Building the Future Urban Structure: Kigali's Green City Project

In the last decades, Africa's rapid urbanisation rate and growing metropolises have attracted the attention of urban studies, pointing to the need to prevent the cities' collapse (re)thinking about their urban future. Kigali - the capital city of Rwanda, reacted first in 2008 with the adoption of a Masterplan recently revised and approved in 2020. Nonetheless, the core aim of the Kigali City Masterplan is the transition to a sustainable satellite city composed of green settlements. The purpose of this research is to examine the response to address the issues raised by the 11th SDGs (Sustainable Development Goals) - titled "Sustainable Cities and Communities", launching over time a series of new settlements' projects: Kigali 2020, Kigali Vision and Green City Kigali. It is studied the use of a well-known urban development plan, the satellite city that has to match with the goal of "make cities inclusive, safe, resilient and sustainable" in a specific built and unbuilt context where tradition and modernity have to find the way to establish an architectural dialogue. Therefore, the paper explores the three case studies through a comparative method and concludes by providing advice for a correct approach to the vision of Kigali as a sustainable city.

Keywords: *Kigali, Green architecture, Satellite city, Sustainable architecture, Tropical architecture*

Introduction

The world in the 21st century is experiencing unprecedented urban growth. According to United Nations, the urban population is expected to rise by 2.5 billion persons, from 4.2 billion to 6.7 billion. In contrast, the world population is projected to grow by somewhat less, 2.1 billion, from 7.6 billion in 2018 to 9.8 billion in 2050. Most of the growth is occurring in developing regions, and the World Health Organization predicted that seven out of ten urban dwellers will be African or Asian in 2030[1]. The current global urbanisation is not only purely a demographic phenomenon. Still, it is also a transformative force that continually shapes societies, their economies, political systems and environments, both built and unbuilt. The new cosmography of the African continent shows a diffuse macrocephaly with three large conglomerations: Cairo, Lagos and Kinshasa (see Table 1). For these reasons, Sub-Saharan Africa is usually regarded as the world's fastest urbanising continent area that will host two of the three above-mentioned largest megacities shortly. According to the predictions, Kinshasa, the Capital city of DR Congo, will count in 2050 a population of around 35 million

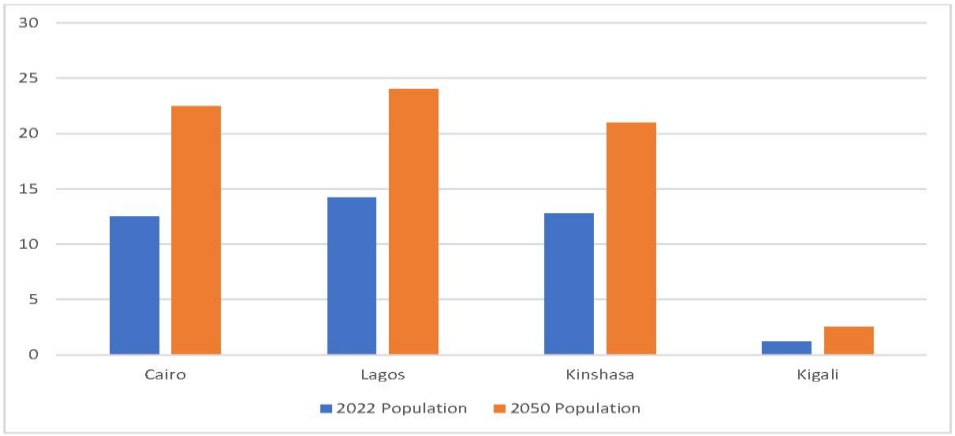
[1]World Health Organization. (2010) . *Why urban health matters*. *World Health Organization* (2018), 8. https://apps.who.int/iris/handle/10665/70230

inhabitants and Lagos, the Nigerian Capital city, will have about 32 million.[2]

Ranked as a rapidly growing city, Kigali accounts for almost 60% of the Rwandan urban population, with an annual incremental rate of 9%. The country aims to reach 35% of urbanisation by 2024[3]. According to the Rwanda National Institute of Statistics, the "Rwandan population is expected to increase from 10.5 million in 2012 to 16.3 million in 2032" In the same period, Kigali will also register a significant growth from 1.3 million up to 3.7 million inhabitants.

