Building Roads to Take the Land. Urban Amazonia and the Case of San Julian

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Abstract

This essay examines the vast urban transformation of the Amazon Rainforest during the second half of the twentieth century. It frames the mid twentieth century geopolitical forces and governmental ethos that instigated the largest urbanization process in the history of the forest. More specifically, the text showcases the small but prominent settlement of San Julian, in the Bolivian eastern plains, as a model project in the context of a regional forest that continues to rapidly urbanize, raising important questions and presenting an important model about urban and economic development in an age of extreme environmental uncertainty.

Il saggio esamina la vasta trasformazione urbana che ha colpito la foresta amazzonica durante la seconda metà del XX secolo. Il contributo intende inquadrare le forze geopolitiche e l'etica governativa della metà del XX secolo che hanno comportato il più grande processo di urbanizzazione nella storia della foresta. Più specificamente, il testo presenta l'insediamento di San Julian, un piccolo ma importante centro abitato nelle pianure orientali della Bolivia, come riferimento progettuale nel contesto di una foresta regionale che in un'epoca di estrema incertezza ambientale continua a urbanizzarsi rapidamente, sollevando importanti questioni e offrendo un importante modello di sviluppo urbano ed economico.

Keywords

Amazonia, South America, Territorial Planning, Urbanization.
Amazonia, Sud America, Pianificazione Territoriale, Urbanizzazione.

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Throughout the twentieth and twenty-first centuries, South America has witnessed the implementation of economically aggressive, yet contentious regional integration plans. From attempts in the 1920s and 1930s to link the Andean region to ports along the Pacific through switchback rails that carved the volcanic rock of the cordillera, to the most recent COSIPLAN- IIRSA[1] initiative that crisscrosses the continent with bi-oceanic corridors, mobility infrastructure as an agent for economic development has been front and center in the plans of all the major South American nations. Yet, no initiative has had a greater impact in the transformation of the South American interior—the Amazon River Basin—than two mid-twentieth century highway projects, pioneered by two of the most prominent South American leaders: Brazilian President Juscelino Kubitshek and Peruvian President Fernando Belaunde Terry. Two projects implemented in the 1960s, namely Kubitshek's *Rodovia Belem – Brasilia* and Belaunde's *Carretera Marginal de la Selva*, popularized the penetration road model, roads open to give people access to undeveloped land, and made it synonymous with development and economic progress throughout the Amazon Rainforest. The construction of access roads paired with the granting of land titles became the process through which the national governments claimed the rainforest and put it to work under the light of economic development.

Most of the large-scale transformations in the region involved top-down policies and regional schemas to survey, make legible, and integrate these complex forest ecologies into their country's national economies through rudimentary road building. Yet, throughout the last fifty years one can find a few exceptional projects that utilized the penetration road model as the point of departure for the implementation of a much more comprehensive and well-tempered urban project. Such an example is the planned settlement of San Julian, in the *tierras bajas* region of Bolivia. A project that combined a formally clear physical planning strategy and social programs to construct a successful agrarian community that has been able to withstand the challenges of the territory and become even more successful over time.

This essay will examine the broader geopolitical forces and mindset that led to unprecedented urbanization of the Amazon Rainforest in the second half of the twentieth century and how these pressures originated a project like San Julian. Furthermore, the essay will showcase the importance of a project like San Julian in the broader framework of an urbanizing forest, and how its lessons can help us re-evaluate road-based urbanization models in a context where contemporary regional plans must prioritize environmental stewardship alongside economic development.

The Myths of Urban Amazonia

Narratives of Amazonia have always been inveigled by the overpowering presence of its thicket. Brought into the imagination of the western world in 1542 by Spanish Expeditioner Francisco de Orellana, what we today understand as the Amazon Rainforest, or the Amazon River Basin, is a complex territory that indomitably resists singular and straightforward definitions. From Orellana's description of the female warriors of the Tapuya tribe as Amazons –alluding to the Greek mythical warriors that gave the region its name– to the vivid first hand observations of copious vegetation and forest people by nineteenth century Prussian botanist Alexander Von Humboldt, Amazonia has historically been rendered in popular imagination as a space that is simultaneously mythical and physical, with light-footed and dispersed settlements that are fully compliant to the majestic cycles of the omnipresent rainforest.

