

Arkitekturax Visión FUA

Revista internacional de arquitectura, urbanismo y políticas de sostenibilidad

ISSN: 2619-1709 | ISSN-e: 2665-105X

Publicaciones Universidad de América

Volumen 2, Número 2, enero-diciembre 2019, pp. 55-73

<https://doi.org/10.29097/26191709.269>

Web: <https://revistas.uamerica.edu.co/index.php/ark>

Symbiotic Urbanism: an eco-systemic perspective on social and environmental repair for urban development initiatives in Medellín, Colombia

Urbanismo simbiótico: una perspectiva ecosistémica sobre la reparación social y ambiental para iniciativas de desarrollo urbano en Medellín, Colombia

This paper was originally written as part of a Master's thesis, for the partial fulfillment of a Master's in Landscape Architecture (MLA) at the Boston Architectural College, spring 2018.

Sección: CIUDAD • Artículo de investigación científica y tecnológica

Recibido: 21 de octubre de 2019 • Aceptado: 18 de noviembre de 2019

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Abstract

Inter-relations of social and ecological systems in the city of Medellín, Colombia have been fraught with complexity as the city has faced decades of systemic violence, political unrest and deep socio-economic fissures. A perpetuation of social inequity has manifested in an expansion of informal settlements along Medellín's urban periphery, and within ecologically sensitive zones of the city. This paper explores an emerging methodology for social and environmental repair through the lens of hydrology, positing the application of an eco-systemic perspective of landscape-led design interventions that seek to recalibrate the foundational relationship between human and nature. The objective is to formulate a systemic response through design and planning initiatives which consider the interconnected social, ecological, political, and economic characteristics of the city, while strongly embedding participatory processes in an effort to foster socially-responsive design outcomes.

Keywords: social urbanism, socio-ecological, systems thinking, social justice, Medellín.

Resumen

Las interrelaciones de los sistemas sociales y ecológicos en la ciudad de Medellín, Colombia, han estado llenas de complejidad, ya que la ciudad ha enfrentado décadas de violencia sistémica, disturbios políticos y profundas fisuras socioeconómicas. La perpetuación de la inequidad social se ha manifestado en una expansión de los asentamientos informales a lo largo de la periferia urbana de Medellín, y dentro de las zonas ecológicamente sensibles de la ciudad. Este artículo explora una metodología emergente para la reparación social y ambiental a través de la lente de la hidrología, postulando la aplicación de una perspectiva ecosistémica de intervenciones de diseño dirigidas por el paisaje que buscan recalibrar la relación fundamental entre el ser humano y la naturaleza. El objetivo es formular una respuesta sistémica a través de iniciativas de diseño y planificación que consideren las características sociales, ecológicas, políticas y económicas interconectadas de la ciudad, a la vez que incorporan procesos participativos en un esfuerzo por fomentar resultados de diseño socialmente receptivos.

Palabras claves: urbanismo social, socioecológico, pensamiento sistémico, justicia social, Medellín.

Introduction

Mitigating the social and environmental impacts of continued exponential growth on vulnerable cities in the Global South requires spatial designers and design thinkers, politicians, planners, academics, among others, to reconsider the mechanisms and methodologies with which they approach their craft. Functioning from top-down, linear processes driven solely by economic or political agendas fail to recognize the complex systems that define urban environments. Through an integration

of systems-thinking in the evolution and development of planning strategies for rapidly globalizing cities, designers have the capacity to more fully comprehend interconnections and interdependencies across the urban fabric, working through ecological and social lenses simultaneously. Spatial designers and thinkers could then begin to reveal the complex systems that shape the city, and use them to locate key leverage points (Meadows, 1996) upon which they might intervene in fostering catalytic change.

This paper discusses particular landscape-led urban planning strategies derived from socio-ecological principles, for the development of an emerging systems-thinking methodology for targeted spatial interventions in the city of Medellín, Colombia. Through an analysis of the research informing the premise for a socio-ecological response, this paper questions whether an eco-systemic perspective for social and environmental repair curates a sustainable development plan for targeted projects in Medellín, and considers whether this perspective would be scalable to similar cities across the Global South.