Kigali became the capital city in the early 1960s and is living today in a fervent urban rebirth driven by the adoption of a sequence of Master Plans. The design process began in 2008 with the Singapore-based firm called "Surbana", with the first Kigali Conceptual Master Plan (KCMP). After that, the municipality approved an integrated and detailed plan for the entire city as part of Vision 2040, also named the Kigali Master Plan 2013[4]. Since 2018 the same Singaporean firm has been identified to lead the revision of the present Master Plan, extending its validity under the Strategic Vision 2050. Recently the municipality presented to the public the updated Master Plan identified by the motto "KigaliYacu! OurKigali", thus emphasising the inclusive nature of its approach and its vision of the city's development as a project.

Table 1. *Diagram representing the African megalopolis population growth from 2020 up to 2030*



Source: UN World Urbanization Prospects.

This paper aims to analyse the urban strategy adopted by the Rwandan capital city to cope with the issues raised by the 11th SDGs (Sustainable Development Goals) - titled "Sustainable Cities and Communities". Most of

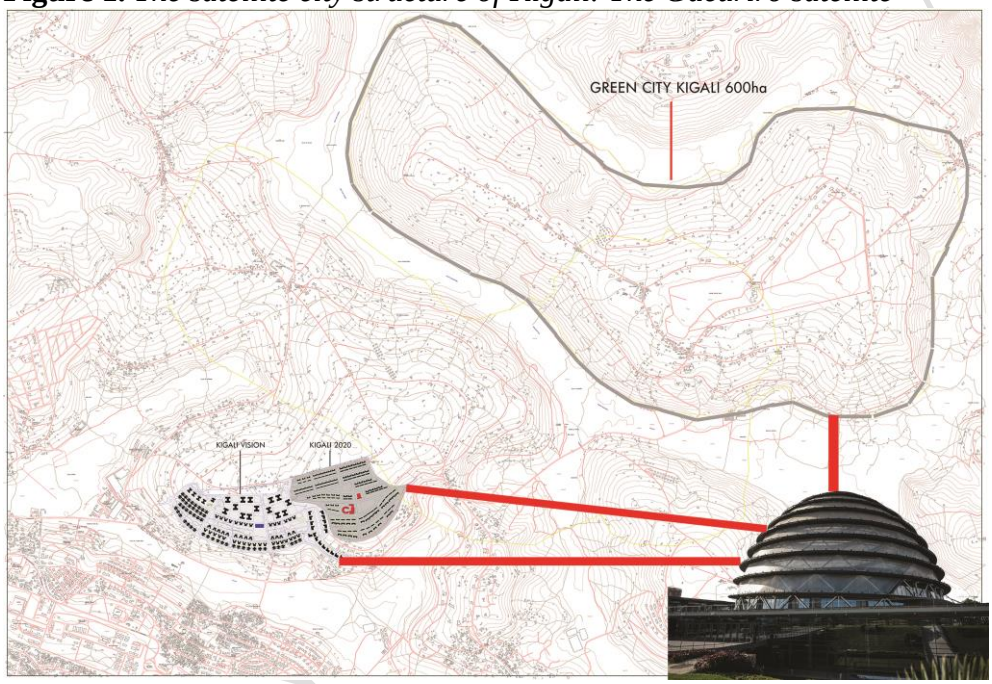
[2]Hoornweg D. & Pope K. (2014). Population predictions for the world's largest cities in the 21st century. *Environment and Urbanization*, 29 (1), 195-216. https://doi.org/10.1177/0956247816663557