Most literature on the Amazon River Basin, particularly before the 1960s, had traditionally rendered the forest and its soils as unsuitable for complex forms of

Fig. 1 - Aerial view of the Amazon River Basin seen from the Atlantic with the Andes Mountain in the background (Drawing courtesy of Felipe Correa / Somatic Collaborative).

human settlement. In *The Handbook of South American Indians*, editor Julian Steward (1947), argues that a class structured society was not "characteristic" of "tropical forests and tribes." Given that cultivation had to shift locations on a rapid cycle, and villages had to adapt to agricultural shifts, according to Steward, this made it impossible for villages to establish roots and flourish as permanent settlements. This belief was further popularized by archeologist Betty Meggers. Meggers, building on her dissertation fieldwork at Marajo Island (Brazil), argued that ancient complex societies found in the region could not have developed locally, due to the limited agricultural potential of the forest (Denevan, 2012). Instead, she claimed that these societies were transplants from the Andes that gradually disintegrated in the forest. Steward and Meggers rationalized a natural determinism theory that prevented Amazonia from being understood as urban.

These views on Amazonia shifted drastically during the second half of the twentieth century. A growing number of archeological studies questioned the notion that the region was unable to accommodate more complex and permanent societies. The groundbreaking work in the 1960s of archeologist Donald Lathrap, conducting field research in the Peruvian Amazon, demonstrated that native Amazonian populations were much greater is scale and complexity than previously believed. Lathrap argued that not all soils throughout the Amazon were equal (Denevan, 2012), and that *várzea* or floodplain soils where agriculturally far superior to *terra firme* or *interfluve soils*, creating a patchwork of agricultural grounds that could accommodate larger and more permanent settlements. Many other archeologists continued to build upon Lathrap's work, with extensive fieldwork along the Brazilian, Bolivian Colombian, Ecuadorian, and Peruvian amazon. This additional fieldwork demonstrated that Pre-Columbian settlements in the region modeled a collection of chiefdoms and polities that constructed a much more complex domesticated landscape than what was previously imagined. More recently, with the assistance of lidar technology, studies in the region have been able to identify large scale embankments, ditches, and causeways that served as the basic infrastructure for permanent agricultural settlements and accompanying cities. Current studies estimate that humans have lived in the Amazon region for more than 10,000 years, mostly occupying the *várzea* floodplains, suggesting that sixteenth and seventeenth century accounts of dense native populations were, in fact, factual. It is estimated that close to seven million inhabitants lived throughout the Amazon region in the sixteenth and seventeenth centuries: a population that parallels population estimates during the 1950s.

