



# INTEGRATION STRATEGY FOR GREEN CITY DEVELOPMENT BASED ON CLEAN WATER MANAGEMENT IN THE INDRAGIRI ROKAN RIVER IN SOLOK REGENCY, DISTRICT AROSUKA

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## ABSTRACT

*This study formulates a green city development strategy in the capital city of Solok Regency in Arosuka, using an integration strategy. The area is unique because it is located in the Indragiri Rokan watershed, whereby the development of an environmentally friendly city is associated with waste management, slums, architecture, sustainable development and other issues. Therefore, this research focuses on efforts to maintain groundwater discharge in Arosuka due to changes in the status of the watershed area. This is a descriptive qualitative research with secondary data obtained from district capital development plans, watersheds and the Arosuka area.*

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## INTRODUCTION

One of the areas currently being developed is Arosuka, the capital city of Solok Regency. It is located between two villages, namely Koto Gaek Guguk and Batang Barus, Gunung Talang District, in Jorong Sukarami Nagari, Koto Gaek Guguk and Jorong Aro Nagari Wood. Barus Trunk. This area also extends toward the surface runoff in the Batang Dareh, Baliang and Lubuk Selasih rivers which constitute part of the Batang Sumani Watershed. The flow pattern of natural ditches or creeks is dendritic (meander), formed by the

influence of relief or wavy physiography. This phenomenon is characterized by wind, and the current is quite heavy with an intermittent flow system (Flannery & Sabloff, 2019).

The development of this area also pays attention to the environmental aspects of creating a green city (Mrkva, Cole, & Van Boven, 2021). However, assuming this enormous potential is not accompanied by a plan and the allocated space properly utilized, its positive impact is bound to turn into a negative one, as has occurred in several other parts of Indonesia. Furthermore, it is important to adopt an



integrated city development concept to avoid the issue of poor management (Hegazy, I., Siddik, W., & Ibrahim, H., 2017). Concerning the conditions and potentials of Arosuka, implementing a Green City concept in an integrated watershed is considered feasible. One of the advantages is that it meets the needs associated with its existence, thereby reducing and even solving environmental problems, such as natural disasters, air pollution, flooding, and noise (Juhola, 2018). As the capital city of Solok Regency, Arosuka is a unique area because it is located in a watershed, namely the Indragiri Rokan River. In terms of growth, various sectors such as agriculture and plantations, tourism, and other agribusiness activities benefit from its diverse potential (Balińska, Gabryjończyk, Siczko, & Zawadka, 2018). These eventually become an attraction and later result in a multiplier effect on the economy (Beyer, Chhabra, Galdo, & Rama, 2018).

Green City is one of the sustainable urban planning approaches (Breuste, 2020). This concept is also known as an ecological or healthy city. It can also be said that a green city is an ecologically healthy city. The ultimate goal is to achieve a clean, zero carbon footprint in energy, transportation, architecture, and business activity cost chains (Tehrani, M., Fulton, L., & Schmutz, 2020). Such a city utilizes water and energy resources effectively, reduces waste, implements an integrated transportation system, promotes environmental health, and synergizes the natural and artificial environment. It ensures an area's comfort and freshness, which positively impacts the environment (Hosam, K. El Ghorab & Heidi A. Shalaby, 2016). In addition, establishing a green city infrastructure minimizes the risk of flooding, thereby reducing public concerns (Antrobus, D., 2011). This concept is indirectly a wise step toward maintaining the beauty of the environment (Scott Campbell, 2007). Furthermore, the increased number of vehicles has an enormous impact on the high level of air pollution due to the emission of carbons

from their exhaust (Zhou, Z. et al., 2018). The use of the green city concept in urban areas is important to ensure balance in environmental, economic, and socio-cultural issues for a better future (Hasanah, 2015; Cavalheiro, Joia, & Cavalheiro, 2020).

Implementing this green city provides added value or a positive assessment of the environment because it reduces pollution and maintains the stability of oxygen needed by all living things (Kreans, P., 2012). According to Mishra, S. et al. (2012), it is also nicknamed a healthy city. Several big cities in Korea and Asian countries have adopted this concept (Mullins, PD & Shwayri, S. T., 2016). However, it is affected by the large human population, and if not properly controlled, it is bound to have a negative impact on the environment (Richter, B. & Behnisch, M., 2019).