[3]REMA. (2017). *State of Environment and Outlook Report*. Rwanda Environment Management Authority. https://www.rema.gov.rw/soe/

[4]City of Kigali. (2013, May). *Kigali City. Masterplan Report.* Republic of Rwanda. https://www.kigalicity.gov.rw/index.php?id=40

the actions have been focused on launching over time a series of new settlements' projects: Kigali 2020, Kigali Vision and Green City Kigali (see Figure 1). It studied the use of a well-known urban development plan, the satellite city that has to match with the goal of "make cities inclusive, safe, resilient and sustainable", in a specific built and unbuilt context where tradition and modernity have to find the way to establish an architectural dialogue. Therefore, the paper explores the three case studies through a comparative method and concludes by providing advice for a correct approach to the vision of Kigali as a sustainable cit

Figure 1. *The satellite city structure of Kigali: The Gacuriro satellite*



Source: Collage by Manlio Michieletto.

Sustainable Cities and Communities Subsections

Unfortunately, the buildings sector remains the prime Greenhouse Gas (GHG) emitter as per Paris Climate Accord ratified in 2016. Hence, urban and building design, construction and operation significantly affect the chances of meeting the two °C target and pursuing efforts to stay well below 1.5°C[5]. Therefore, the definition of Green Urbanism and Green Architecture is based on a precise design approach which focuses on increasing the efficiency of exploiting the resources but at the same time targeting a reduced urban and building impact on human health and the environment during their life cycle.

Therefore, the definition of green embeds a variety of necessary actions: to promote energy & water efficiency; to benefit from the ambient climate; to reduce the use of air-conditioning; to implement the natural cross-ventilation;

[5]Government of Rwanda and GGGI. (2015). *National Roadmap for Green Secondary City Development*. GGGI. https://gggi.org/search/?search=national+roadmap

to maximise the use of local and sustainable construction materials; to provide superior indoor Environmental Quality (IEQ); to protect the natural environment and to promote biodiversity. Green Architecture is also relevant to several targets of the UN Sustainable Development Goals (SDGs) included in the Agenda 2030 for Sustainable Development that forms the Global Development Framework.

The concepts of sustainable development and sustainability are founded on the assumption that there is an improvement in the quality of life, substantial equity, conservation of biodiversity, and promotion of human survival. In this respect, sustainable urbanisation ensures that urbanites have an excellent standard of living through access to essential services and equity in allocating services to promote social justice. Together, it is necessary that urbanisation harm the environment and that human survival is maintained by reducing diseases, crime, and safety.[6]

Despite Goal number 11, "Sustainable Cities and Communities", which argues for making cities inclusive, safe, resilient and sustainable, and that is directly connected to the vision of Kigali as a green city, it is worth listing the other goals directly linked with it among the 17 established and adapted in 2015 by United Nations: Goal 3 (Good Health & Wellbeing), Goal 7 (Affordable and Clean Energy), Goal 8 (Decent Work & Economic Growth), Goal 9 (Industry, Innovation & Infrastructure), Goal 12 (Responsible Consumption & Production), Goal 13 (Climate Action) and Goal 15 (Life on Land).

Rwanda has adopted different policies to achieve the mentioned goal(s). The National Green Growth and Climate Resilience Strategy for climate change and low carbon development adopted in 2011 has been followed by the National Urbanization Policy (2015). The National Roadmap for Green Secondary City Development (2015) identifies building and construction as one of the key pillars to achieving green urbanisation in Rwanda. Then, the National Urbanization Policy (2015) and the latter approved Rwanda Green Building Minimum Compliance System (2019). The policies and strategies aim to support good urban development that can enhance local and national economic growth and ensure a good quality of life for all citizens.

