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Towards Regenerative
Environments

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Edited by:
Pablo La Roche and Marc Schiler

**PLEA 2016 - Cities, Buildings, People: Towards Regenerative
Environments, Proceedings of the 32nd International Conference on
Passive and Low Energy Architecture;**

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Edited by: Pablo LaRoche and Marc Schiler



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Living the informal city

Sustainable design education in risk areas

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ABSTRACT: Should architects deal with informal city? How can they increase its resilience, also adopting sustainable criteria? May planners imagine resilient cities without evaluate their impact on local and global environment? The paper describes the results of an international workshop “Living in risk areas. Sustainable urban redevelopment” within a cooperation agreement between the University of Florence (Italy) and the Universidade Federal de Santa Catarina (Brazil). The goal of the workshop was to create a new generation of designers, conscious in environmental design, also in the informal city. The methodological approach adopted was focused on the on-site analysis of a favela in the city of Florianopolis in Brazil, in collaboration with local expert, academic researchers and public administrators, which have worked on habitability in the risk areas, in a broadest meaning: natural, anthropic and social.

The working group analysed the environmental conditions of the urban context; the characteristics of settlement and its relations with the "formal" city; the building typology, construction technologies and materials; the social tissue, the livelihood economy of the inhabitants and their needs. The student's proposals are been specifically referred to the site's physical aspects and to the requirements determined by the cultural, social, and economic context, with a added value of a character of replicability in similar contexts.

Keywords: sustainable design, informal city, environmental sustainability, resilience

INTRODUCTION

The architectural research seminar “Living in risk areas. Sustainable urban redevelopment” is part of an international cooperation agreement between the Italian University of Florence and the Brazilian Federal University of Santa Catarina. The cooperation has been started in 2013 and still in progress.

The research and the teaching activities have been focused on social and urban adaptability to demographic and climatic problems of the informal cities of Latin America.

The goal of the international seminar is to promote the challenges of sustainability and resilience, developing a new design approach and new professional skills for the architect of the future that will be called to work in these risk area.

The urban context chosen as case study is the Serrinha Favela located in Florianopolis (BR), a new part of city that was comparable with the precarious model of informal city for its environmental, urban and social characteristics.

In particular, two design workshops were organized during the seminar:

- “Rethinking the living in the risk area of Latin America cities” in 2013,
- “Rethinking the margins for the risk area of Latin America cities”, in 2015

The two international workshops, focused on the topic of urban and living infrastructures, have allowed

fostering the transfer of knowledge between the teachers, researchers and students involved.



Figure 1: Serrinha Favela in Florianopolis.

The projects outcomes, focused on the urban and social regeneration of Serrinha Favela (Fig.1), are innovative design solutions that could be repurpose also in other risk areas of Brazilian cities. The work developed during the seminar and the two workshops is linked to the specific geographical, economic, cultural and social condition of Latin American Cities.

THE INFORMAL CITY

For the first time in history, more than half of the world population lives in high-density urban settlements, with a grooving trend will reach the 66% in 2050 (UNDESA, 2015). Only in the developed countries is expected the constructions of at least 70 million new homes in the next year (UN-Habitat).

This urbanization phenomenon regards mostly the population that shows economic, social and cultural disadvantages. This people adapts itself to live in poor settlements made up by precarious dwellings without any supporting infrastructure. The part of city where they live are known with many names: slums, favelas, villas miseria, shantytowns, bidonvilles. These informal settlements (that are usually illegal and out of public institutions control) generate unbearable living conditions from an environment, as well as social and cultural, point of view.

To get an idea of the size of this phenomenon, in 2012 about 863 million people (UN-Habitat, 2003), a third of the urban population of developing countries lives in informal settlements. (Sampo', 2012).

In Brazil, more than 11 million citizens (corresponding to 6% of population) still live in favelas. According to the Brazilian Institute of Geography and Statistics there are 3.2 million precarious and irregular dwellings (technically called *aglomerados subnormais*, commonly known as favelas) exposed to any kind risk. Actually, 618.000 of these informal houses are located on dangerous slopes, potentially subject to landslides, and 27.000 beneath high voltage pylons. (IBGE, 2011).

Moreover, these settlements have to deal with the social risk connected to the presence of organized criminality, linked to the drug traffic.

