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Mind The Gap: Smart Infill Designing

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New planning policies are requested to and some how implemented with respect to the exploitation of existing housing stock. With the major urban expansions or redevelopments there are also initiatives which aim at using more efficiently present urban spaces and architecture buildings. It might be easy to focus on what Lynch called abandoned spaces but this paper rather focus on transformation the initiative which coming openly freely form public and private spontaneous ideas (the unplanned). Many studies have worked on the issue of density, the consumption of soil, the exploitation of existing assets as an opportunity for sustainable development of the city, promoting initiatives that would promote preserve and convert the recovery or the conversion of existing buildings through the use of infill spaces. Some examples could be, like as the renovation of roofing and building envelope, with rooftops, additions and retrofit. This phenomenon has led to a rethinking of new forms of development strategies of the urban fabric toward which it might be called a "acupuncture strategy", focusing on which focuses on the gap rather than the voids. It is proposed a reflection about transforming existing cities according to this new a planning and design process strategy.

Introduction

EEA (European Environmental Agency) is yearly sending warning signals about policies of land uses with respect to social, economic and natural sources. The issues are worldwide different and complex but if we focus on the macro aspect and only regarding the European development scenarios, some main figures are really challenging. For example, between 1990 and 2000, 15% of natural European land was transformed into housing-infrastructure developments or policies (whose 40% was pastures land and 50% agriculture land). Within this time frame, urban areas become five times bigger. This urban expansion was taking different patterns mainly around the city, along the main infrastructure and this starts spoiling those European regions with a polycentric economic and transportation structure (WWF, 2009). Moreover, while in the past the expansion was connected to the growing population, today land is being consumed nearly three times more rapidly than the necessary (20% sprawl by 6% of growing population). This tendency is about one to ten regard to Italian regions. However urban population has a positive growing rate which obliges the EU to set up policies towards this tendency. Most of the scientific forecasts are reporting that urban areas will gather 80% of population by 2020. EU commission has published in 2006 the StS (Soil Thematic Strategy) in order to prevent and preserve ecologic function of soil, but also economic, social and cultural aspect related to soil. This has given a chance to national and regional detached policies and monitoring programs in Italy (e.g Urban Coordination Program of Turin metropolitan area PTC2), however none was nationally widespread and shared.

Land consumption: challenge or natural cycle

In Italy, the National Institute of Urban studies (INU) has set a stable group of work for studying the land consumption phenomenon. So far, many indicators were invented and monitored throughout regional or provincial initiatives (Socco et al., 2002). However all those measures were mostly keen in detecting the scale of the phenomenon rather than containing or reversing the sprawling. The question is: “if this is the future of planning policies, are we ill avoiding or sick mending?” As we are experiencing, there are economic limitations to real estate investment. Hence, we cannot grow the same as in the past and in some part of Europe we are not even having reason to grow. The world population is about 7 billion of people whose growth cannot be sustained by present level of natural source consumption. If cities are hosting more than 60% of peoples activities, this must be the place to find efficient sustainable new strategies. All this macroscopic figures claim to focusing on new form of development settlements in the cities. Gap spaces in the cities are growing in the last two decades (e.g main Italian cities has got nearly 30% of residential space unused). “*Minding the gap*” in urban spaces means to think deeply at the present condition with new eyes; be concerned about what is the present pattern of urban voids, unused spaces, re-usable areas. (Figure 1)

Urban in-fill strategy

Regardless the economic crisis and present urban density, planning debates on European scale might be divided into three main development scenarios. One development scenarios is economy-driven, here the real estate market might reinvent land uses exploitation, forcing new and fancy ways of adding values to the land. The second scenarios is regulation-driven where most of the unused free land is preserved in a way that big developers no longer act or invest at European level. Most of the growing population rates are located outside Europe. At the same time, real estate initiatives change its traditional role and it is turn their economic interest at the local level, improving the social welfare and the environmental system. The third scenarios is regarding the process we are mostly dedicating our studies and efforts. We might call it “acupuncture planning”. According to J. Lerner, it is possible to study urban environment starting from underestimated set of criteria as in medicine, it is possible to learn ill signals from our body and releasing the pain by provoking the right spots.

In a period of crisis it is necessary to use this kind of selective policies of exploitation to use efficiently our own sources. If no longer we can rely on our subsidies and incentives, we must than try to save as much as



we can or we must exploit deeply and slowly what we have left behind during the boosting and fast economic period. It is important to watch at our land with new eyes, it is necessary to find still active sources which are experiencing a welfare urban condition. Even more, it is crucial to mind those gapped areas where there is a slightly different condition (not a sick one). It is a sick avoiding policy the one we encounter in most of present literature rather than an illness mending (Roccasalva, 2012): this is not only the main concepts of this paper but it is one of the most challenging focus of our research smart city group at Polytechnic of Turin.