Systems-thinking emphasizes a non-linear assessment of how systems respond to external disturbances (Meadows, 1996). In regards to urban design and planning theory, systems-thinking is posited as a crucial tool for problem solving as it allows for connections to be revealed between components, at multiple spatial and temporal scales. Given that systems exist in constant states of flux and renewal, and are largely self-regulating, spatial design interventions should attempt to situate within the structure of a system to become part of the inconsistency, supporting and responding to continual change. Systems-thinking offers a foundation from which spatial design can operate more in tune with natural structures and energies. The city is part of nature, not separate or distinct from it (Spirn, 2014). The city, in being a human construction, is a natural system in itself, and to allow it to be seen as such may progress its further growth more organically. Hough (2004), states,

Humanity and nature have long been understood to be separate matters. Such a dichotomy has had profound influences on the way people have thought about themselves: the cities where people live and the non-urban regions beyond where nature lives. In the unique cultures from which the disciplines of intervention spring- civil engineering, building, planning and design- this perceived separation has also profoundly influenced the desire to control, not only nature, but also human behavior. (p. 8)

In forming a deeper understanding of the city through ecological and social lenses, and working to develop a methodology that responds to these lenses, spatial design will have the potential to behave through holistic means, while generating shifts

in ecological function, environmental degradation, social orders and relations, and even the political and economic drivers of development. This is perhaps a lofty goal, but it asks spatial design to be more inclusive, across social and ecological parameters, and this is the fundamental basis from which spatial designers must operate.

Seeking social and environmental repair

Medellín; a background

Originally founded as a Spanish colony in 1675, Medellín's growth into Colombia's industrial powerhouse saw the city swell from 14,507 in 1786 to 59,815 by 1905. With the Colombian Conflict kicking off in the 1950's, Medellín's urban development further exploded as internally displaced people sought refuge from intense rural violence and exploitation. Medellín's urbanization ballooned from a population of 358,189 in 1951, to nearly 2.5 million in 2005 (Betancur, 2007). This growth was largely focused on the higher slopes of the city where the poorest barrios were built through self-construction and self-organization, on illegal land. With the drug wars and dominance of the Medellín cartel in the late 1990s, these barrios became targets, overrun with guerilla forces, with warring factions battling for control over land, labor, and economic resources (Maclean, 2015). Medellín's history of violence became deeply embedded in political, social, economic and cultural constructs (Maclean, 2015), and the resulting impacts on the poor instigated a systemic condition of inequality and distrust.

Social Urbanism and the Transformation of Medellín

In response to systemic violence, the national government of Colombia and the local government of Medellín worked to implement a new governance process to address the inequalities that had led to Medellín's particular demise. When Sergio Fajardo was elected mayor of Medellín in 2003, the city was beginning to emerge from a dark period of human and environmental tragedies and corruption. Responding to the need to "recover" the poorest parts of the city (Fajardo, 2013), and offer opportunities for inclusion and improved equality, Fajardo created a strategy for urban development which came to be known as Social Urbanism. Social Urbanism derived from Fajardo's premise,

The most beautiful things for the most humble people, so that the pride felt in that which is public illuminates us all [...] Where before there was death, fear and dislocation, today there are the most impressive buildings [...] cultural and educational focal points around which we can all come together in peaceful coexistence. (Fajardo, 2013, p. 3)

Fajardo saw his city as a fractured space, in terms of social, political and economic structures, and a strategy which sought to knit these back together would be crucial to its future. Through a dedicated participatory process, the strategies of Social Urbanism gave citizens of informal communities more ownership, allowing their ideas to come to the fore, placing them in charge, through community leaders, of identifying priorities, managing participatory budgets and maintaining projects through ongoing stewardship (Calderon, 2012). This process began to build a culture of transformation in the city of Medellín. Colombian landscape architect Martha Fajardo, who was President of the International Federation of Landscape Architects while Sergio Fajardo was Mayor of Medellín, stated that “Social Urbanism is changing the very fabric of Colombia and offers the promise of hope to some of the world’s most troubled cities” (Fajardo, 2013, p 3). Her perspective that landscape architecture is at the forefront of urban planning and development, with the capacity to shift how we, as spatial thinkers and designers, shape our urban future, offers valuable support to this burgeoning profession in Latin America. The landscape of Latin America has been the defining force behind its evolving socio-cultural, political and economic fabric, and we must continue to recognize its power as we address ongoing challenges.