Several cities in various countries have also implemented clean water management. For example, in the Republic of Moldova, the main requirements for watershed management are regulated by the Water Law 7 of 2011, the 2011 to 2020 water management development plan and the 2002 Draft National Water Resources Policy. In Kazakhstan, the 2003 Water Code was the main national legal document used to establish the principles of basin water management. In Kyrgyzstan, the transition to a watershed management approach was foreseen by the 2005 Water Code and was only tested in pilot watersheds. The adoption of this concept in the development of an area results in the need to pay attention to many principles and learn from regions that received the best green city award (Albino, V. & Dangelico, RM, 2012). The environment can be organized to exhibit ecological and social functions. This simply indicates it can provide space for comfortable and beautiful outdoor family activities, thereby creating a conducive atmosphere (Aliero, MS et al., 2021). This leads to the understanding that urban planning must evaluate the interdependence between evolutionary cities and the environment (Bork, R. & Pflueger, M., 2015).



In Australia, particularly New South Wales (NSW), water management concerns the local governments. Several strategic steps, namely 1) water planning, policy and regulation, 2) regional water security and 3) government relations, have been adopted to overcome the problems encountered (NSW Government, 2018). Certain factors need to be anticipated to overcome wastewater management in order not to pollute the environment and ensure community activities are undisturbed (Hossain, K. et al., 2018). Therefore, it is necessary to adopt an ideal urban planning scheme and proper management to ensure that the water is not polluted because it is a source of life (Bowden C, Konovalsk M, Allen J. et al., 2015).

## METHOD

The empirical method, which consists of a case study domain, was adopted (Montes-Rodríguez, Martínez-Rodríguez, & Ocaña-Fernandez, 2019). This exploratory research involves open problems, and there are no hypotheses. A descriptive survey method was employed because data were obtained from direct observations in the field. This approach is used to describe, identify, and analyze the concept of green architecture in the residential area of Brantas Watershed, Penanggungan Village, Malang, which is perceived as the research object.

Data collection involves observing elements that make up the settlements, such as the natural environment, protection, and networks, throughout the research area. This is followed by documentation and surveys in the field to ascertain the actual situation and conditions (Alam, 2020). At the observation stage, the green city development strategies in the watershed are recorded at the research location. The next step is to identify and categorize data into the various elements of regional integration and modernization theory. Afterwards, the results of the grouping were analyzed based on the parameters of an environmentally friendly city. This is realized by

viewing the aspects of the Green City and Catchment Area Management Conceptions.

## RESULTS AND DISCUSSION

The objectives of developing the Arosuka Area in the long term are "its realization as a City Park which is the Core of the Capital based on a harmonious, comfortable and environmentally friendly trade, office and residential areas while maintaining the function of the catchment region".

Arosuka Area development policies in the long term are as follows:

1. Improvement of the region that is directed as a garden city.
2. Improvement of regional functions directed as economic development centres.
3. Improving service centres as the basis of productive and efficient activities.
4. Improving the quality and coverage of urban infrastructure network services in an integrated and equitable manner in all regions.
5. Increased cultivation tasks in an integrated and harmonious manner by considering the environment's carrying capacity.
6. Improving the area's function and quality to maintain the water's function.
7. Improved coordination, integration, and synchronization of regional development through inter-regional cooperation, stakeholders' partnerships, and strengthening the role of the community.

In the context of the development of Solok Regency, the Arosuka area plays an important role in regional economic growth, socio-economic services, and government. The existence of the Arosuka Area, traversed by the Padang-Solok crossing, is an important asset supporting a wider collection and distribution function expected to counter the growth in the border regions. This role does not only cover Solok Regency, but it also acts as one of the collection and distribution centres in West Sumatra Province. Furthermore, the capacity of

public services is increased to cover the entire regency.

However, from its function and role, the Arosuka area is the Solok Regency Government Center, the Center for Economic Activities, the Center for Collection and Distribution of agriculture and plantations, tourism and other agribusinesses. These activities are also related to the regional transportation system and social service centre for the people of Gunung Talang and Solok Districts.