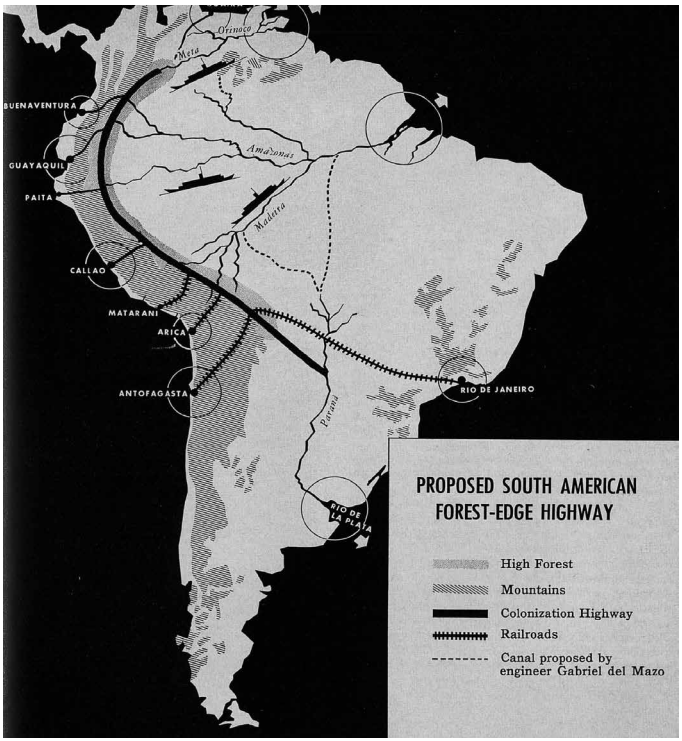


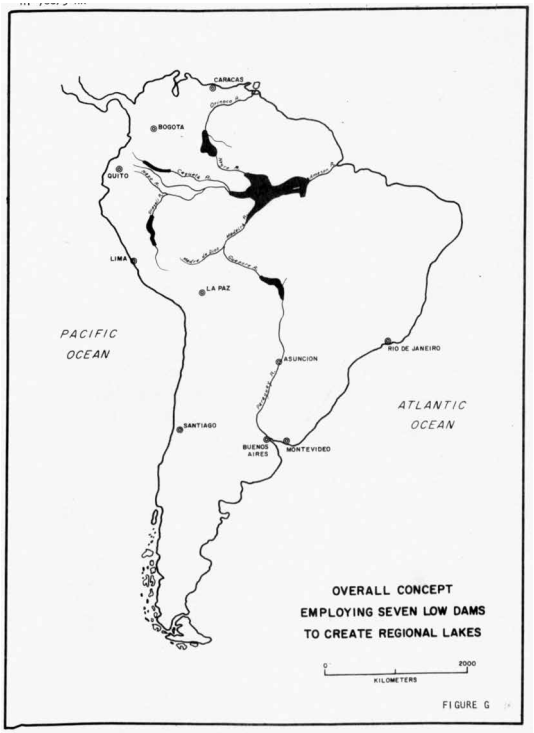
Fig. 2 - Regional plan of the Carretera Marginal de la Selva proposed by Fernando Belaunde Terry and its connection to the rivers of the Amazon Rainforest. As featured in Newsweek Magazine in October, 1960 (Image courtesy of the New York Public Library).

Fig. 3 - Regional Plan of Robert Panero's "A South American 'Great Lakes" System" as presented in the 1967 report issued by the Hudson Institute (Image courtesy of the New York Public Library).

Lathrap's work, and the many additional studies backed by his findings, single out two key points about settlement and early urbanization in Amazonia. The first point addresses the diversity of soils that exist in the region, many capable to accommodate permanent settlements through a combination of agriculture, fishing and hunting. A model of urbanization that Brazilian geographer Bertha Becker later defined as *foresta urbana* or urban forest (Becker, 2013). The second point undertakes the long-term alteration of the forest by humans. The work shows how the canopy has been, for thousands of years, altered by human settlement primarily through agricultural practices and inter-forest migration. What is most relevant about the second point, is that it questions the simplistic belief of absolute harmony between Amero Indians and the forest in pre-colonial times and the start of ecological devastation during the Spanish and Portuguese colonial era. In contrast, these studies show a continuous land management process, with the ebb and flow of population and extractive activities, that debunks the natural deterministic notion that the Amazon could not, in fact, be urban.

Developmentalist Governments and the Integration of the Amazon Rainforest into the National Economies of South American Nations

The radical shift in Amazonian patterns of urbanization happen in the second half of the twentieth century. It is an evolving notion of the rainforest as a pioneer frontier that should be integrated to the national economy of each bordering country what spearheaded a wave of unprecedented resource extraction and urbanization in the history of the region. The emergence of state sponsored developmentalist plans, paired with a growing international interest on the the Amazon Rainforest as a global resource, catalyzed an urbanization process that favored the construction of roads as a way to take the land, extract



the resources and defend national borders. Two major highway projects in Brazil and along the Andean nations of South America exemplifies this mindset. In 1958, shortly after the inauguration of the country's new capital, Brasilia, Juscelino Kubitshek aggressively implemented the *Rodovia Belen-Brasilia* also known as the Trans-Brazilian Highway. Linking the newly minted capital with the until then largely forgotten Amazonian region. In *Brazil's Jungle Road of Tomorrow*, a New York Times article published in November 9 of 1958, the paper describes the project as "piercing the rainforest that locks the vast Amazon Basin, the Trans-Brazilian Highway will lead at last to fulfillment of the old dream of civilizing the wilderness." Despite the severe challenges to implement such a project in the depths of the forest, the 1958 New York Times article captured the spirit of the project, the "Jungle Road was the means to make the Amazon Rainforest an integral component of the national economy". In 1963, running parallel to the Brazilian highway, both physically and temporally, Belaunde Terry began construction of the *Carretera Marginal de la Selva*. Conceived as a 2500-mile corridor that flanked the eastern edge of the Amazon River Basin, it was to be a transnational corridor that linked Venezuela, Colombia, Ecuador, Peru, and Bolivia along the eastern edge of the Amazon (Belaunde Terry, 1960). Seen, literally and metaphorically, as roads to eradicate poverty, both highway projects promised these nations an unprecedented access to the land and riches of the Amazon River Basin. While implemented in a rudimentary manner, these two initiatives exemplified the notion that roadways were the path to integration and development of the South American interior, which at the time was seen as backwards and economically stagnant. While the plans never yielded the results that these two leaders and their successors hoped for, the promise of extracting wealth through roads still lures governments and private international investment.