Although Medellín’s transformation has been regarded as a model, studied and, in some cases, replicated, the city still faces difficulties, including rapid urbanization, proliferating inequality, discontinuity in political structures, and the depletion of crucial resources (Hermelin, Echeverri and Giraldo, 2012). In understanding how Social Urbanism has evolved the city towards innovation and greater inclusivity, there is still a recognition that it has not been a comprehensive repair for all the city’s challenges. Therefore, in developing an emerging systems-thinking methodology, it has been important to note where Medellín’s weakest points remain, as this project seeks to define how these vulnerabilities create disconnections in the existing social and ecological systems of the city. To comprehend these continual concerns, a review of the city’s social and ecological degradations offers a perspective on where the model of Social Urbanism may lead in regards to systemic socio-political and environmental change.

Social degradations in Medellín

As a result of decades of instability, violence, distrust and corruption, the citizens of Medellín contend with a frayed social fabric, with broad divisions between social elites and the poor. Huge numbers of internally displaced people arriving in the city

as a result of ongoing political conflict continue to fight for housing rights, employment, and access to basic public services, while political forces make considered, yet cursory, attempts to repay a “social debt” (Maclean, 2015).

In Medellín, and across Colombia as a whole, a mechanism of economic classification, stratification, enacted in 1991 through Colombia’s new constitution, placed families in defined socioeconomic groups, based on the condition of their housing. The classification intended to induce social equity, as it dictated the amount one pays for public services. Those in the highest strata, strata 6, pay more for services and subsidize the payments of strata 1, the lowest strata. There are inconsistencies with this system, however, as a person with a higher income may still be living in a lower strata home, and thus pay less for services than they should be required to. There are also influences from infrastructure and public works projects, such as the recent greenbelt intervention at the periphery of the city (Patiño, 2015). Families currently living along this route, at 1800 meters above sea level, are in strata 1 or 2. They fear, however, that with the building of the greenbelt and its gardens, they would be re-classified as strata 3, without the increase in income that would allow them to pay for services (Gómez, 2014). This classification system also appears to create stigmatization across the city, effectively legitimizing a class system as a result of the social perception of one’s economic strata (Blanco and Kobayashi, 2008).

This social dysfunction can be witnessed across multiple scales in Medellín, from the nearly complete lack of a middle class, to the contentious relationships between individuals from neighboring barrios. Distrust has played a magnified role in the creation of territorial mindsets in the city. Influenced largely by the drug wars of the 1980’s, where street gangs openly fought for dominance and forced locals to pledge loyalties, much of this distrust continues today.

As further cause of distrust for many poorer citizens of Medellín, the government has continued to implement the removal and relocation of people from lands deemed ‘high risk’. Many of these communities have been formed as a result of forced displacement, and newcomers to the city have been forced to build their homes on land they do not own, as a matter of survival. These ‘invasions’ are considered illegal, and though many have since become formalized communities, a number of families are still classified in zones of landslide risk that, according to government officials, warrant their relocation, often to social housing towers rife with social dislocation and exploitation.

These families affected by removals and relocation have called for dignified housing, and recognition as core citizens. The Mesa Interbarrial de

Desconectados de Medellín, a public interest group representing the poorer citizens of the city, published a report in 2011 to public opinion where they state,

The Mesa Interbarrial de Desconectados de Medellín has decided to denounce the situation faced by thousands of families in the city who cannot access the right to decent housing, either because they are evicted for the construction of new infrastructure works, or because of a lack of attention and investment in certain areas, which are always affected and now more rigorously during the rainy season¹. (Mesa interbarrial de desconectados, 5/05/2011)

The mesa's report describes numerous situations where families were promised a suitable housing relocation which would not increase their rent, their costs for services, or remove them entirely from their existing neighborhoods. In far too many cases these promises were not met, and families have been placed in growing debt they will never be able to amend, or have been relocated to social housing towers where community cohesion is tenuous. These actions by the local government have formed scars in the social fabric of the city, and while many community leaders have emerged to fight for the rights of their people, and though some change has occurred as a result of the policies of Social Urbanism, practices in government still perpetuate divisions where cohesion is necessary for systemic change.

Ecological degradations in Medellín

As Medellín has expanded, particularly since the 1950's, the city has felt extreme strains on its natural resources, from the prevalence of arable land, to access to potable water, to the concentration of protected forested zones. The core ecological concerns for the city and wider region involve contamination and depletion of water resources as a result of illegal dumping of waste and the continued practice of channelization; soil erosion from deforestation and subsequent landslides; loss of biodiversity as a result of habitat destruction and the planting of invasive species; high levels of air pollution from poor emissions practices; and increased flooding events due to poor management practices of hydrological systems (Gómez, 2014).