Supporting factors,

- a. Physical Aspects (Administrative Boundaries, Topography, Land Requirements, Geology, Morphology, Climatology, Hydrology, Land Use, Disaster Vulnerability, Plant Types
- b. Population
- c. Condition of Urban Facilities (Clean Water, Electricity, Communication, Telephone, Road, Solid Waste System, and Drainage Networks.
- d. Regional Development in Regional Constellations
- e. Policy Support

### Green City Concept

The green City concept is a sustainable and environmentally sound urban development achieved by striking a balance between economic growth, social life and environmental protection, making the region livable for both current and subsequent generations. Hidayat stated that it aims to produce sustainable urban development by reducing its negative impacts on the environment by combining spatial, infrastructure and social development strategies (Brilhante & Klaas, 2018).

The green principle is committed to the environment as part of a broader ideology that places the relationship between humans and nature as its basis, with the consequence of increasing efficiency in development activities without compromising environmental

sustainability. Although, this is not what Daniel Goleman stated in his book *Ecological Intelligence* (Pasquero & Poletto, 2019). The *Coming Age of Radical Transparency* reported that several products labeled "green" are mere nonsense and highlight humanity's inconsistency in terms of responding to the ecological crisis. According to Daniel Goleman, such items are greenish – that is, "have an appearance that is purely for ecological benefits", embellished with an ostensibly eco-friendly presence. Daniel Goleman further stated that the love for environmentally friendly products depends on the transitional stage, namely "increasing awareness of ecological impacts, despite lacking precision, in-depth understanding, and clarity". Nurmardiansyah stated that any product referred to as 'green' is either a fantasy or exaggerated. The current standard of "greenness" is considered *eco-myopia* (eco-myopia), which is a superficial view of the environment.

Additionally, the green city concept also comprises the terms green urban and transportation. Green urban is an area that is realized by applying three criteria for a sustainable city, namely environmental, economic, and social systems (Platt, 1994; Brundtland, 1987; Ugwu, 2007). According to Wildsmith (2009), in developing a green city, its design needs to pay attention to the environment to ensure sustainable functions and benefits in saving energy, water and air. Green or environmentally friendly transportation is an effort to fulfil the mobility needs of the current generation without compromising that of the future ones.

Green Urban Areas Sustainable cities are designed, built, and managed to maximize the quality and minimize or eliminate the negative impacts on their natural environment. The discussion on green transportation's role in creating the Simpanglima City Center area of Semarang is approached by examining its actual performance and attributes (Mulyani & Gandhi, 2016).



## Legal Aspect

The transfer of the capital city of Solok Regency to Arosuka was regulated by the Government Regulation of the Republic of Indonesia number 39 of 2004. It states that the capital was moved to Arosuka in Gunung Talang District, Solok Regency. The boundaries of this territory in the north and east are Nagari Koto Gaek, and in the south and west by Nagari Batang Barus. Based on this, Arosuka deserves to be used as a model for an environmentally friendly city approach. Additionally, 26 Article 8 paragraph 1 states that the integration between cultivation activities and the control of its development needs to be improved not to exceed the environment's carrying capacity (Suwesa, 2011).

## Integration Strategy

Ideally, a catchment area needs an open space cultivated with plants that help infiltration and percolation with little evaporation (Bernelius & Vilka, 2019). This needs to be considered in the development of the Arosuka Area as the new capital of Solok Regency. The development of a city in any area must be well thought out and planned. Regarding the relocation of this capital, the construction of new cities is a long-term plan and scenario aimed at creating new growth centres, stemflow, and rainwater that directly penetrates the soil surface either as runoff, evaporation, or infiltration. The combined evaporation of water vapour resulting from transpiration and interception is called evapotranspiration.

Currently, the water discharge in the Solok Regency Capital Region is 30 l/second. This groundwater is obtained from quality springs that are suitable for bottled water. This 30 litre water debit sufficiently meets the needs of 2,800 house connections in three areas that are an inseparable part of Arosuka, namely the Samsat housing area, offices, and indigenous peoples. The development of urban regions often leads to certain problems associated with the transportation system and environment.

Therefore, there is a need for urban planning to strike a balance in the city. This is evident in the existence of green and non-green areas, thereby creating a livable city. Green areas are important because they are a source of oxygen and water absorption in the region (Persson, Möller, Engström, Sundström, & Nooijen, 2019). District spatial planning policy is a regional development direction enacted by the district government to achieve the spatial planning objectives within 20 years.