Figure 1 | The case of High Line New York, an existent rail track converted in high pedestrian path (©Alec MacLean)

Soils for urban air temperatures

One of the first strategy of agopuncture planning is focusing on the energy consumption. Towns are often studied under the light of the so cited urban heat island effect, see for example the EU Urban SMS project (Soil management strategy¹), which is focused on this problem, comparing to the surrounding area, with higher surface and air temperatures (Matzarakis, 2001). Among the causes for temperature enhancement of urban areas there is the soil consumption and surface sealing (Kuttler, 2004). To reach the heat balance between urban environment and covered soils we need to modify thermo-physical properties of these surfaces and its evaporation attitude. In comparison, urbanized soils warm up more slowly during the day and cool down faster during the night. Through this altered process, incoming radiations not transferred to sensible heat in the surfaces and adjacent air masses, generating urban overheating. Thus impact on available water capacity of soils (water holding capability against gravity) reducing the rates of evaporation after

1 F. Gerst, O. Bubenzer & B. Mächtle, (2011)

precipitation events (Asaeda et al. 1996). An important challenge related to permeability of soils is the management of stormwater. Some city administrations are conducting policies to improve resilience of urban land, especially over the building environment, introducing wet surfaces (such green roofs, green alleys, ...) Together with the heating enhancement, other criteria could be tackled and specific urban policies might be implemented.

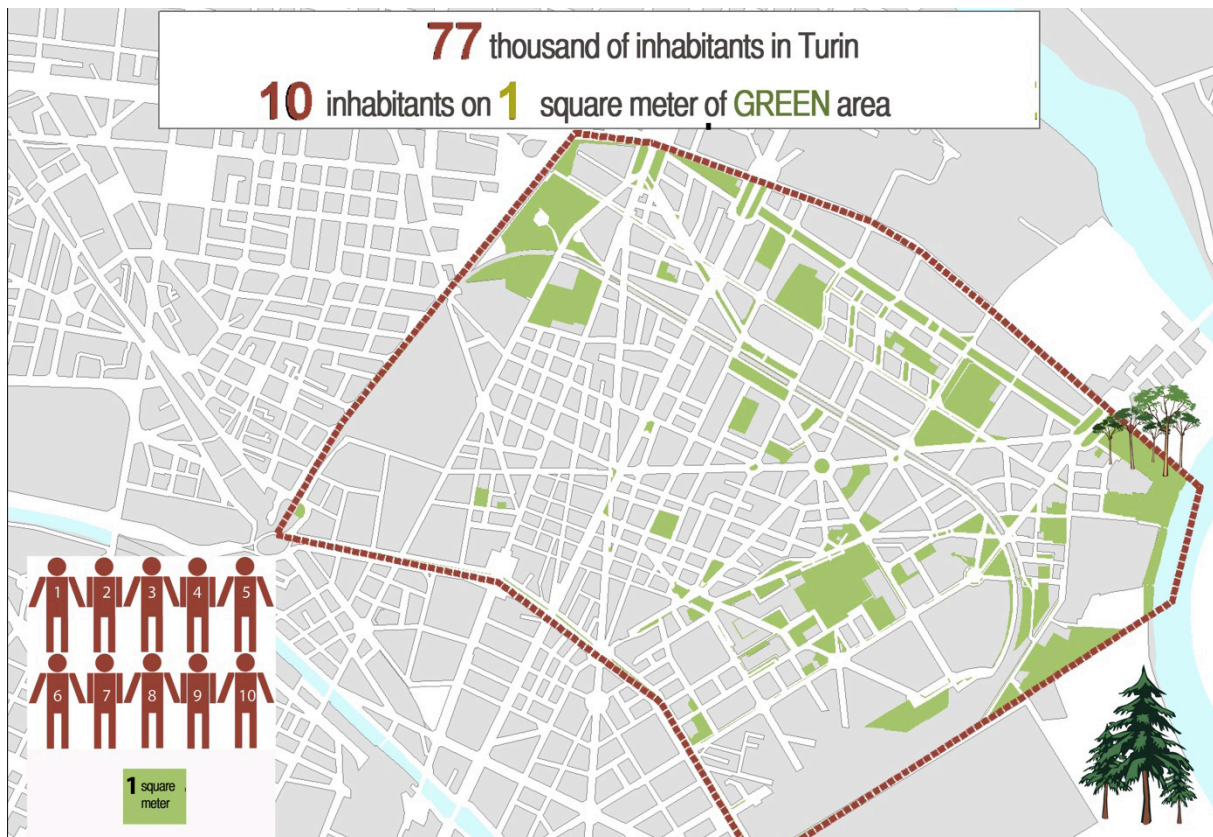


Figure 2 | Analysis of urban standard within a City core quarter (source: elaborated by Roccasalva 2008)