In order to face with this situation, seemingly out of control, the Brazilian Government has launched a number of actions for social and urban requalification of *favelas*, in conjunction with the Soccer World Cup (2014) and upcoming Rio Olympics (2016). In particular, the most interesting government programs are "Morar Carioca" and "Minha Casa Minha Vida" (<http://www.rio.rj.gov.br/web/smhc>): the common goal is to find innovative urban models of social, economic and environmental development, to transform *favelas* from marginal and degraded areas to places where it is possible to live a normal lifestyle.

THE FAVELA SERRINHA IN FLORIANOPOLIS

Florianopolis is one of the Brazilian cities with the highest rate of economic well-being, mainly due to national and international tourism, origin of a flourishing turnover. The geographical location and natural beauty of the island make it one of the most popular places in the south of Brazil, especially during the summer months. However, in the rest of the year the absence of tourists in the island produces a significant

reduction of residents and a consequent decrease of working demand.

Despite this (or perhaps because of it), also in Florianopolis, over the years have been built many favelas, with the same logic with which they were built in major urban centres of the Latin America. (Sugai, 2015).

Many poor and jobless people leave their places of origin or even leave the favelas of other cities and moved on the island of St. Catherine attracted by promises to improve their living and economic conditions.

However, these people find themselves in a critical economic circumstances also in Florianopolis, forced to live in poor housing, in the absence of supporting infrastructure (water, electricity, etc.), in unhealthy conditions, almost always beyond the control of government institutions.

As a recent research of the Universidade Federal de Santa Catarina (Sampaio, Heinisch, Luiz, Rossetto 2013) shows one of the most critical urban situations of Florianopolis is the Serrinha favela. Here, in the last years, many people have decided to live after that they have moved in the city, building their poor houses (Fig.2).

The Serrinha Favela is located in the central area of the island near the formal city of Florianopolis, on the north slope of the Morro da Cruz (the central massif of the island) and it borders to east with the headquarters of the Universidade Federal de Santa Catarina. Thank to this location is possible to see the favelas from everywhere of the city and know its rapid and uncontrolled growth.



Figure 2: Serrinha: typical buildings

Usually, the houses built in the Favela are realized according to the urban model of Portuguese Servidao: the first buildings are located along a principal sloping road, that is the matrix of the new part of the city on which are inserted the secondary streets, parallel to the contour lines. This undisciplined development occurs through a process of deforestation and illegal occupation of land. The consequence is the increase of landslides risks' in a geographical area subject to heavy rainfalls in spring and autumn.

In Serrinha, families are numerous, and usually more families live in the same building, on different floors. For this region, generally, buildings located here are characterized by a vertical organization, with a overlapping planes where are located the primary living spaces: a kitchen with dining area and living room, a bathroom and other small spaces. As documented at the national level also the Serrinha inhabitants, although poor, have in their dwellings consumer goods that usually is possible to find in the houses of rich citizens: refrigerator, TV, and more often air-conditionings (IBGE, 2011).

Inside the *favela*, there is an informal housing market, which replace the formal one, managed by its own rules and based on the properties absolutely lacking any consistency titles: in fact, houses can be sold or rented generating an income to "owners" who sometimes, becoming wealthier, live outside the favela.

From the urban point of view, we can distinguish *favela* from formal city further because the lack of primary (water, electric, sewer) and secondary (adequate road networks to ensure easy connections between different parts of the settlement) urban infrastructures.

Finally, except for a waste recycling center, there is an evident absence of working and public spaces, such as health center, primary and secondary schools, spaces for cultural activities, markets, etc.

To find a solution for these urban phenomena the local municipality has developed in the recent years a "favela redevelopment program" to stem the rapid expansion that goes to interest also the university area. However, in the same time, to circumvent the prohibitions that are consequence of this program, the people that live in the favela build their houses during the night and in the days of religious holidays, when the governmental bodies are unable to do the legal control on the processes of construction.

TEACHING METHODOLOGY

The adopted teaching methodology has been developed to respond to complex issues of environmental and social assessment, in particular for a risk area. The complexity of the topic has also requested a strong discipline contamination, supported by a deep work of field analysis on site.

The both workshops has been divided into three phases:

1. A preliminary phase, held at the University of Florence, characterized by multidisciplinary lectures by Italian and international professors, on issues of informal cities and sustainability, as well as on the role of architectural research. The training objective was to provide students basic knowledge and methodological tools necessary to approach the design phases.