The particular concerns for hydrological systems in the city are evidenced through multi-scalar attempts at remediation. This has been attempted through the

1 "La Mesa Interbarrial de Desconectados de Medellín ha decidido denunciar la situación por la que se encuentran miles de familias en la ciudad que no pueden acceder al derecho a una vivienda digna, ya sea porque son desalojados para la construcción de nuevas obras de infraestructura o por la falta de atención e inversión en ciertas zonas, que se ven siempre afectadas y ahora con más rigor por la época de lluvias."

planting of thick vegetative buffers along streambanks, dredging of streams for construction waste and silt buildup, and the planning of numerous linear parks along sections of the city's quebradas (creeks) (Echeverri, Velez and Werthmann, 2012).

The hydrological network of Medellín is a foundational component of its initial settlement as an agricultural mecca, and its exponential growth as a result of its industrial prowess. Today, however, this intense dendritic structure forming the framework of the city has been deeply fragmented, divided by channelization, re-routing and burial beneath the city's concrete skin. This has led to a deep fissure in the human recognition of this fundamental element.

An emergent methodology for social and environmental repair

Maintaining current urban development and displacement practices in both formal and informal settlements of Medellín exacerbates environmental degradation and continues to marginalize already vulnerable populations. For a city defined by its position in the Valle de Aburrá (Aburrá Valley), and by its expansion into high slopes and sensitive ecologies, designers, planners and policy makers in Medellín have begun to recognize the importance of finding a balance between urban growth and environmental stewardship.

With an understanding that this balance between the expansion and contraction of growth in the city is ingrained with complexity, this project seeks to tackle a wicked problem (McPhearson, January 20, 2017) through the development of an emerging methodology utilized to dissect the multi-dimensional and inter-connected challenges the city of Medellín continues to face.

The reconstruction of broken social and ecological systems depends on the comprehension of inter-relationships, dependencies, correlations and confluences evident within the system. Following this comprehension, identifying the leverage points (Meadows, 1996) at which intervention can be fruitful is achievable through the adoption of an eco-systemic perspective. This perspective allows for the development of a spatial design methodology informed by systems thinking theory, functioning across multiple scales of both the social and ecological spectrum.

This project reviews the building of a holistic response to the scale of challenges identified through both ethnographic and data analysis assessments. The key questions posed throughout this investigation consider the following:

1. Will an eco-systemic perspective for spatial design allow for more holistic spatial and social outcomes to emerge in sustainable urban development initiatives in Medellín, Colombia?

2. Will employing a design methodology that identifies targeted interventions in a particular study location create potential for systemic change throughout a broader region?
3. Can a socio-ecological methodology scale into a framework for socially-conscious spatial design applicable to similar cities confronting social and ecological degradation?
4. Does an eco-systemic methodology for spatial design offer a viable remedy for addressing the dichotomy between human and nature so prevalent in rapidly growing cities?

Political power struggles within a society often end up oppressing those without the means to influence the political environment. Thus, empowering communities to develop a voice, and giving them the social and political space in which to exercise it, is paramount to developing inclusivity and generating social justice. This empowerment must be embedded in trust. Therefore, a further question we must ask is whether designers have the capacity to create this trust, particularly when approaching a community that is not their own, either culturally, socially or geographically?

Designers must begin to shift their roles towards listener, and then translator, to remove imposition and ego from the equation, and recognize that they alone do not hold the answers, that they are not providing a comprehensive 'fix' to the problems a community faces. Rather, designers must become the facilitators of a community's ideas, tapping into their embedded ethnographic knowledge to bring these ideas to fruition, while offering particular design-led expertise as guidance. Designers are ultimately service-providers, and should recognize the crucial need for projects that allow social justice agendas to be situated at the core.

Methodological process

The research process for this paper employed a mixed method, ethnographically-led methodology, with a sequential transformative design, drawing from an initial qualitative investigation to define the parameters for subsequent quantitative research (Lenzholzer, Duchhart and van den Brink, 2016). Drawing relationships between the two methods aimed to spur further investigations in a non-linear directionality. As a phenomenologically-led research design, this project sought to develop this socio-ecological framework from a considered participatory angle, working with

community leaders primarily in Medellín's informal settlements. Applied through strategic prototypical design tactics, this project aimed to pilot a systems-thinking approach led by social and ecological directives, in the pursuit of conceptual design interventions which could provoke a dialogue with community leaders, and the agencies which suppress and/or promote future sustainable development in their neighborhoods.