Rwanda Green Building Minimum Compliance System

Conceived as simple, effective and environmental performance-oriented regulation, the Rwanda Green Building Minimum Compliance System collects a series of indicators identified to foster, in particular, energy & water efficiency, environmental protection, a better IEQ for the inhabitants and green innovation[7]. The System aims to apply the indicators in the design and

[6]Matamanda A.R., Nel V. (2020) Sustainable Urbanization in Africa: The Critical Enablers and Disablers. In Leal Filho W., Azul A., Brandli L., Özuyar P., Wall T. (eds) *Sustainable Cities and Communities. Encyclopedia of the UN Sustainable Development Goals*. Springer. https://doi.org/10.1007/978-3-319-71061-7_119-1

[7]Republic of Rwanda. (2019b). *Official Gazette n° Special 16/04/2019, Rwanda Green*

construction of the following public buildings:

- Commercial buildings (excluding warehouses and retail shops)
- Public administrative and institutional buildings (excluding correctional services, police, and fire department)
- Social, cultural & assembly buildings
- Health facilities
- Educational buildings (excluding living areas for students)

The approved System that is not yet targeting the residential buildings is composed –as said, of 5 main modules or focus areas. The first one is conceived to improve energy efficiency with particular regard to the orientation given to the building, the overall design, the construction materials used and the choice of equipment. Afterwards, the building has to optimise the water efficiency, which is mainly based on appropriate devices to harvest the rainwater, the installation of water-efficient features and last but not least, the wastewater treatment plant that cuts down potable water use. Then, the named "environmental protection" is more oriented to reducing the building's environmental impact through a contextualised design, adopting good practices and a proper selection of materials to implement the project. Further, the IEQ enhances the fresh outdoor air and thermal and acoustic comfort. The last module – Green Innovation, targets the application of green practices and new technologies that are innovative and have potential environmental benefits.

The Rwanda Green Building Minimum Compliance System counts 29 green building indicators cutting across five modules defined in the draft document and is weighed at 190 points. Each green building indicator is allocated points based on the relative importance of its contribution to green building goals[8] (p. 817). To some extent, the Green Building Minimum Compliance System is a step forward from the results of the so-called Tropical Modernism in Africa.

Tropical Modernism or Tropical International Style refers to a specific period in continental Architecture, identifiable through the application of a series of grammar elements that have been employed since the early decades of the twentieth century mixing Western modernism with the local climatic conditions, a perfect symbiosis and synthesis between the human being, the environment and the traditions. Therefore, green architecture is the updated or modernised version of tropical architecture, especially regarding water efficiency and environmental protection. Furthermore, new technologies in these 60 years have been introduced and have started to be produced locally, avoiding the unsustainable import process.

Building Minimum Compliance System. Republic of Rwanda. https://www.rha.gov.rw/fileadmin/user_upload/documents/General_documents/Laws_of_construction/Green_Building_Minimum_Compliance_System-Official_Gazette.pdf

[8]Republic of Rwanda (2015b). *Rwanda report. Habitat III*. habitat3. http://habitat3.org/documents-and-archive/preparatory-documents/national-reports/