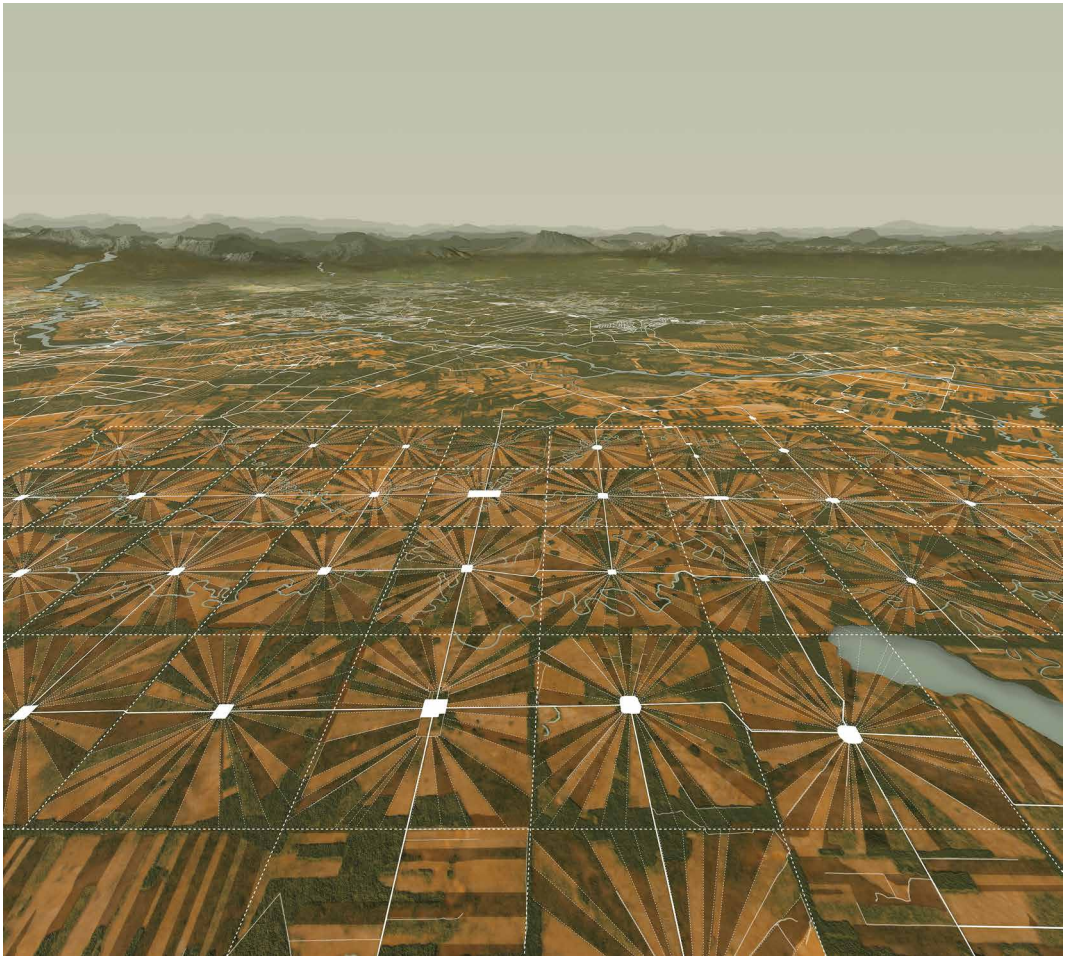
Road infrastructure was not the only large-scale mobility infrastructure envisioned for the Amazon Rainforest. Contemporaneously to Belaunde's and Kubitshek's road projects, several studies were developed that looked at the unification of the multiple rivers that make up the Amazon River Basin into one large navigable network. The most influential of these studies was the one presented by the Hudson Institute, a pro-development think tank based out of Croton-on-Hudson in New York, titled *A South American 'Great Lakes' System* (Panero, 1964). Authored by Engineer Robert B. Panero, the project advocated for the implementation of a series of low dams, seen as highly suitable for flatlands as the most efficient and cost-effective way to transform the rivers of the region into a set of "artificial great lakes". From the Amazon and Orinoco to the Chaco and the Ucayali, low dams were promoted as a wonderous technology that would link rivers big and small, joining fluvial networks throughout Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela. An article published by *The Wall Street Journal* on December 3 of 1968, titled *Jungle Frontier: Brazil Begins Effort to Unlock the Wealth of Vast Amazon Basin*, vividly describes the boldness of the "Artificial Lakes" project:

> [Panero] reasoned that in one stroke, the productive areas of the interior would be opened up. The land that would be flooded is expendable, Mr. Panero contended. The proposal envisions nine dams that would create seven huge lakes. One dam, more than twenty miles long, would form an inland sea several times the size of Lake Superior, at Monte Alegre on the Amazon. This lake alone, Mr. Panero estimates, would have one quarter the hydroelectric potential of the entire U.S. (Northrum, 1968).