This research initially launched through the collection of information relevant to both phenomenological and spatial conditions, using observation, field research, interview collection and participatory engagement on the ground in Medellín during three research intensives in 2016, 2017 and 2018. Following an assessment of this investigation, mapped data produced through GIS formed a more comprehensive picture of the existing conditions present in Medellín and its surroundings. This covers a range of scales from the regional, to the city, to the site-specific. This collated content supported the development of a systems-perspective of the study region, informed by the phenomenological data.

In the development of a spatial design methodology responding to phenomenological and data-driven research, this project utilized Medellín's hydrological network as an ecological, social, and spatial lens. Urban watercourses tend to witness a variety of ecological, social, political, and economic conditions and challenges. Many of these manifest in physical and emotional disconnections in the urban fabric, perpetuating social and ecological degradation that is revealed throughout the watercourse. This project sought to uncover these conditions, and use them to reform the socio-ecological functionalities of the city, as a means of ecological repair and social healing.

The human/nature dichotomy perpetuated through a continual desire to control nature for human benefit has proliferated a psychological disconnection that threatens to permanently fracture human recognition of nature, and human as nature, deepening inequities while extracting nature's resources for human greed. Within the context of the city, the most potent landscape in which this divisive construct has formulated with the onslaught of global urbanization, Marx calls it a "metabolic rift" (Wachsmuth, 2012, p. 507). In implementing a methodology developed through an analysis and comprehension of localized urban conditions, spatial design practitioners have the potential to engender shifts in social equity and community cohesion, in tandem with environmental stewardship and ecological restoration, towards a re-calibration of social and ecological systems. Further, identifying and utilizing an existing, site-specific natural system which has been altered

and damaged for human benefit, a methodology for repair can begin to reverberate beyond the micro scale of any one particular site, and stretch to impact the foundational human/nature relationship in the city and its environs.

Water and the city: a fractured relationship

The Valle de Aburrá, when first discovered by Spanish conquistadors in the early 1600's, housed local indigenous people living along the banks of the Quebrada Santa Elena, on the Eastern side of the Medellín River. The indigenous people held the creek in high esteem, and believed it to be a source of life. They regarded the waters with respect, and used them as minimally as possible. Their agriculture worked in tandem with the season and with the natural water cycle, within an *Economy of Nature*² (Gómez, 2014).

This all shifted with the influx of Spanish colonists. The Spanish founded the new city of Nuestra Señora de la Candelaria (the current city of Medellín) at the original point of confluence of the Quebrada Santa Elena and the Quebrada La Palencia, instigating a steady decline of the natural water systems and the surrounding environment. Their European practices of monoculture agriculture exploited the complex hydrology of the city, as they imposed a traditional urban grid over the landscape and disrupted the natural systems below.

The explosion of industry in Medellín with the introduction of the Antioquia railroad in 1929 allowed for exponential urban expansion, with many peasant farmers living in the surrounding rural zones arriving in the city to find more stable employment opportunities. The Coltejer factory, the largest textile manufacturer in Colombia, was founded at the turn of the century, with their first factory sited along the eponymous Quebrada Santa Elena. Though the company created many job opportunities for poor urban citizens, it perpetuated the decline of the city's natural systems with its disposal of industrial waste into Medellín's waterways. The factory catalyzed a major shift in the city's attitude towards its hydrological past, with exploitation becoming the new normal, and a reverence disappearing with emerging generations of industrial workers. Contamination of the waters with agricultural and construction waste eventually led the growing city to declare the Quebrada Santa Elena as a blight in the early 1920's, and begin a scheme to bury a two-kilometer section under the growing city.

² An Economy of Nature traditionally refers to the comprehension of natural cycles and systemic processes evident in the relationships amongst living things. It involves feedback loops, metabolisms, and transformations of matter, which continually evolve in supportive networks (Scientific American, 1858).

With the use of water in the Valle de Aburrá diverted for increasing agriculture, mining and hydroelectric plants, the resource is now in a constant cycle of commodification and depletion. Citizens of the poorest communities in Medellín often see their water source cut off during the hours of 8pm-4am during the dry seasons, when the aquifers cannot be replenished (Mesa interbarrial de desconectados, 13/05/2011). This is a social and ecological inequity that leaves citizens vulnerable and disregarded.

