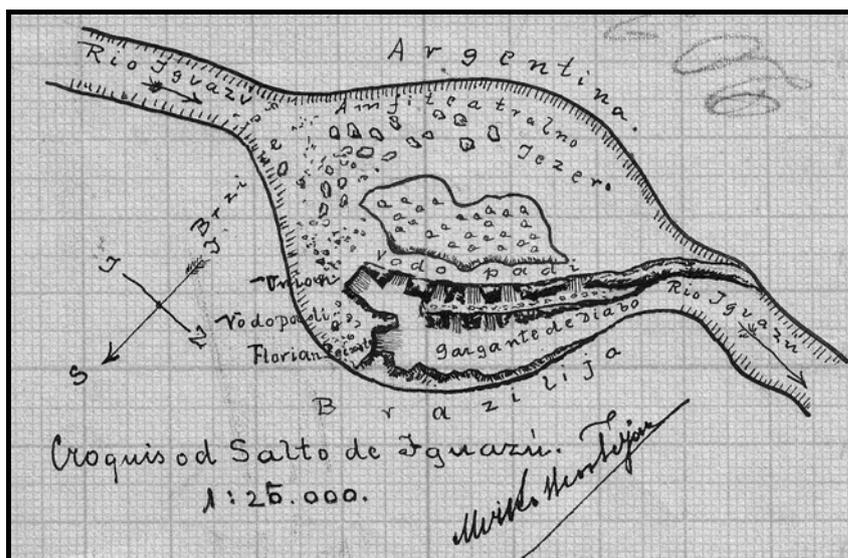


Figure 3. Mirko and Stjepan Seljan' map od Iguazu falls

wide and 67 m high and Salto Benjamin Constant 16 m wide and 63 m high. The isthmus amongst the three main falls is called Gargante del Diablo. Numerous falls are also on the Argentinean side and the greatest is Salto Victoria". The results of the measurements undertaken by the Seljan brothers in 1904 do not vary significantly from today's measurements, and their map of the falls scaled at 1:25 000 is the first detailed map of these falls. Besides mapping, they took numerous photographs of the falls which represented valuable historical documents about the appearance of the falls and its surroundings before their tourist exploitation. Mapping the falls of Iguazu, they went eastwards, exploring the possibilities of a connection between Fort Iguazu and the town of Curitiba which was already connected to the Atlantic coast by railway. From Port Iguazu they went eastwards across the mountains of Serra Boi Preto, Serra das Araras and Serra da Esperanca concluding that this was the best route for a traffic connection between Iguazu and Curitiba. They expressed this opinion to the Brazilian government after their return to Rio de Janeiro. At this occasion they gave their reports about their accomplished explorations and maps with a proposal for railway and roads for the connection of south-eastern coast of Brazil with the Parana river. The railway was not built but today there is a road from Guarapuava all the way to Fort Iguazu following exactly the same route explored by the Seljan brothers and proposed by them for the building of the railway.

The great expedition in Matto Grosso and its undoing

At the beginning of 1905 the brothers were in Chile, first in Santiago, then in Valparaiso where they met Francisco Pammer a medical doctor of Croatian origin who joined them on their next expedition, the exploration of Matto Grosso. Yet another idea for the better traffic connection for the, at this time isolated, Brazilian state was born. Namely, Matto Grosso had no direct connection to the Atlantic Ocean and it was necessary to travel down the rivers Paraguay and Parana to Buenos Aires and Montevideo and then via steamboat to Rio de Janeiro. Arriving in spring 1905 in the capital city of the state of Matto Grosso, Cuiaba, the Seljans' idea for better traffic connection received the great approval of the local government. Just some time before Czech explorer Jan Kobbe arrived in Cuiaba from Amazonia, claiming that it was possible to pioneer a way from Cuiaba northwards all the way to Amazonia. Nevertheless, the northern part of the state Matto Grosso was covered with vast jungles and was still unexplored and unmapped. Here the Seljan brothers and Dr. Pammer saw their chance. In the summer 1905 Misión Científica Croata signed the contract for the expedition which would explore and pioneer the route of the future traffic connection between the city of Cuiaba in the state of Matto Grosso and the town of Santarem in Amazonia. After the accomplishment of the job, the Seljan brothers were obliged to give the government of Matto Grosso detailed maps with drawn routes as well as all the rest of the exploration results. The government was obliged to assure the expedition all the measuring instruments (theodolite, sextant, compass, aneroid barometer, thermometer, goniometer, binocular and photographic camera), medical equipment and armed escorts. As a fee for the accomplished job, the government had to acknowledge 80,000 hectares of the land to the Misión Científica Croata Company as well as giving a concession for the building

of the mentioned road. In this way the idea of the expedition in Matto Grosso received its legal form.