In accordance with the framework of achieving spatial planning objectives, the formulation of the Solok District is as follows:

- a) The development of an efficient spatial organization by structuring a hierarchy of activity centres covering the entire region.
- b) development of network systems and infrastructure nodes that integrate all district activity centres and their rural regions and provide services to as many settlements as possible.
- c) Stabilization of protected areas determined by the province and its inclusion under the authority of the regency.
- d) Management of cultivated areas supports economic development through the sustainability of natural resources related to agriculture, plantations, tourism, and industry.

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As a derivative of the spatial planning policy formulation described more operationally, that of the Solok Regency is proposed strategies to be carried out as follows:

1. Developing efficient district spatial planning through the arrangement of tiered activity centres covering all regions by performing the following:
  - a. To develop the district's main activity centre in accordance with the direction and promotion of others according to their potential.
  - b. Establish at least 1 (one) activity centre as a Regional Development Center in each sub-district.
  - c. Establish an activity or settlement centre that has an inter-village service area or more than one as an Environmental



- Service Center, other than those that have been designated as a Regional Development Center.
- d. Designing a residential center with a service level similar to the aforementioned ones.
  2. The strategy "development of network systems and infrastructure nodes that integrate all district activity centers and their hinterland rural systems including the provision of services for as many settlements as possible" include:
    - a. Supports the development of an access road network to Solok Regency in accordance with the National and Provincial policies, as well as the development of new road pioneers to other adjoining cities.
    - b. Develop multi-access roads to and from activity centres that integrate all districts.
    - c. Support the development of the National and West Sumatra Provincial Railway network systems that cross the Solok Regency area.
    - d. Design water transportation systems in Lakes Singkarak, Above, and Bawah to support regional economic activities and tourism.
    - e. Develop an Energy Network System to meet the electricity demand in all sub-districts.
    - f. Develop cellular and improved cable telecommunications network system that serves the entire area, especially for industrial services at the Regency Main Activity Center.
    - g. Develop a raw water network system to meet the needs of the district's main activity centers and for areas experiencing water scarcity. This also includes the development of district irrigation networks in areas that are suitable for wetland agriculture.
    - h. Ensure the region is developed in collaboration with the City of Padang and adjacent regencies within the Padang Metropolitan and its surroundings.
  - i. Develop economic infrastructure in activity and service centres.
  - j. Construct basic infrastructure for worship, health, and sports to boost the community's comfortable and sustainable socio-cultural life (Balany, Ng, Muttill, Mut Hukumaran & Wong, 2020).
3. Consolidation of protected areas included under the authority of the Solok Regency" is performed as follows:
    - a. Maintaining existing protected areas.
    - b. Restoring their functions which have been stipulated in the RTRWN and RTRWP and have changed the designation of the non-protected regions, as long as the terms and conditions of the protected areas are in accordance with Government Regulation Number 10 of 2010 concerning Procedures for Changes in the Designation and Function of Forest Areas.
    - c. Develop district-scale protected areas following the existent potential functions.
    - d. Efforts to maintain a forest area of at least 30% of each watershed in the entire district.
  4. Management of cultivation areas that support economic development through the sustainability of natural resources related to agriculture, plantations, tourism, and urban forest industry include:
    - a. The development of cultivation areas such as rice granaries through the intensification and extensification of agricultural land, directed at maintaining Solok Regency as part of the National and West Sumatra Province.
    - b. The cultivation of plantation areas is directed at developing productive regional economies that highly encourage productivity and economic growth.
    - c. The development of tourism areas is directed at boosting the peoples' comfort as well as part of regional productive economic growth that encourages tourist activities within this district.



- d. Develop an industrial designation area that is directed at the potential management of natural resources to increase added value and regional productivity sustainably.
  - e. The development of residential areas is directed at supporting the improvement of activity and service centres spread according to the Regency Spatial Plan.
  - f. The development of forest cultivation areas is directed to stimulate the economic activities of neighboring communities as well as increase the productivity of district areas in this sector.
  - g. Develop mining areas for the potential management of natural resources in a balanced and sustainable manner by prioritizing and striking a balance between aspects of the ecosystem and environmental sustainability.
5. The realization of an effort to change the function of forest areas into non-forest regions is needed for the benefit of district development in accordance with applicable provisions and regulations of PP No. 10/2010 concerning Procedures for Changes in Forest Area Designation and Functions. This is executed by considering the aspects below:
- a. Redefining forest regions included in cultivation areas in Solok Regency, such as in West Sumatra, which the Minister of Forestry has approved.
  - b. Realizing the management of these areas as approved by the Minister of Forestry, and possibly for developing a productive economy related to agriculture, plantations, tourism, and industrial-based society.