The Province Turin has nearly 34% of land occupied (mostly by urban areas) and if we consider the main town (Turin) nearly 60% of soil is under a human intensive use. These are the macro values within each criteria as the urban heat island might be correlated. If we mind the variation by putting in contrast spoilt and unspoilt areas we lose the challenge to build a sustainable acupuncture scenarios. We invite scientist to concentrate on finding slightly different gap in land consumption. There are many studies which have detect and monitored densification in Italy and this have been related to socio economic factors. For example, the density population rate on spoilt land in Turin is about 40,36 inhabitants per hectare or the density rate of factories on spoilt land is 3,19 building per hectare. The questions is :“Are these values stable or there is space or gap for new exploitation?” We believe so, and we think both the monitoring and the proposal must start by active and creative solution which start from the existing urban environment. This strategy is keen in finding a new balance and welfare condition in the present structure of urban mechanism. This strategy is implementing mainly by substitution of functions, or adding small but efficient choices to the present stock of urban opportunities. For example, if we look at one of the biggest development area of Turin (named *Variante 200*, nearly 1 million square meter of new developments) some striking choices must be done well ahead. The urban quarter which is including this transformation area is about 90.000 inhabitants with a very poor quality of public urban spaces (Figure 32). According to present regulation, this quarter must

have nearly 15 squared meter of green spaces per inhabitants while it has rather one square meter of poor green areas each 10 citizens. Of course this is a very shallow criteria but it gives a rather challenging target for those who must develop new land without considering the poor urban neighbourhood quality of life.

In-fill design strategy

Nowadays built environment growth is changing. In Europe it is possible to see the seeds of new transformation strategy according to new demands. The society is changing and asking for a different architecture, more efficient, secure and comfortable. What are the main aspects that define a sustainable space related to social and environmental issues? What are the feature of new spaces to work, study and have free time? What is the scale of new smart urban spaces? Our target starts from specific analysis on space, as mentioned above, and promoting a localized suggestion. It is our belief that just one project implementation can induce to a multiplying effect on the city. Often it is a latent and marginal opportunity to be more effective than a big planning transformation. This suggestion is based on belief that people power can convert the spaces they live in. Moreover there is a set of underling rules which are intrinsically bounded up with city mechanism. The renovation and improvement strategies are the modern tools to deal with a city. This is possible by enhancing social and physical elements of complex urban fabric.. Studying some recent implementation experiences, it is possible to outline three main approaches which can fill the gaps in urban spaces. These approaches differ in term of urban and design research.



1: Dalston Roof Park, NY
Dalston Park is inspired by traditional English country gardens, but is meant to be a prototype for other pop-up green spaces.

2: Brooklyn Grange urban Farm. © Alec MacLean
A one acre urban farm in the Long Island City neighborhood of Queens.

3: Village on the Roof - Klara Zenit
Stockholm - Equator European Architects
Example of mixed use regeneration in city transformation using rooftop space as living space.

Figure 3 | Examples of different strategies in designing infill spaces in urban areas.

New green spaces:

Green roofs are one challenging topic within building design scientific community,. Among the benefits it is possible to enumerate: reduction of heating and cooling costs; mitigation of urban heat island effect; endurance of roof systems; storm water management; turning carbon dioxide into good oxygen.

Some cities are promoting a new vision for designing urban spaces (e.g. New York with the PlaNYC 2030 made by Bloomberg's plan and Chicago with its Climate Action Plan). These transformations encourage the use of green rooftop to reduce heat island effects and storm water problems. In Europe, this approach is can be part of the Copenhagen policies against climate change. This was the first Scandinavian town that adopted city this strategy for all new buildings with roof slopes less than 30 degrees. Copenhagen has presently 20,000 square meters of flat roofs. It is forecasted that nearly 5,000 square meters of new development each year will be covered with vegetation.

