

Promoting Productive Urban Green Open Space Towards Food Security: *Case Study Taman Sari, Bandung*

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Abstract. The common trend of urban population has been growing significantly in Indonesia for decades, are affected by urban green space conversion. Generally, this area is utilized for urban infrastructures and residences. Furthermore, urban area has grown uncontrollably that could enhance the phenomenon of urban sprawl. The conversion of green urban area and agricultural area will significantly decrease urban food security and quality of urban environment. This problem becomes a serious issue for urban sustainability. Bandung is a city with dense population where there are many poor inhabitants. Families living in poverty are subjected to food insecurity caused by the rise of food prices. Based on the urgency of urban food security and urban environment quality the local government has to achieve comprehensive solutions. This research aims to formulate the policy of productive green open space towards food security for poor people in Bandung. This research not only examines the role played by productive green open space to supply food for the urban poor but also how to govern urban areas sustainably and ensure food security. This research uses descriptive explanatory methodology that describes and explains how to generate policy and strategic planning for edible landscape to promote urban food security. Taman Sari is the location of this research, this area is a populous area that has amount of poor people and has a quite worse quality of urban environment. This study shows that urban green open space has the potential to be utilized as an urban farming land, which poor inhabitants could be main actors to manage urban agriculture to provide their food. Meanwhile, local government could contribute to subsidize the financial of urban farming activities.

1. Introduction

A city is a large scale of settlement with a non-agricultural main activity. The characteristics, which stated defines the dependence of a city to its hinterland due to food supply. In spite of that, the rapid urbanization that is taking place goes together with a rapid growth of urban poverty and food insecurity. The World Bank (2000) estimates that approximately 50% of the poor live in urban area, while there were only 25% in 1988. Most cities in developing countries have great difficulties to cope with this development and are unable to provide services to the poor (Armar-Klemesu, 2000). Food security has always been a key facet for people living in cities. However, supplying food in the urban areas may have obstacles in production and distribution that leads to unaffordability for the urban poor.

The sustainability of one city is coherence between modernization and sustainable food system. The urban strategy by supplying food in cities and merge the society and food system to build a healthy and sustainable urban lifestyle. Food resilience in a city could solved by bringing food back to the city.



In this case, by empowering urban agriculture. This urban design model focuses on public health, community development, and ecological stability. As for applying urban agriculture requires an available open space in a city.

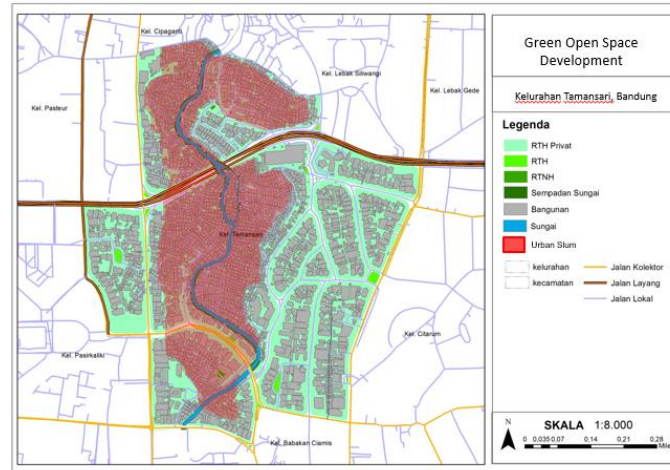
In most cities in Indonesia, urbanization has resulted in converting available green open spaces. Generally, the land conversion is an effort to provide public housing and supporting facilities. These conversions will decrease the quality of urban environment and food security significantly. Green open spaces in city is a land capital to provide urban farming. Though, one of the purposes of open spaces in cities is for agriculture (Minister of Home Affairs Regulation, 2007).