For the preparation for the expedition, during 1905, the Seljan brothers created preliminary maps of the wide area around the city of Cuiaba and further north and westwards all the way to the borders with Bolivia. From this period some field sketches of this area have been preserved and it is obvious that throughout the whole journey they undertook precise measurements of the geographic latitudes and longitudes, altitude, air temperature and distances passed, passing 320 kilometres in total. They placed the results of these field explorations on their map of the northern part of the state Matto Grosso and published it in their geographical study of the state Matto Grosso, creating a part of the preparation for the great expedition of exploring the traffic route connection with the River Amazon. Three maps were added to the study. The first represents the overview map of the state Matto Grosso (Estado de Matto Grosso, escala de 1:11 575 500) which was not their creation and where the future route was drawn in. The second map shows the route of the road which would connect Cuiaba to the port of Santarem. The third map shows the northern part of the state of Matto Grosso and is the result of the original field exploring of the Seljan brothers. Namely, the results from the previous exploration which are known from the earlier mentioned field sketches were inserted on the map. The level of the Seljan brothers' contribution in mapping the state of Matto Grosso is in fact best seen on this map. On areas north and south of the city of Cuiaba which they mapped, can be seen for the first time the dense network of water flow and settlements, which makes a strong contrast to the rest of the map which contains only basic geographic elements. For the first time on the mentioned map were drawn all the tributaries of the River Cuiaba, Rio des Mortes and all sources of the rivers Xingu and Tapajos, the large tributaries of Amazonia, and in this way the brothers advanced the less known and explored northern parts of the state of Matto Grosso.

At the beginning of 1906 the expedition was ready to depart. Nevertheless when they arrived to Cuiaba there was a surprise for them. Nothing that was agreed in the contract with the state government was there. They bought the necessary instruments and departed but very soon a revolution stopped their plan because the president of the state of Matto Grosso was deposed and executed. Armed conflicts began during which all the property for their expedition was robbed and the Seljan brothers together with Dr. Pammer organised a hospital and looked after the injured. After the establishment of the new government, the Seljan brothers intended to renew the contract and return their capital invested into expedition but without results. The court process which was conducted in Santiago lasted until 1909 when they received only a symbolic compensation. Later on in connecting Matto Grosso with Amazonia a road was built following the route from Cuiaba towards Santarem just as the Seljan brothers had planned in their project. This road today still represents the main longitudinal traffic route between Matto Grosso and the ports in Amazonia.

At the Amazon's mouth

During 1908 the Seljan brothers, whilst in the service of the Brazilian state of Parana, worked on exploring and mapping of the mouth of the Amazon as well as the right bank in the area of the mountain Serra Tumucumaque. This exploration was described by Stjepan Seljan in his book which he published in 1919 in Ouro Preto in Portuguese. As a result of their work a map of the Amazonian delta scaled at 1:2 250 000 was created and it represents the state of the river islands and channels of the delta. Starting by boat in Belem, following the direction marked on the map, they measured the depth of the river, speed of its flow, pressure and temperature of the air and from the islands they took samples of soil as well as noting the flora and fauna. Arriving at the port of Mazagao on the right river bank, they continued walking towards the hinterland along the River Maraca and Rio Branco, exploring the quality of the soil and carefully identifying the areas of Para rubber tree (*Hevea brasiliensis*). Along the mountain of Serra Saranjal they found significant stocks of hematite and layers of bitumen, suitable for exploitation. In this way the Seljan brothers contributed to the better cartographic recognition of the Amazon's mouth as well as the future better economic valorisation of the area.