Both the Hudson Institute report, and its portrayal in mainstream media, rendered the region a site fit for resource extraction. While navigability and regional integration across states were the objectives of the project, the authors of the report did not consider the short-term or long-term environmental impacts of such a massive undertaking.

Fig. 4 - Aerial Perspective showing the agrarian block configuration of the town of San Julian, seen from the east with the Andes Mountains in the background (Drawing courtesy of Felipe Correa / Somatic Collaborative).

From a technical perspective, Panero's vision dovetailed with Belaunde's *Carretera Marginal* and Kubitshek's *Rodovia Belem-Brasilia*. A network that overlapped fluvial and ground transport would be the ideal infrastructure to take over South America's new pioneer frontier. In fact, Belaunde's government assisted with the Peruvian portion of the Hudson study and was partially incorporated into the plans for the *Carretera Marginal*. While unbuilt, Panero's regional planning study raised serious queries regarding the environmental and geopolitical implications of the proposal. On the one hand, the audacity of the paper's recommendations raised eyebrows within the scientific community. The dissemination of the report in mainstream media carried worldwide attention to the region and prompted the beginnings of more focused environmentalist activism in the region. On the other hand, Panero's work raised fear about the meddling of international actors in the heart of South America. Given the Hudson Institute's link to the Pentagon and its reputation for preparing nuclear studies, rumors swept Brazil that the Central Intelligence Agency (CIA) was behind the study, all in an effort to help the United States take over the Amazon. Brazilian diplomats in Washington DC and local politicians in Brasilia and Sao Paulo feared the possibility of an international protectorate capable of taking away Brazilian control over the rainfor-



est. This seemingly baseless threat of international interference, paired with a growing interest in transforming the Amazon into a treasure chest of commodities, propelled the basin to become one of the epicenters of Brazil's economic agenda for the second half of the twentieth century. Other South American nations with access to the rainforest and similar resource extraction ambitions followed suit. Penetration roads and the slight upgrading of navigable rivers combined with the assignment of land titles became the primary tools to bring the Amazon into the heart of each nation's economy. Today, a rapid look at the Amazon Rainforest from above reveals the devastating effects of the penetration road in the area. A main throughway with secondary roads that grant access to unspoiled land commonly referred to as 'fishbone' urbanization, has become the standard model for opening up the rainforest, unraveling the largest and most destructive urbanization process the region has ever witnessed.

The town of San Julian, an experimental semi-assisted colonization plan sited in the foothills of Santa Cruz along the western edge of the Amazon River Basin, stands in stark contrast to the ubiquitous model of 'fishbone' urbanization – secondary roads arrayed along the edges of a primary road providing access to clear the forest – prominent throughout the rainforest. Built as an urban project that stems out of

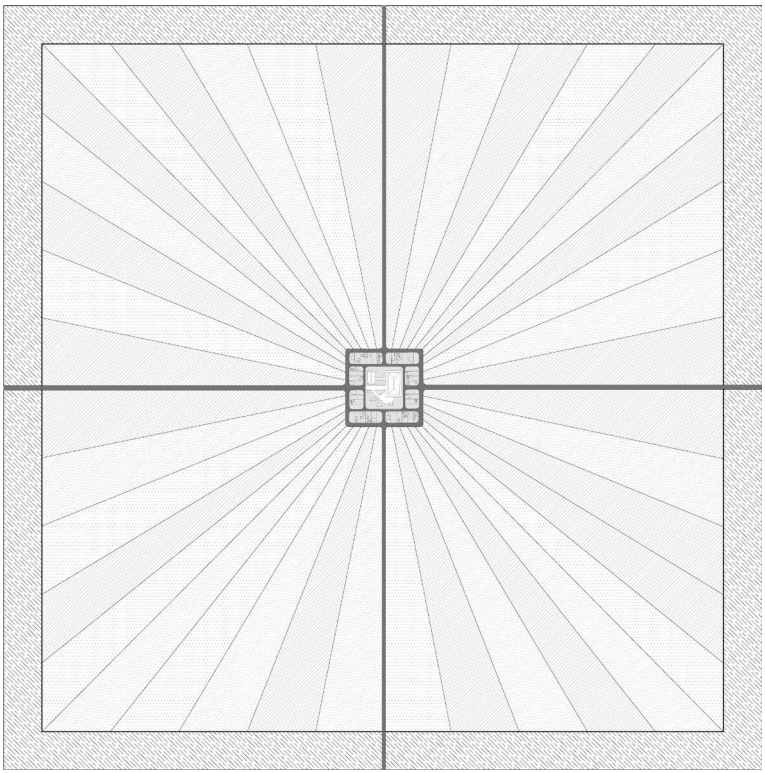


Fig. 5 - Plan of a prototypical *nucleo* showing settlement, agricultural parcels, and forest lattice (Drawing courtesy of Felipe Correa / Somatic Collaborative).