Nevertheless, the empowerment of green open spaces as an urban farm has yet productive in supporting the basic need of urban societies. Crops haven't been planted in available urban spaces. By attempting a sustainable urban food system needs supports from both the state government and local societies. In spite of that, the implementation of urban farming would require land extension from the existing green open spaces. Applying urban farming activity could stimulate city independency in supplying food so that creates a food resilient city. This study is to identify the impact by applying urban agriculture in fulfilling the basic needs of urban societies.

2. Area Description: Urban Slums in Tamansari, Bandung

Bandung is the largest city in West Java Province. Since 1985, Bandung has a common trend of rapid urbanization which cause sprawling urban areas to the east side of the city and Cimahi on the west. The urban growth that is not well-maintained leads to a significant land conversion from open spaces to public housing. While the population increases, the public facilities are yet able to support the people's needs, especially the poor. One of the locations of poor neighbourhood is Tamansari Neighbourhood which located around Cikapundung River.

Figure 1. Map of Tamansari Neighborhood, Bandung City



The picture above shows Tamansari Neighborhood which located in Cibeunying District, Bandung. According to the city's zoning regulation, Cibeunying District is a housing area built with supporting facilities. Most area of Cibeunying is for ecological conservation and cultural heritage. But in fact, rapid urbanization that is taking place in this northern Bandung area emerges urban slums in some particular area and unplanned land use conversions. Tamansari Neighborhood has a large slum area surrounding Cikapundung River. The slum is shown in red in the picture above. The slum are has taken almost half the area of Tamansari.

The area that marked in red on the picture above is a populous slum area that has amount of poor people and has quite a bad quality of urban environment. In spite of it, a typical unplanned urban slum area does not facilitate the residents with a decent utilities and other needs. One of those other needs is open space for local society to interact daily. The map above also shows green open space distribution

on Tamansari Neighborhood. There is only minimum space that is used for green open space in the whole Tamansari, none in the riverbank slum area.

3. Land Potential for Agriculture

Urban agriculture may take place in locations in the inner city area, suburban area, and even the peri-urban area. The activities may take place on private owned space such as homestead, a land away from the residence, private building yard (owned, leased) or on public land such as parks, conservation areas, along roads, streams and railways. Some practices may even use semi-public land such as schoolyards, grounds of schools and hospitals, either the buildings are still operating or not.

Meanwhile, Tamansari Neighborhood has many private open green space along building yards and homesteads. Most of the private open green space occurred on the eastern side of Tamansari where lies a residential and some commercial areas that regulated with a low building base coefficient. Those area has many private yards and some public parks. But on the other hand, urban agriculture targets food resilience for the urban poor. While then space availability to implement an urban farm mostly lies on the prosperous part of the neighborhood.

Table 1. Built Area Allocation

Development	Area (Ha)	%
Building	50.19	49.3
Building Yard and Homestead (Private Owned)	11.058	10.9
Green Open Space + Riverbank Area (Public Owned)	1.14	1.1
Public Space	0.06	0.1
River	2.09	2.1
Roads	11.45	11.2
Alley	25.802	25.3
TOTAL AREA	101.79	100.0

The table above shows the land distribution for particular use across Tamansari. According to the Ministry of Home Affairs regulation (2007), the minimum requirement of green open space existence in a city 30% of the city area. From the 30% area, consists both public owned and private owned which took 20% public owned and 10% private owned. From the table above can be seen that the private owned green open space has already fulfill the requirement. While the public owned green open space is falling behind the minimum requirement by 18.9% less. Tamansari only have public green space as 1.1% of the whole neighborhood area, which consists of a few small parks.

The concept of productive green open space is empowering green spaces as an urban farmland, which produces crops and other types of plantation. The most suitable type land use to implement an urban farm is green open spaces (RUAF, 1999). However, the total area of public green space in Tamansari is only 1.14 Hectares. From which is the only available public land to be developed as an urban farmland. Therefore, only small part of the neighborhood that could be utilized as an urban farm to produce crops for the populous slums in Tamansari.