The overlaps of social and ecological degradations in Medellín: “Water Wealth”

After decades of heavy industrialization and urban growth, the city of Medellín has successfully carved itself out of the complex topography and hydrology that has shaped its valley position. With an attempt to control these geographical elements, the citizens of Medellín have exposed themselves to high levels of risk. With each rainy season, the multitude of streams across the city swell, even those covered and hidden beneath the city streets. As a result, the city experiences flood events which have undermined housing, weakened infrastructure, and taken lives. A continual practice of strict control over these water systems has exacerbated the floods, damaged the ecology of the city, and psychologically disconnected citizens from this foundational resource. This result can largely be attributed to political policy, as government practices influence the actions of citizens, and can lead to a condition of apathy.

Additionally, the numerous Quebradas throughout the city have served since its founding as invisible borders, segregating neighborhoods and leading to strained relationships in both social and ecological manifestations. Territorial control and resulting identity ‘politics’ in the city formulate a critical disconnection in the socio-ecological systems that are inherent to the culture of the citizens of Medellín.

The Quebrada Santa Elena offered this research and design project a physical embodiment of the more theoretical ideas concerning social and environmental repair. In exploring the Quebrada’s historical significance in the city of Medellín, and unveiling its evolution from revered watercourse to urban blight, this project has been able to build a theoretical methodology which could begin to address both the social and environmental challenges plaguing the city, while recognizing the impact of spatial design on catalyzing incremental change. This work begins to consider the Quebrada as a potent landscape in itself, capable of engendering new

cultural norms through its own repair mechanisms, and allowing this borderland to become a social and ecological suture rather than a systemic schism.

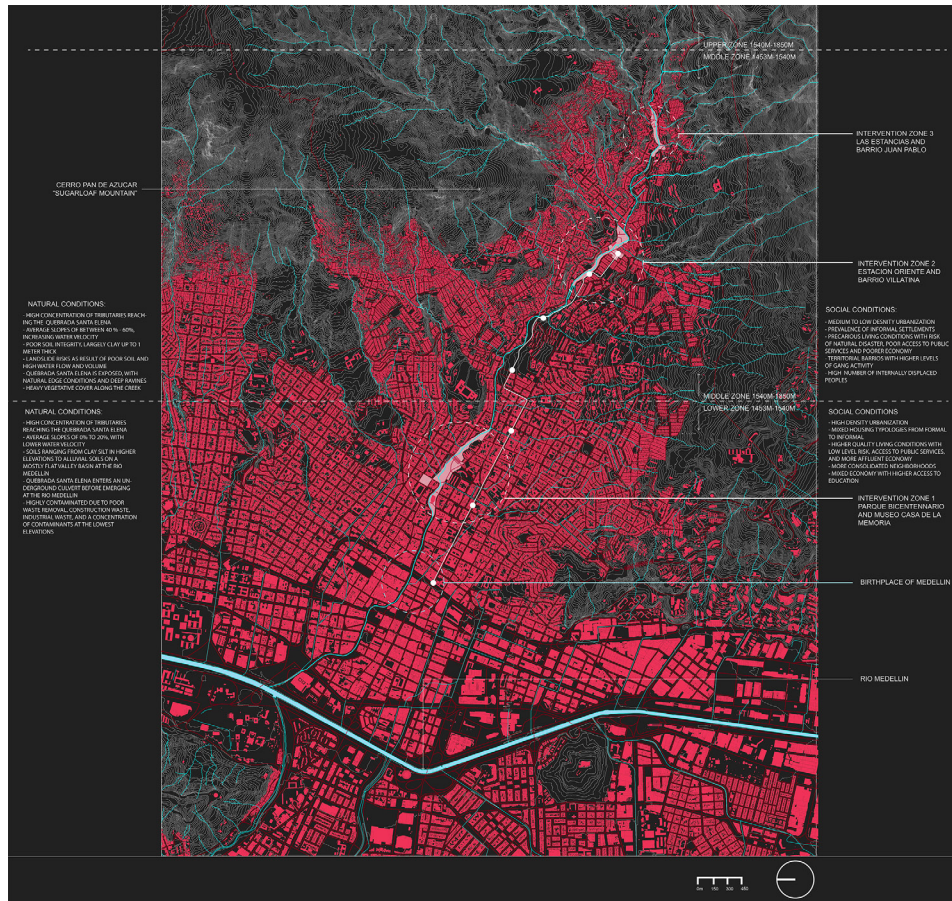


Figure 1. Social and Ecological analysis of the Quebrada Santa Elena in Medellín, Colombia. Daniela Coray

Developing an integrated design and planning process

What is an eco-systemic perspective?