Fig. 6 - Plan of the agrarian superblock composed of nine *nucleos* with the larger central town (Drawing courtesy of Felipe Correa / Somatic Collaborative).

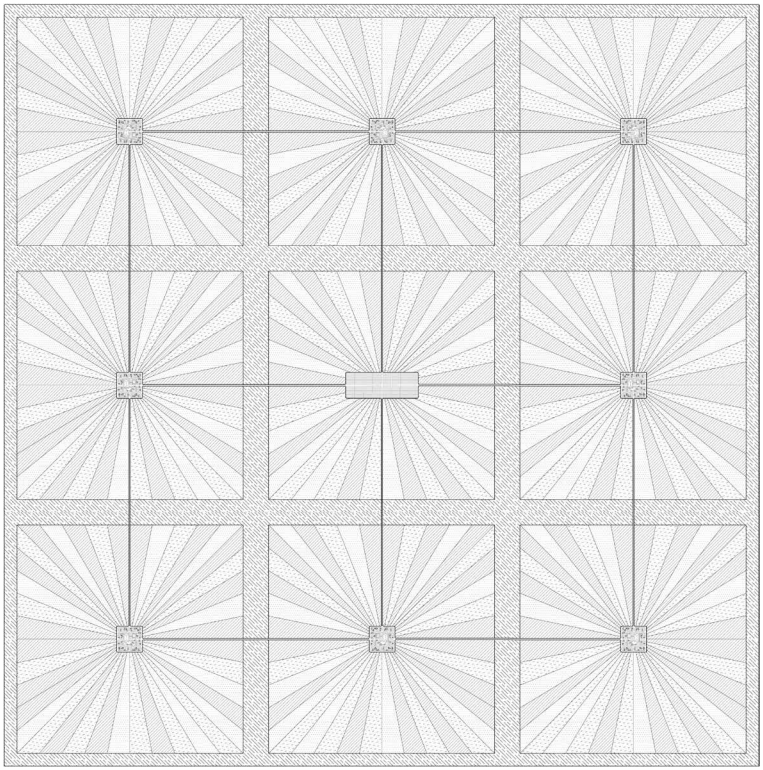
the *Brecha Casabre*, a penetration road in the Bolivian Amazon, the project brings together a regional vision with town planning principles that provided an effective blueprint for agrarian development.

San Julian: An Experimental Town in the Bolivian Flatlands

A quick glance at satellite imagery of the region to the northeast of the city of Santa Cruz de La Sierra, reveals an eye-catching urbanization pattern. One's eye is immediately engrossed by a field of small towns with agricultural parcels extending tangentially away from their center and crisscrossed by a grid of preserved forest. Consistently featured in social media posts as a geographic novelty, these geometries are the result of an urban project that attempted to carefully construct a space, and a process, to address the rapid migration that was taking place from the Andes to the Bolivian lowlands, in the late 1960s.

In combining a town plan with educational programs, economic aid, and collective ownership, the vision for San Julian aimed at a settlement plan that went beyond simply transplanting conventional surveying and property ownership models from the Andes to the Amazon.

In 1961, the economic crisis of COMIBOL, the largest state-owned mining company in the country, led to major layoffs, putting pressure on the government to provide new sources of employment for thousands of workers (Stearman, 1980). In response, the Bolivian government implemented a series of colonization projects that would relocate unemployed *campesinos* to areas within the country where the economy needed to be reactivated. Bolivian authorities saw in the Amazon, or the *oriente* as it is called in Bolivia, the ideal landscape to put unemployed workers to work, and in doing so put this forgotten region to work for the national economy. Furthermore, the ur-



banization of the Bolivian lowlands was an effective way for the nation to assert political sovereignty over remote lands with contested borders. The semi-assisted planned settlement of San Julian stems out of this need to accommodate large numbers of workers, mostly Quechua and Aymara indigenous populations, that were migrating to the lowlands in search of economic prosperity, through nationally sponsored relocation programs.