4. Cultivation of Land Allocation

The can author specify local residents' needs by taking several sample respondents to determine their vegetative food preference. These respondents are people that lives in the slums surrounding Cikapundung River. According to the data collected, most inhabitants preferred vegetables (consists of spinach, kale, onion, garlic, chili, tomato) as 48% of the total consumption. Followed by spices (22%), fruits (13%), nuts (12%), and tuber (6%). From then, the author can specify societies' preference and make weighing in land allocation of certain commodities to be produced.

The existing available land to develop an urban agriculture in Tamansari is only 1.14 hectares. Which means that the author can only calculate the agricultural productivity based on the land available. The land allocation for preferred crops are 703 m² for tuber, 5,875 m² for vegetables, 492 m² for nuts, 1,583 m² for fruits, and 2,744 m² for spices. Every type of commodity has a different productivities and harvest terms. By a year period, the green open space land could only produce 73.2 tons that consists of 4.5 tons of tuber, 54.3 tons of vegetables, 0.5 tons of nuts, 4.3 tons of fruits, and 9.4 tons of spices. Due to land limitation, harvesting intensification would be needed in order to fulfil food needs.

5. Design Strategies for Urban Agriculture

A framework of urban design strategies can be used to aid in creating urban agricultural landscapes that promote ecological biodiversity and social sustainability in urban environments no matter what the scale, type, or location of the landscape. Incorporating a systems thinking approach that considers appropriate methodologies and tools, creativity and innovations, combined with the design principles that follow, urban agricultural landscape can flourish and aid in the evolution of the sustainable city. By building an integrated systems thinking model for urban agricultural landscapes, there are several principles that promote a more integrated approach.

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- **Promote biodiversity;** The importance of biodiversity in urban environment is being a part of ecological services that make life livable on cities (National Wildlife Federation). It could also provide us with an array of foods and materials and it contributes to the economy. Without biodiversity stability, an ecosystem can be jeopardized.
- **Increase food security and food safety;** Should focus on the utilization of foods through proper nutrition, preparation, and feeding practices, and the stability of these conditions over time (Maxwell and Smith 1992; FAO 2006).
- **Incorporate education and outreach for awareness;** The teaching and outreach of the food landscape and food system ecological, social, and economic benefits to both private and public sectors. This part of the system includes on-site education, training and mentoring local societies as well as the outreach associated with the marketing and branding of the urban agriculture development.
- **Be climate adaptive for environmental resilience;** Agricultural landscapes, on their own and/or when combined with buildings and other urban infrastructures, can increase the ability to climate control and aid environmental resilience. As we lose permeable surfaces that support vegetation and soil life to paved surfaces of streets and buildings.
- **Maximize water accessibility, availability, and quality;** All vegetation requires water. The amount of water needed depends on the crop and other aspects of the layout. According to the Governmental Regulation (2011) the requirement of developing city area as an urban farm is gaining water source, both by irrigation and rainwater. Furthermore, building a drainage system is also important in managing agricultural water waste.
- **Provide for soil health;** Through past urban development and conventional farming practices, the health of the soil has been compromised and degraded. Through urban agriculture landscapes integration of ecological based practices, the soil can be revitalized adding to food vitality and also the soil's ability to reduce erosion in urban environment.
- **Develop a systems network that is both regionally and locally appropriate;** Connectivity of the various natural and built resource systems provides for a more integrated resource management structure that current conventional agriculture and current city planning systems do

not consider. The benefits and value of a regional system add to the ecological, social, and economic sustainability of the city and the outer city boundaries.