The urban system development plan is intended to describe the role and function of each city in totality (Shi, Zhai, Xu, Zhou, Lu, Liu, & Huang, 2021). Meanwhile, the strategy adopted in Solok Regency was carried out by establishing activity centres determined hierarchically according to their respective

potentials or based on the direction of development policies. The Arosuka area, which is designed as a City Park because it is the core of the Regency Capital, is understood to be an environmentally friendly city. Considering that the population is the object's content and the subject of development, it is better to plan a garden city based on the activities of urban regions, trade centers, harmonious, comfortable and environmentally friendly offices and settlements. Consequently, tracks or transit areas used for the movement of regencies and regions serve as a corridor of the Padang City Metropolitan. In addition, there is a need to erect facilities and infrastructure in Arosuka as a place for "melting" various interactive, recreational activities, including the gathering of local communities.

The realization of the Arosuka Area as a City Park is the Core of the Capital in the Detailed Spatial Plan. This is an effort to develop a livable urban environment that provides opportunities for the communities to adapt, integrate and interact socially. It also aims to ensure that the regional land area is properly utilized to offer better benefits for the Arosuka Region in particular and Solok Regency in general with the aim of (a) maintaining harmony and striking a balance between urban environmental ecosystems, (b) creating a balance between the natural and artificial environments and (c) improving the quality of a healthy, beautiful, clean and comfortable urban environment. Affirming the image of the Arosuka area as a Regency City Park, as well as its optimal and efficient functioning, essentially requires improvement and realignment starting from the regional structure.

The main concept of developing the structure of the city park area is based on its linear rearrangement, in which all movements and functions are oriented towards the main route. This leads to forming a compact regional structure directed towards quality design and values, which are stated as follows.

1. Integration



This is the process of encouraging the growth of various activities in an integrated manner in the planning area, to determine the value of the land area and its vitality. It improves the circulation system in the planning area and ensures a better achievement of the various activities and modes of circulation in this region

## 2. Functional Efficiency

This process is associated with the ease of access and achievement of various facilities within the reach of both vehicle and pedestrians. It determines the availability of infrastructure, service facilities and several supporting amenities for carrying out diverse activities in the area. Procurement of infrastructure and utility systems that are more efficient and economical in the planning area for the optimization and productivity of land use.

3. Environmental Harmony - achieving a certain level of environmental quality (Physical Environmental Quality).
4. Sense of Place - provides a flexible space framework for building and innovative environmental designs in the Arosuka Area, which gives it a distinctive image or character as a Garden City, thereby making it a landmark.
5. Commercial feasibility- Land use control ensures its capability is highly utilized to provide even better benefits for the area.

Based on the five values of regional design quality, the structure of the Arosuka area in Solok Regency was developed by applying a Transit Oriented Development (TOD) concept. Generally, TOD is defined as an area with a density level controlled by mixed usage. It consists of housing, workplaces, shops, and social facilities located 'near' or within easy reach of the transit centre (terminal), based on a green line that functions as a park. This region is specially designed with connecting access between existing land use types through pedestrian facilities, bicycles, and little access to motorized vehicles.

The location of Arosuka, which is crossed by the Padang - Solok primary arterial road - and the existence of a terminal makes it seem strategic because it is perceived as a transition point of transportation modes, covering regional to local transportation and vice versa. In accordance with this condition, those who shop and work in this region are not only local residents but also people from other areas connected to the primary arterial roads.

Based on this paradigm, public transportation is the backbone of human movement. It is the starting point for all humans to reach their respective destinations. The zoning of these functions is based on diverse movement, and the range that pedestrians can reach comfort distance in Indonesia is  $\pm 400$  m to a maximum of 600 m. Functions that generate high movement, especially commercial ones, are located closer to the transit point, while residential ones are farther away.