Conceived in the early 1970s and located in an alluvial plain in-between the Rio Grande and the San Julian River in the Department of Santa Cruz, the agrarian settlement of San Julian is born as a collaboration between national and international actors. Kickstarted by the *Instituto Nacional de Colonización* or the National Colonization Institute, it had the technical and economic support of British based OXFAM, The Government of Germany, and the U.S. Agency for International Development (USAID). The project also counted with the assistantship of the United Church Committee, an interdenominational church consisting primarily of Catholics, Methodists, and Mennonites, that had on the ground experience providing help to underprivileged communities (Stearman, 1980). With a budget of 5.2 million dollars at the time, allocated to roads, wells, basic services and social programs, the project began implementation in 1974, covering an area of approximately 250,000 hectares and with a target to accommodate 4680 families at a cost of approximately $1800 per family.

The spatial planning concept, known as the *nucleo* settlement pattern, was one of the most distinctive characteristics of the project. A modular plan unit lodged forty households around a central clearing, from which parcels of approximately fifty hectares of soon to be cleared forest radiated outward. A *nucleo*, composed of settlement, basic services and future farmland was a five-kilometer by five-kilome-

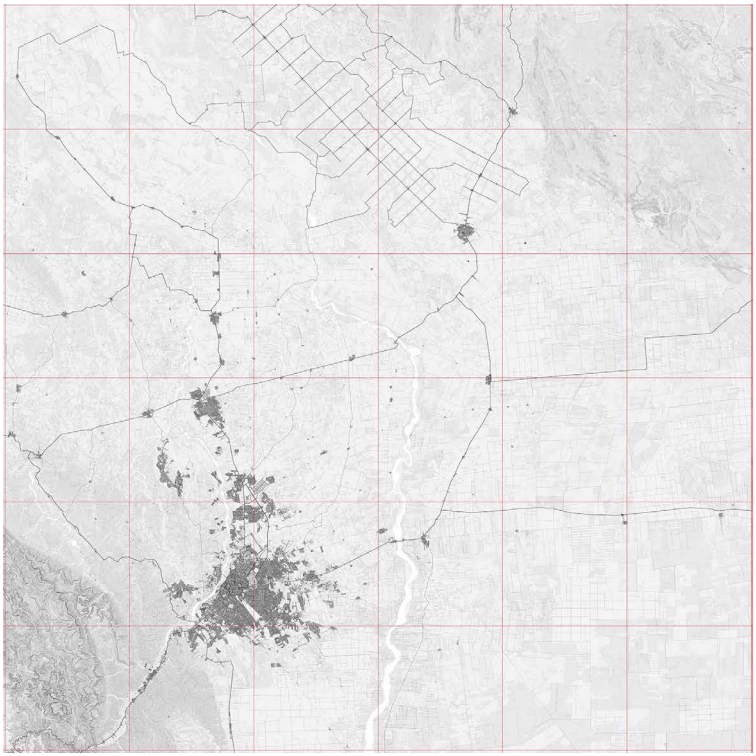


Fig. 7 - Regional plan showing the current morphology of San Julian in relation to the City of Santa Cruz de la Sierra (Drawing courtesy of Felipe Correa / Somatic Collaborative).

ter block. The *nucleo*, or center of the block would be equipped with one deep well, a hand pump, and two latrines to be used collectively by the forty households. This block was repeated nine times to compose a 15-kilometer by 15-kilometer, agricultural superblock. A *nucleo central* or town center with a school, a health center, and other social services would be placed in the midpoint of the superblock and serve the larger community. In-between each *nucleo*, a forest lattice, 500 meters wide, was designated as a conservation corridor allowing for forest continuity and animal crossings.

The two most innovative elements of the plan involved incorporating a sense of communal living and allowing for growth over time within the design framework. In San Julian, households were organized in a town configuration that minimized the built footprint and empowered shared resources. For example, each *nucleo* had a central well and a hand pump that was shared by all households, facilitating a sense of belonging among its residents. In San Julian's strategy, the first act of urbanization was demarcating and building the *nucleo*, making it the staging ground for the clearing of agricultural land over time. In allowing farmland to grow over time, the scale of agricultural production could be tailored to available labor and resources at any given time.