An eco-systemic perspective is based in the ecosystem paradigm (Ale and Howe, 2010), informed by Systems Theory. Systems Theory, according to Dekay (1996), is

A post-industrial, post reduction, post-mechanist, holistic evolutionary paradigm of reality. Systems Theory treats wholes (systems) as made up not only of parts, but also of relationships. Therefore, the study of the interconnections (in space, time,

and process) between parts is critical, relationships are at least as important as the elements themselves. (p. 1)

Bringing systems theory into the development of a socio-ecological design framework has assisted in the creation of a methodology that is more cyclical, where identified problems, and components of problems, can be viewed through their influences on, and relationships between, one another. This approach has led to the development of design interventions which respond equally through cyclical means, repairing systems from multi-scalar and interdisciplinary directives. It also considers how social and environmental parameters are intertwined as integrated socio-ecological systems (SES), where the impact of any disruption, or disaster, within an ecological system will be read equally through a revelation of social problems that interact and react within the broader complexity of the system (Alcayna-Stevens, 2015).

Even though systems-thinking can allow for complex problems to be dissected and understood, it is not a solution in itself. Rather, it functions as a means for identifying potential interventions within and across complex processes. To further the application of Systems Theory to a design and planning methodology, the adoption of an eco-systemic perspective could prove beneficial. This perspective requires a level of ecological literacy, defined as “An understanding of ecological principles and taking action based on ecological values...To be ecologically literate means to have a systemic consciousness, to understand the interrelatedness of life” (Dekay, 1996, p. 4). Nature exists in continuum, with all things impacted by those elements above, below and beside them in hierarchical structures (Moffatt and Kohler, 2008). The system is the entirety, the comprehensive collection of a multitude of parts and processes (McHale et al., 2015). To apply an ecological literacy within design involves placing ecology and an understanding of ecological principles at the forefront of the design process. Developing a read of the landscape through an ecological lens creates the foundation for an eco-systemic perspective, and further allows for a spatial morphology of resilience (Marcus and Colding, 2011).

Applying an eco-systemic perspective through landscape-led spatial design interventions

To utilize this eco-systemic perspective through spatial design involves first an ecological literacy, then the application of this literacy to the design of a methodological process. To embed design within an existing system in a state of constant flux,

the design must be able to adapt and evolve, to capitalize on exchanges of energy, and to encourage further cyclical processes of regeneration. Systems exist within systems, where relationships across scales create flows of information that shape and re-shape the whole.

This adjusted perspective of designed process also involves the need for integrated policies and practices across multiple disciplines. Just as the ecosystem houses multiple components relating to one another through exchange and interdependence, so too do the multiple players involved in spatial design. As the ecosystem paradigm recognizes the impact of one ecosystem component on another, and the fundamental reliance of the whole on the parts, one could argue that the degradation or removal of one player, or component, from the process of spatial design, would modify the system and damage the whole. Thus, spatial design functions best as a collective of players...designers, ecologists, politicians, and citizens.

In order to apply an eco-systemic perspective, we require a foundational understanding of the socio-ecological systems that must also include a socio-cultural component. “Understanding how flows of energy affect a natural ecosystem may illuminate how flows of information affect a social system” (Capra, 2012). Yet, there is a tendency to separate the ecological from the socio-cultural in divisive comprehensions of the elements of urban life. Within ecology and spatial design, Frank, Delano and Caniglia (2017) define socio-ecological systems (SES) as,

Coherent systems of biophysical and social factors that regularly interact in a resilient, sustained manner; a system that is defined at several spatial, temporal and organizational scales, which may be hierarchically linked; a set of critical resources (natural, socioeconomic and cultural) whose flow and use is regulated by a combination of ecological and social systems; and a perpetually dynamic, complex system with continuous adaptation. (p. 4)

When we consider whole cities to, in themselves, be complex socio-ecological systems, there is a natural progression to the adoption of a socio-ecological-cultural approach when considering the development of a design framework (McHale et al., 2015). With the emphasis being placed on the inter-relationships and dependencies between nested systems, designers are able to see the wider impact of a single intervention, from the immediate surrounding to the broader regional influence. It also allows designers to move across these scales of impact to read changes in the environment from the minute (the bacterial profile of a site’s soil) to the magnified (the watershed’s alterations due to climate change). According to Echeverri (2016),

of Eafit University's URBAM in Medellín, Colombia, the city must be recognized as a whole system that includes the socio-cultural as well as the physical, across and along the macro to micro scales that inform the functionalities of the city and, thus, the interventions design is enabled for.