However, even if green roofs are minimal compared with the green need of global town, vegetation on the top might represent a new boundary of the design research. The Dalston experience (Fig.3, 1)² is one of the experience of these green roof space. Dalston, is a transformation area near the center of London, a «cul-

2 Dalston roof Park_ www.bootstrapcompany.co.uk

turally diverse neighbourhood which includes immigrant communities, artists, students and street markets as well as the aforementioned fashion designers³. They started to think the rooftop space as a public area for making different activities. “While developers were quick to construct housing that does not relate to the local context, a few projects have emerged within Dalston that build on its character.” (Redstone, 2010). Dalston roof park will be a green garden, but reveal some interesting features for our purpose. The use of roof-park all the day long in every season. It is used by children of a summer school of language during the day, while it is a bar, gathering young people at night. This become a model for community regeneration, this case shows relationship between private and public function.

Urban farm:

Urban agriculture is a key point in some US city policies (e.g. NYC). Despite this activity seem to be mostly related with big ground area, the advance in agricultural technologies offer great results also in little area, even without soil (e.g. hydroponic system). Bloomberg NYC Plan boost this strategy giving incentives for conversion initiatives. Garden urban spaces have the potential to capture millions of gallons of storm water and divert it from the sewer system, which can overflow when it rains. Garden urban spaces might work as big filter, by delaying the time rain takes to come to the ground. So the production of ground floor on the rooftop of building could increase U-value of the roof partition, and reduce heat island and storm water effects.

Nowadays, New York could be define as the most active city on this topic, as refer Joe Nasr, co-author of “Carrot City”⁴. It would be the largest rooftop farm in the United States, and possibly the world. New technologies, like as hydroponic cultivation methods, permit new farms to spread easily on rooftops, perhaps the last slice of untapped real estate in the city (Despommier, 2010). This new farm operations in New York are selling greens and other vegetables from both to residents and supermarket chains like Whole Foods. Brooklyn, Queens and the Bronx are the main areas involved in this kind of transformation, the biggest is, is Brooklyn Grange Farm (Fig.3, 2)⁵. This project covers a one-acre rooftop in Long Island City, Queens. Developers spread out 1.2 million pounds for soil and planting. On spring 2012, Brooklyn Grange started a second farm on a 65,000 square foot roof, where more than 100 rows of vegetables. The advantages of rooftop soil are plentiful sun and no pests use, the absence of animals, reducing the loss of production. The creation of local chain could solve some problems and educate citizens in feeding themes. Also, the City Planning Department of NY has recently promoted “Zone Green” regulations to encourage green development, including rooftop farms, called. Greenhouses were allowed on non residential buildings, within certain building height and floor-area limits.

Sustainable retrofit:

In the last years, the use of infill space was mainly dedicated to residential building. Cities between 1-3 million of inhabitants will have a positive growing trend in the near future, much higher than megalopolis (Hoballah & Smaoun, 2012). Thus, this implies new design perspectives towards smart and efficiency guidelines. Researches showed a close relationship between high urban density and low energy consumption. New energy regulation is the key for city changing. The city of Genève (Mooser, 2011) is among the most influential European city for sustainable growth. It was prompted a plan of densification through rooftop addition of living space. Empty or un-used rooms are another very significant problem in Italy. Coworking or co-housing are some possible solution for promoting the re-use of buildings. A successful example of building renovation is the Klara Zenit project (Fig.3, 3). It is an headquarter which was built in the '70. The Equator European architects have took the challenge and restored the building with a mixed function ap-

3 This project become an urban space for the community, transformed by the voluntary approach of a Boot Strap Company and Natasha Yildiz

4 Carrot City project_ <http://www.ryerson.ca/carrotcity/>

5 Brooklyn Grange Farm _ www.brooklyngrangefarm.com/



proach. They transform the headquarter in a mixed space for commercial activities and offices, and decided to design a new living village over the roof. This project was appreciated by citizens and the municipality. Klara Zenit is one of the examples in the field of renovation that convey new emphasis urban development starting from the present opportunities (the gaps).

Conclusion

The paper proposes some representative case studies and new implementation strategies for the enhancement of existing buildings. It is outlined a basic strategy of in-fill planning and designing. This means that new global and coherent urban analyses must feed the designing initiatives. It is not needed to cover the “whole” but this strategy aim at small very effective urban spots. This approach is aiming to control urban micro-clime, to improve environmental and social present opportunities within the city, This topic might become the driving force for many European medium size cities, promoting a new research approach against soil consumption. If Cities play a vital role in the quest to achieve global ecological sustainability, they could become a critical leverage point to significantly reduce emissions and avoid the social and economic costs associated with climate change.

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Sitography

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