Beyond a physical layout that encouraged solidarity among dwellers, the plan also incorporated social programs that assisted migrants during their transition from the highlands to the lowlands and continued during their first two years of settlement. Catering primarily to heads of household between eighteen and forty-five years old, the social component of the plan included an orientation program with educational component on how to clear land and build a basic home, as well as training on small scale agricultural practices and commercialization. The plan also incorporated basic health facilities. Through a partnership with the World Food Program, a program initi-

ated in 1961 by U.S. President Dwight Eisenhower as an experiment to provide food aid through the United Nations network, colonists were provided full rations of food for the initial nine months of residency. Furthermore, the new residents had access to a seed bank that would help them start agricultural cycles. The orientation program was mandatory for all settlers, and titles to the land where only given upon completion of the orientation program and the mandatory clearing of 40 hectares of forest per household (Painter, 1980).

Throughout its implementation, San Julian did experience many challenges over time. Among the most significant ones was the opening and maintenance of permanent roads, especially during the rainy season. Heavy rain and lack of equipment made many roads unusable during the rainy season. The adequate provision of potable water was also an issue. While each *nucleo* had a well, distribution of water beyond the well was never fully implemented. Finally, the relative long distance from the basic *nucleos* to the *nucleo* central became a major problem. Five kilometers away made it impossible for dwellers to have access to the services in the *nucleo central* without motorized transportation. Yet, in examining San Julian today, and analyzing it in comparison to other contemporaneous resettlement projects in the region, a carefully articulated physical plan in combination with well managed social programs proved to be successful. The evidence is in San Julian's attrition rate. While most assisted or semi assisted colonization projects in Bolivia experienced an attrition rate of forty to fifty percent, San Julian's rate was only twenty percent. Overall, families have adapted to the area and resided there on a long-term basis.

A careful examination of San Julian provides multiple lessons for the future of town planning in urban Amazonia. For one, it showcases the importance of an urban strategy that goes beyond the implementation of utilitarian road infrastructure, in incorporat-

ing the concept of the penetration road into a more comprehensive urban vision, the project effectively negotiates between a larger regional infrastructure and the life of a small town, providing a more direct blueprint for successful long-term settlement in the area. San Julian also demonstrates how a strong, yet flexible, urban plan can allow for future interventions and improvements to be added over time. For example, it would be quite feasible to implement a settlement upgrading strategy that would implement a better potable water system, larger educational facilities within the *nucleo* central, and even the introduction of higher density housing within the original parcels of the *nucleo*, all possible within the framework of the original plan.

At a more regional scale, San Julian teaches us the importance of intermediate scale plans that can help mediate between regional road and agricultural parcel. While the notion of building *ex-novo* towns is not as prominent as it was in the late twentieth century, the urban structure of San Julian combined with the broader social programs that accompanied it could help us rethink how we upgrade hundreds if not thousands of small cities and agricultural towns, built in the last seventy years, mostly without the insight of a carefully crafted urban vision.

While Planned communities like San Julian proved to be successful in the organization of new communities in the 1970s along the edges of the Amazon rainforest, today its environmental and social strategies have to be examined in relation to a much broader and complex regional transformation. Now, San Julian is one of hundreds of towns and agricultural subdivisions that make up one of Bolivia's fastest growing agricultural corridors. A patchwork of heterogeneous communities that include indigenous groups, Japanese settlers, Mennonite missionaries, and large industrial holdings, among others. While these groups present very different approaches to organizing the land, what communities share is the overuse of soil for monocrops, primarily soy production, paired with significant increases in populations that are no longer directly associated to an agrarian enterprise. This opens the need to revisit and upgrade San Julian and its larger region in relation to new population densities, renewed civic aspirations, and major environmental degradation concerns.

I would like to end this essay by bringing attention to Figure 4, an aerial perspective drawing showing the agrarian block configuration of the town of San Julian, seen from the east with the Andes Mountains in the background. First, the drawings show the ways in which roads, along with simplistic land subdivision models, have come to define Urban Amazonia today. In other words, they drive urban growth and are as integral to shaping the biomes and ecotones of the basin as the snow melt from the Andes Mountains. Second, we can see in these corridors a patchwork of

cities and forests, much like what ecologist T. T. Foreman delineated in his book Landscape Mosaics. However, as we can observe here, there is a great deal of co-authoring between humans and non-humans alike in defining these patchworks. Third, a closer look at how we built roads to "take the land" allows designers and policy makers to reexamine the legacy of the built environment we have inherited and to speculate on the ways in which design can contribute to the evolution of these cities under the canopy. This, I believe, is the greatest challenge of urban landscapes in the Amazon region for the 21st century.

Notes

[1] The South American Council of Infrastructure and Planning (COSIPLAN) is the forum where political and strategic discussions are held with a view to implementing the integration of South American infrastructure, in the context of a commitment to social, economic, and environmental development.

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