Piloting a spatial design project

As a result of this research, the piloted interventional design project which emerged developed through an initial identification of target sites along the Quebrada Santa Elena which could prove catalytic if shifts in both the social and ecological fabric were comprehended. The site chosen for testing the emerging design methodology was located at the point at which the Quebrada Santa Elena disappears below the streets of the city, in an attempt to repair social divisions that have emerged through localized inequity, as well as the ecological that have proliferated from environmental disregard.

The project honed in on the prevalent Quebrada as the means of repair, stitching both social and ecological fissures through returning the Quebrada's recognition and importance to the citizens of Medellín by intentional psychological and spatial reorientation. Daylighting the Quebrada along the eponymous Avenida La Playa made evident the creek's significance at the core of the city. Within Parque Bicentenario, de-channelization and re-contouring returned the creek's edge to the people, and new structures over the creek brought renewed attention to its ecological importance. An integrated walkway weaving across and along the creek linked the banks of the Quebrada, and thus the neighborhoods that emerged from them, to bring together divided communities in collective reverence of the water.

This piloted project was multi-layered in its assessment and categorization of ecological and social conditions belying the community immediately surrounding the Quebrada Santa Elena. In hyper-localizing the issues that were leading to a fractured urban fabric and social tissue, this work was able to reveal patterns of social inequity inherent in the spatial constructs of the neighborhood, while also drawing attention to the environmental deteriorations that have proliferated from divisive practices. This focused consideration was then re-evaluated across a broader scale, to begin to understand how any singular intervention might echo across the city.

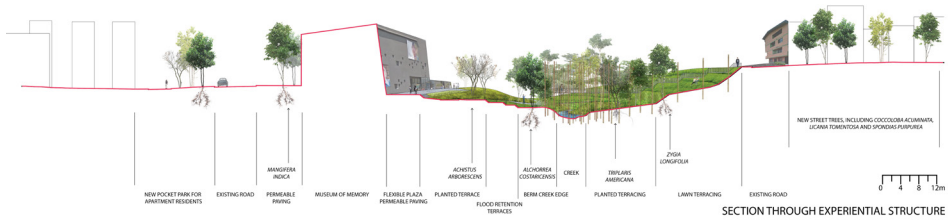


Figure 2. Conceptual proposal for new connections with and across the Quebrada Santa Elena. Daniela Coray.

Results and conclusion

This project fundamentally sought to redefine a methodology for landscape architecture and urban development in Medellín that rooted itself, first, in an understanding of the landscape itself, read through its geographical and ecological features, but also through the people that have shaped and re-shaped it over time. The timescale of this project did not allow for a deeply thorough assessment of the socio-cultural manifestations of the landscape, as this requires an even further ethnographic consideration through sustained local engagement. However, as a pilot project that tests the feasibility of a methodology and resulting conceptual design outcome, this work has begun to suggest that in adopting an eco-systemic perspective, the city could see a potent re-calibration in the social, political and economic systems that have authored the landscape.

Recognizing the systemic quality of the hydrological network of Medellín, working with its reverberations across social and ecological systems in the city, allows this emerging eco-systemic methodology for sustainable design to be measured against existing social and ecological parameters. This methodology requires further refinement, and application to similar cities contending with the confluence of social and ecological degradations, to more comprehensively address its potential for social and environmental restoration at a systemic level.

If we are to generate a systemic shift in the burden of environmental degradation and social inequity that have brought Medellín, and similar cities of the Global South, to their current precarious states, we must consider altering socio-political structures and environmental frameworks in parallel. They are deeply entangled and can no longer be considered in isolation. Spatial design has the capacity to recognize deep socio-ecological scars, and begin to implement a healing process

through a comprehensive eco-systemic methodology born from local, geographical and cultural reads of the landscape, in the return to an *Economy of Nature* (Gómez, 2014). Our foundational human linkages to the land must be rebuilt through a rediscovery of the economy of nature, and, in time, the profound psychological divisions between human and nature could, finally, be repaired.

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