The planning area has several development potentials achievable through the application of the following TOD concepts:

### 1. Transit Point:

The transit point is a rest area from residential to commercial regions after a distance of about 600 meters. The main downtown area is about 3 km from the terminal, therefore, it is imperative to develop internal mass transportation facilities to support district activities.

### 2. Density:

The planning area is usually projected with commercial activities as the main driving function and has a rapid growth rate.

### 3. Diversity:

The planning area's functions comprise various shops, markets, retail and shops.

### Green open space

According to Law Number 26 of 2007 concerning Spatial Planning, Green Open Space is made of at least 30% of the city area. Their public and private spaces are allocated 20 and 10%, respectively. Green Open Spaces are



spaces within a city, either in the form of an area or elongated lane, which in its use is more open without buildings. In addition to functioning as the city's lungs, it is one of the elements forming the structure of urban space. The management of the green open spaces generally includes 1.) Restrictions on building construction, except those with vital functions, 2.) Development of public facilities and environmental parks, and 3.) Development of green open space as a barrier between functional and residential areas.

The method of calculating the need for green open space is based on a percentage linked to Law No. 26 of 2007 concerning Spatial Planning. The proportion of green open space is at least 30% of the city area, divided between the public (20%) and private (10%). The RTH is calculated as follows: a.) Arosuka City Regional Planning Area: 1,682.1 Ha, b.) Standard: Law Number 26 of 2007 concerning Spatial Planning, c.) The need for green open space in the Talawi area according to the standards of Law no. 26 of 2007 is 30% of 1,682.1 Ha which yielded 504.63 Ha, and d.) The need for green open space in the Silungkang area according to the standards of Law no. 26 of 2007 at 20% for 504.83 Ha, which equals 100.93 Ha.

Subsequently, the direction of City development (Green Open Space) is conducted by considering the following aspects:

1. The creation of a comfortable microclimate in the Arosuka planning area with vegetation cover contributes to development through the following processes: 1) Productive Green Open Space, in the form of agricultural and plantation areas, 2) Conservation of Green Open Space, such as large and urban forests and water catchment areas, 3) Environmental Green Open Space comprises yards, city and environmental parks, 4) Corridor green open space, including road network, high-voltage power lines, a surrounding area designed with a buffer zone of 100 to 500 meters, and 5) Special Green Open Space includes a public cemetery, office yard,

Buffer Zone, and educational and tourist areas.

2. The choice of vegetation type is adjusted to the mission of the type of green open space to be developed. For instance, in the corridor type, the selected vegetation must have a root system that does not damage the road body with a branching system not capable of causing traffic safety disturbances.

Additionally, the types of green open spaces that need to be planned in the Arosuka Urban Area are as follows:

### 1. City Forest

Implementing the urban forest as a buffer is for the environment to improve and maintain the microclimate and aesthetic value, absorb water, create balance and harmony and support the preservation and protection of Indonesia's biodiversity. Urban forest can be in the form of 1) clumps or heaps with concentrated vegetation communities in one area, comprising a minimum number of 100 trees with irregular spacing. 2) Scattered urban forest that does not have a certain shape pattern, with a minimum area of 2,500 m<sup>2</sup> in small groups. 3) The area planted with plants is 90% to 100% of the urban forest area. 4) In the form of paths following the formation of rivers, and roads, with a minimum width of 30 m. The structure of the urban forest consists of two-story and multi-strata communities of plants and grasses, as well as two trees, grasses, shrubs and irregular ground covers.

Additionally, vegetation selection criteria for urban forests comprise varying heights, plants that invite the presence of birds, shady and compact canopy with the ability to absorb air pollution and repel pests and diseases. Furthermore, it is long-lived, tolerant to limited sunlight and water, resistant to motor vehicles and industrial pollution, and contains a strong trunk and branching system. Its upright rods are easily broken because the strong root system does not easily prevent landslides. The resulting system is sufficient and not allelopathic, hence

other plants can grow well as ground cover. The types of plants are included in the evergreen group, not the deciduous and consist of deep roots.

## 2. City Park Green Open Space

City Park Green Open Space is a park intended to serve a minimum of 480,000 residents of a city at a minimum standard of 0.3 m<sup>2</sup> and 144,000 m<sup>2</sup> per garden. This park can be in the form of green open space, equipped with recreational and sports facilities at 80% to 90%. All these facilities are open to the public with the selected vegetation types comprising annual trees and shrubs in groups or scattered to function as trees that act as a barrier between activities.