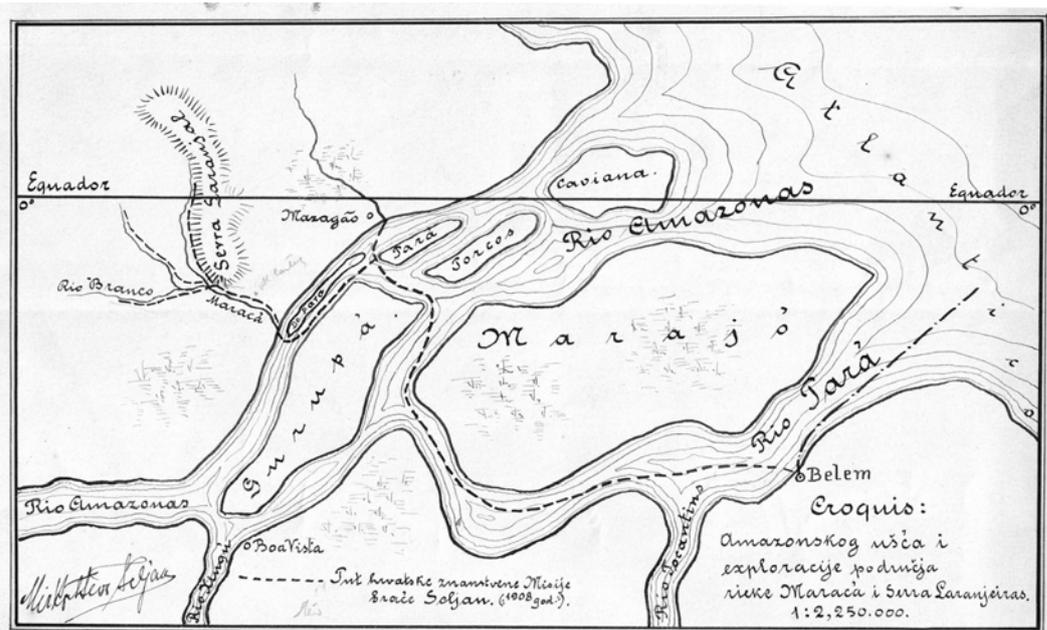


Figure 4. Map of the Amazon's mouth made by Seljan brothers

The last expedition in the Peruvian jungles and the mysterious death of Mirko Seljan

The Seljan brothers spent the following year in Chile, exploring the metalliferous layers of Atacama and giving numerous lessons throughout Chile, Brazil and Argentina. In 1911 they developed an interest for Peru where they came in contact with Croatian emigrants and they established 'Croatian Shares Society' with its headquarters in Lima.

The same year through this society the Seljan brothers concluded an agreement with the Peruvian government about designing and building a road which would connect the Peruvian Pacific coast with the rivers of Amazonia to the east of the country. In order to be able to financially conclude this demanding project, the Seljan brothers travelled to the USA where they persuaded several American magnates to financially support the project and the establish 'The American Peruvian Corporation – Sociedad Peruana-Americana'. Very soon they created the projected map of the future traffic route which would connect Lima and Pacasmayo on the Peruvian Pacific coast with the Amazonian rivers. Namely, at the time Peru had two railways, one led from Pacasmayo to Cajamarca in the Andes and the second from Lima to Cerro de Pasco. From Cajamarca there existed an old road across the Andes to Pajatén from where it was necessary to make a route for the new road to the valley of the River Huallaga which is suitable for sailing in its lower flow and where river traffic was developed from Yurimaguas to Iquitos, the ports on the Amazon. In this way Lima and Pacasmayo on the Pacific coast would receive a connection to the Atlantic.

Finally in autumn 1912 Mirko Seljan started the expedition while Stjepan Seljan stayed in the USA working on the project. Departing from Lima, the expedition was divided into two groups, one led by Mirko Seljan together with the American representative of the project Patrick O'Higgins while the second group was led by the Peruvian engineer Lezcano and engineer O'Donnell. They were supposed to meet in Pachiza and from there proceed towards Pajatén from where it was necessary to mark out the new road to the valley of the River Huallaga. The mentioned two groups never met. Mirko Seljan went missing in May 1913 together with the rest of the expedition. Parts of his body were found near Cajamarquilla (today Bolívar) at the end of 1914. His mysterious death as well as the collapse of the whole expedition (there were no survivors) was never clarified, but it is believed that they were killed by local tribes. Mirko's map of Peru contains the exact location of Cajamarquilla in the vicinity of which his body was found. In this way the dedicated cartographer also mapped the place of his tragic death.

Mirko's death halted the work of the most famous Croatian cartographic duo. Stjepan Seljan, broken hearted by the brother's death, never took on any further cartographic work. The rest of his life was spent quietly in the Brazilian state of Minas Gerais. He based his family near the town of Ouro Preto and researched ores. His successors still live in Brazil today.

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