- **Protect and increase human health benefits;** This human health aspect consists from psychological, biological, and physical. Urban agriculture landscape will prove fruitful to increase health and well-being benefits in a city. Adding plants for both nutritional and medicinal needs, community gardens that provide for social interaction, and educational opportunities, all add up to a healthier environment for people and ecosystems.
- **Provide for the connection for people with nature to the enrichment of both;** The Nature Deficit Disorder is a description of the human costs of our alienation from nature (Richard Louv in *Last Child in the Woods*). Therapeutic landscape design has statistics that show that landscapes help to heal and soothe patients as well as people walking in urban environments. Agricultural landscapes offer an excellent chance to engage not just experience nature in the city.
- **Foster community, placemaking, and social resilience;** Placemaking is both an idea and a tool that considers the context of creating communities that are desirable places to live. It is based on the idea that places are complex and dynamic systems. Some of these tools are asset mapping, visualization, or predictive modelling (Boyd, 2002). One tool is shaping a community's identity and activity pattern. The other is identifying the many aspects of food and agriculture that are central to fostering human health and happiness.
- **Promote sustainable economic benefits and opportunities;** Poor people generally spend a substantial part of their income, approximately 50%. Growing the relatively expensive vegetables therefore saves money as well as on bartering of produce. Selling products brings income. The municipality and sectoral organizations can play a crucial role in stimulating micro-enterprise development related to urban agriculture.
- **Increase the treatment of waste as a resource for plantation compost;** Thinking of waste as a resource, or in a way to produce food, is an important part of rethinking waste streams in a city (Bill McDonough in *Cradle to Cradle*). Upcycling a material to be reused in a new and improved way is one method to address some waste products. Designing for deconstruction and repurposing those materials to another use is another way to address waste. Green can be turned into soil and compost.

Due to the cross cutting and multi-dimensional nature of urban agriculture, policy development and action planning on urban agriculture should involve various sectors and disciplines: agriculture, health, waste management, community development, parks and nature management, among others. Moreover, urban farmers have to be involved in the planning process. An important aspect of strategic urban planning is related to the participation of the urban poor themselves in the analysis of the situation, in the definition of priorities and in action planning and implementation. Such consultative processes will make the outcomes of policy development and action planning not only robust and comprehensive, but also accepted and sustainable.

By implementing municipal strategies for sustainable urban agriculture, urban policy makers can substantially contribute to the development of safe and sustainable urban agriculture by:

- Creating a conducive policy environment and formal acceptance of urban agriculture as an urban land use;
- Enhancing access to vacant open urban spaces and the security of agricultural land use;
- Enhancing the productivity and economic viability of urban agriculture by improving access of urban farmers to training, technical advice, and credit and supporting the establishment and strengthening of urban farmer organizations; and
- Taking measures that prevent/reduce health and environmental risks associated with urban agriculture.

In the case of Tamansari, the available land to develop an urban agriculture and fulfilling the urban poor's needs are very limited. Therefore, the government should make an inventory of vacant land and

by adding an extension by making land acquisition to provide urban farmlands. This practice should gain city-planning objectives of acquiring more green open spaces and creating a better urban activity pattern. Furthermore, the urban agriculture development should require the involvement of municipality, private parties, and local communities to achieve environmental, social, and economic goals.

6. Conclusion

In order to actualize a food resilient city, urban agriculture plays a major role. It has an impact on human health, local markets, and city inclusivity. This development concept is addressed to the urban poor where food affordability is questioned. Due to its regional characteristics, Tamansari Neighborhood has a number of urban slums whereas many poor inhabitants live. Indeed, the current spatial planning in Tamansari does not support this landscape development. But a productive green open space is much needed to increase public interaction and to provide economic opportunities. On the other hand, productive green open space could also bring environmental sustainability in the city. Developing a productive green open space, in other words food landscape, needed both good landscape design and policy planning. The agricultural productivity in the vacant land in Tamansari is far beyond necessity. Therefore, policy planners should consider zoning reform by expanding urban land for agriculture in order to gain a food resilient city. While the food landscape itself should be maintained by local community to regain ecological biodiversity and social sustainability.

Acknowledgments

We would like to thank Center for Research and Community Services Institut Teknologi Bandung for the support to the research activities.

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