The criteria for selecting vegetation for environmental and city parks are as follows: a) Non-toxic and thorny branches that are not easily broken, with the roots not interfering with the foundation, b) The canopy is quite shady and compact, but not too dark, c) Plant height varies with the colour green and other balanced ones, d) The stature and shape of the crown are quite beautiful, e) medium growth rate, f) habitat for local and cultivated plants, g) Types of annual plants, h) Half-tight spacing to produce optimal shade, i) Resistant to pests and plant diseases, j) Capable of trapping and absorbing air pollution, and k) plants that attract birds.

The green open space in residential areas can be used Rukun Tetangga residents in accordance with type and function in the KKN Park. This process supports the activities of residents in the surrounding environment, facilities park benches and children's play facilities. Aside from being a place to carry out social activities, it can also be used as a Community Park to plant family medicinal plants, vegetables, and fruits that residents can utilize.

## 3. Public cemetery

Besides functioning as a burial place for corpses, the provision of green open space in the burial area is also used to grow various types of vegetation, thereby creating a microclimate and a place for birds to live. It is also used for social functions for the surrounding community, such as resting and as a source of income.

The provisions for the shape of the cemetery for the provision of a burial green space are as follows: 1.) The size of the tomb is 1 m x 2 m 2.) The distance between graves is at least 0.5 m, 3.) Each grave must not be bricked/paved, 4.) The cemetery is divided into several blocks, with the area and number adjusted to the local cemetery conditions, 5.) The boundary between the burial blocks is a pedestrian area 150-200 cm wide with a row of protective trees on one side 6.) The outer boundary of the cemetery is in the form of a fence or a combination of artificial fences and hedges, or with protective trees and 7.) Cemetery green open spaces, including unpaved burials, are at least 70% of the total burial area, with a vegetation cover level of 80% of the green open space.

## 4. Green Line Road

According to the road class, the provision of green open space can be carried out by placing plants between 20-30% of the rumija. It is necessary to pay attention to two things, namely, the function of the plant and the conditions for its placement. Furthermore, selecting local plant species favoured by birds with a low evapotranspiration rate is recommended.

## 5. Pedestrian Room

Pedestrian space is the pathway provided for pedestrians on either side of the road or in the park. It is equipped with green open space that provides comfort to measure the functional qualities offered by a pedestrian system. This includes orientation in the form of visual signs, such as landmarks and road markings, to help people find their way in the context of the larger environment. The ease of moving from one direction to another is

influenced by pedestrian density, the presence of physical obstacles, road surface and climatic conditions. Pedestrian paths must be accessible to everyone, including persons with disabilities, through the adaptation of local socio-cultural conditions, habits and lifestyles, population density, heritage and shared values of the environment. The average distance people walk in each place is generally different, influenced by the purpose of the trip, weather conditions, customs and culture of the community. The Decree of the Minister of Public Works No. 468/KPTS/1998, dated December 1, 1998 concerning Technical Requirements for Accessibility in Public Buildings and the Environment as well as Guidelines for Provision and Utilization of Infrastructure and Facilities for Pedestrians, provided more detailed technical guidance on pedestrian paths. Generally, people do not want to walk more than 400m.

According to the mandate of Law no. 26 of 2007 concerning Spatial Planning in article 31, non-green open space is also needed in cities. Non-Green Open Space (RTNH), which is not included in the RTH category, in the form of hardened soil, form a body of water that cannot be overgrown with plants. In the Arosuka Planning Area, non-green open space used as parkinglots, are made available by the government. This is to enable vehicles to park properly when using shophouses available on several roads in the middle of the planning area to avoid disturbing traffic orders, especially in the market centre, because it can trigger congestion. Therefore, parking lots need to be built on sections that have the densest level of vehicle mobilization, such as the primary arterial road, Jalan Solok - Padang City in the Arosuka area, and the metropolitan support area.

## CONCLUSION

The Arosuka area, known as the Capital of Solok Regency, is striving to become an environmentally friendly green city with

adequate management through developing city parks, drainage, waste management, and others. Regional leaders and related parties have prepared plans comprising five strategies to develop a green city vision in the watershed. Further research is needed to determine the implementation of the strategies that have been developed.

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