2. An intermediate phase in Florianopolis focused on fieldwork on environmental conditions, urban settlement characteristics, construction techniques, as well as a phase of ethnographic analysis, determining the real inhabitants needs (Fig.3). This phase was conducted through interviews to the people and social association of the Favela, supported by the contribution of local administrators and technicians. (Fig.4). Furthermore, it was characterized by brainstorming, among Italian and Brazilian teachers and students, to develop and define the strategic objectives of the project.

3. A final phase of synthesis, held at the University of Florence, during which the Italian students have worked out on project proposals using all workshop outcomes. Moreover, in this last phase, the educational contributions was focused on the communication strategies and results dissemination, oriented to produce a scientific publications and to promote the participation of students in architectural international competitions.

The structure of the seminar was developed offering a full range of activities to achieve innovative and competitive skills, as expected by Dublin Descriptors (http://ec.europa.eu/education/policy/highereducation/bologna-process_en.htm). In detail, the purpose was to stimulate cognitively the students to apply the knowledge acquired during their Architecture study, in an interdisciplinary way, enhanced with ethical and social input typical of the complex urban phenomena. Additionally the goal has been learning to communicate in clear and precise matters, the project proposals to the several customers.



Figure 3: Interviews of Italian Student to Serrinha inhabitants.

THE DESIGN WORKSHOP

Workshop 2013: Rethinking the living in the risk area of Latin America cities

The first architectural design workshop in 2013 explored the theme of housing infrastructure. It was focused on the design of a basic modular construction system just in its structural part: within those basic structural cells can find place the new housing units, according to the functional and/or economic users' requirements.

Two different technological scenarios were offered to the future dwellers, giving them the opportunity to choose the solution according to their resources:

1. In the first scenario, the objective was to orientate and enhance the community's local economy by recycling some types of waste (plastic bottles, cans, tetra Pac etc.) and combining them with cementitious binders to produce cladding and partition panels, according to guided procedures and models already experimented by the Universidade Federal de Santa Catarina.
2. In the second scenario, the objective was to give dwellers the possibility to acquire traditional construction materials (clay blocks, insulated metal panels, wooden panels etc.), according to the principle of social self-determination, common in the informal communities.

Both scenarios represent a realistic constructive and economic model that allows preserving the typical formal features of the Brazilian favelas, where the variety of technological and material solutions is a significant element of identity.



Figure 4: Focus Group with local administrators during the workshop of 2015.

The modular design of the structural system has been developed on a basic unit of 4x4 mt, adaptable to the elemental living functions (eating, sleeping, etc.). In this modular grid, it is possible placing residential functions, collective services and open spaces. The structural system also becomes the infrastructural for the integration of plant networks (water and electricity). The simple geometric configuration of this technological scheme allows to achieve the objective to integrate the bioclimatic strategy to increase the indoor comfort inside the buildings (natural ventilation, water saving, etc.).

The proposed design module follows the settlement pattern of Servidao, but with a lower density with respect to favela settlement "one plot, one house". The proposed building typologies was characterized, in fact, by a prevailing vertical development to decrease the favela density through free areas. In this urban scheme, the free areas could be changed in green areas, in order to limit landslides effect, typical of deforestation or could also be used as urban gardens for food production.

The results of this first architectural design workshop were also finalized to the participation to the international competition "Houses for change. Architecture for social responsibility" proposed by IE University. Two of the three participating groups from University of Florence, which were involved in the workshop, were selected among the 15 finalists, on a total of 148 proposals from all over the world (Fig.5).



Figure 5: One of the finalist Project of the international competition: "Houses for change. Architecture for social responsibility".

Workshop 2016: Rethinking the boundaries for the risk area of Latin America cities

The second design workshop was focused on the urban sustainable planning of the informal settlement, providing the placement of new infrastructures with public and private functions, approaching with a strong attention on the social aspects of community living. The main objective was to redesign the borders of the favela, transforming a physical and social limit in a formal element of connection between two adjacent but different urban areas. The project of public spaces is a key action in the regeneration process of the informal city (Friedman 2009), because increase the possibility to involve the inhabitants, not only in setting the project objectives, but above all in the managing of the redevelopment of the urban places where they live.

The teaching methodology provided primarily a deep fieldwork, encouraging students to get in touch and dialogue with the local community, the local urban management experts, the local university professors and the local voluntary organizations. The analysis highlighted on the one hand the tendency, typical of informal settlement, to constantly expand its borders

without any services compensation, and on the other hand the presence of a very active social and economic pattern, who requires the presence of collective spaces as "right to the city" (Lefebvre, 1970). The objective of the analysis was to bring out the positivity of the informal system, and thus its true regenerative potential (Mang and Reed 2012), approaching the upgrading starting from the people before than the spaces, in order to transform the cultural, social and economic capital of the informal city in a formal capital (Roy, 2005) capable of creating resilience.

The proposal phase, still in progress, outlines in a masterplan an evolutionary urban development model for Serrinha, shaped on the transposition of the concept of social infrastructure in a network of physical spaces that are necessary to develop the community's resilience (Fig.6). The project proposal for Serrinha is developed respect the following thematic areas:

- Boundaries' Design, reducing the informal expansion of the informal city, with no physical obstructions, but providing spaces of public domain and stimulating a new relationship with the formal city based on the concepts of environmental sustainability and social cohesion;

- Social Capability and Economic development, responding to the need for awareness-raising activities, identity enhancement, training and strengthening of the local economy, as a basic prerequisite for the upgrading of the Favela. Among the functions to be located: spaces for the management of the waste recycling, kindergarten, community center, food market, health center, vocational training center and entertainment center;

- Social' Design, involving the community in a low impact self-building process. It is the key action in the process of setting up the network of public spaces, since it could be implemented through knowledge dissemination and the aware use of basic sustainable technologies. In particular, in this project the site occupation is thought as a gradual re-appropriation process of the public spaces, through the assignment of temporary uses and redevelopment of green boundaries with slow traffic roads, public open spaces and urban agricultural gardens.



Figure 6: "Rethinking the margins": masterplan.

CONCLUSION

The two international workshops have identified sustainable regeneration processes for the informal city, through the drafting of project guidelines. As matter of fact, models underpinning urban planning suffer the lack of technical and operational guidelines to support the elaboration of reliable scenarios. This procedural lack determined the need to approach design with an operating methodology aimed firstly to identify risk causes, and then to find solutions to improve the living quality of informal settlements, in their relationship to the territory.

The design proposals, processed during the educational workshop experiences, has been based on the following needs:

- to decrease informal land consumption, adopting models for public employment of "non-built areas" to accommodate spaces for the community;
- to increase green areas, intended as a linear and physical space, that redraws the boundaries of the informal settlements, and as a "non-built area" to be used in agricultural production;
- to reduce landslide risk, adopting urban solutions that promote rainwater saving;
- to increase technological solutions to promote self-construction processes, with the use of recycled and

/or recyclable materials and energy passive solutions at urban and building scale, with the aim to improve the indoor and outdoor comfort.

All proposals have been based on the concept of infrastructure as basic element in settlement update. It could provide network services necessary for the inhabitants of the favela, assuming not only the technical and constructive solutions, but also a model coherent with the economic capacity and user management (Abbott, 2002). These considerations arise from the observation that, in the case of Serrinha Favela as for many Brazilian ones, the local municipality attend regularly later, investing significant financial resources for solve problems arising from lacking services and general infrastructure at first of spontaneous settlement.

Therefore, in both cases the proposals predicted the intervention of municipalities in the settlement process by providing a general infrastructure system for the purpose to:

- regulate urban expansion on the territory;
- determining a settlement model compatible with the cultural traditions and characteristics;
- protect physical context;
- equip the residential segment with the primary services: roads, water supply, electricity, sewerage;
- establish social services for the community: social and cultural centers, childcare centers, commercial facilities and so on;
- establish the minimum conditions of security against the risks prevalent structural, hydrogeological, sanitary, electrical;
- stimulate initiatives, participation and community self-determination processes in a framework of general rules;
- promote local and legal economy self-sustaining.

The results of the workshop have been supported by the adopted teaching methodology: an active commitment to stimulate the creative re-thinking of local redevelopment dynamics through action design, as a participatory learning process.

Students shared innovative approaches: a design research based on a strong understanding of social and environmental local phenomena, in order to face today's challenges of sustainability from every point of view: environmental, social, economic.

According to the increasing necessity of improving the fundamental living condition of millions of people, students experimented a new way of playing the role of an architect-designer, as an exponent of real people's needs and mediator of social interests (Manzini, 2015) combining top-down and bottom-up approaches.

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