The City as a Project

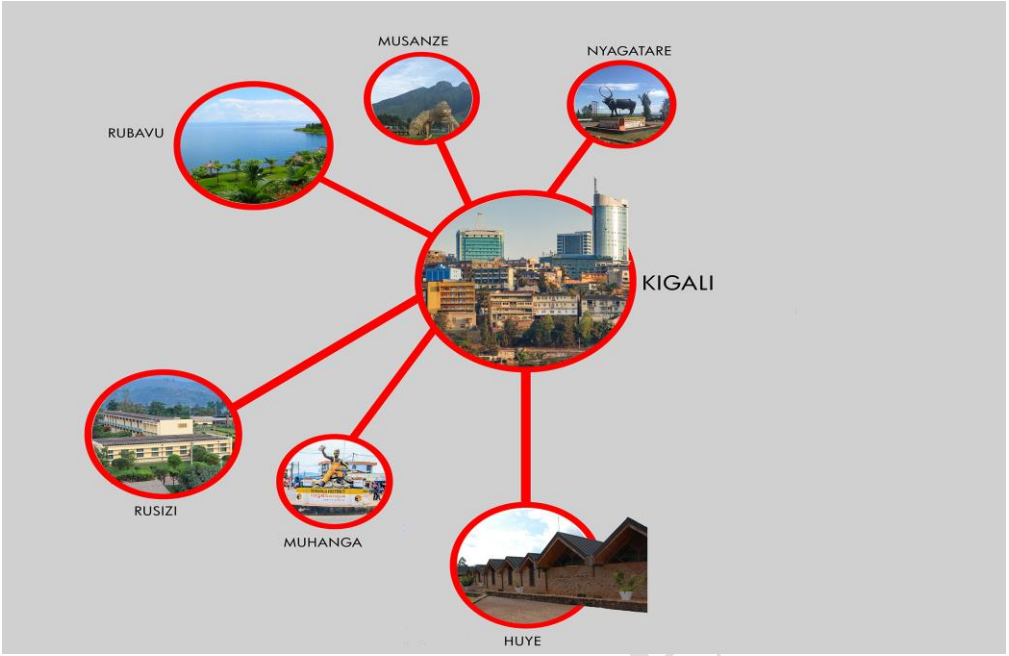
The paper aims to tackle the nature of Kigali's urban future. The starting assumption is to intend the city as an architecture that builds itself over time. Aldo Rossi, in the book *Architecture of the City,* reminds us that the city "is to be understood as architecture. By architecture, we do not only mean the visible image of the town and all its architecture. It's more about architecture in terms of construction. It wants to talk about the structure of the city over time[9]. Therefore, the city built itself over time, a time that is becoming more and more sustainable in the sense of a continuous comparison with its history and its identity towards the future.

The Kigali Master Plan is a comprehensive long-term plan intended to guide the growth and development of Kigali City[10] and, at the same time, provide a road map for future expansion. Kigali's Masterplan from 2013 underlines the principles of sustainable development, and its vision is to make Kigali "The Centre of Urban Excellence in Africa". The Master Plan adopts a structure of a satellite city, with decentralised growth nodes and development meant to intensify along transit corridors mainly directed east and south, with the Central Business District (CBD) being the centre point of the growth. The adopted satellite structure is meant to be extended to the country with six secondary cities (Rubavu, Huye, Rusizi, Muhanga, Musanze and Nyagatare) network around the Rwandan capital (see Figure 2). Therefore, the Country and Kigali have to be intended as parts of a unique plan designed to shape the built and unbuilt environment and as the result of political intention, often in the form of specific architectural projects[11], an accurate compositional strategy triggered from the single cell, the house.

According to Monestiroli, the actual task of the architect consists precisely in interposing reality by structuring it with the intervention of thought and trying to make it intelligible, which means equipping it with architecture" (p. 18)[12]. Therefore, architecture has to regain its fundamental role in shaping the city and paving the urban future. The project of Kigali as a green town begins from a peculiar model of the city, the satellite one, composed of architectural projects the green settlements. The research will analyse the contribution of three main components of the satellite city and three territories to demonstrate the initial thesis.

[9]Rossi A. (1982). *The Architecture of the city*. MIT press.
[10]Republic of Rwanda. (2013). *Kigali Master Plan.* https://bpmis.gov.rw/index.php?id=200016
[11]Aureli, P.V., (2013). *The city as a project*. Ruby Press.
[12]Monestiroli, A., (2004). *L'Architettura della Realtà,* Allemanni.

Figure 2. *The Rwanda satellite structure*



Source: Collage by Manlio Michieletto.

Research Method

The methodology implemented in the paper was split up into two different phases. The first phase includes the comparative analysis of three case studies that exemplify the path towards the vision of Kigali as a green city. It talks about Kigali 2020, Kigali Vision and Green City Kigali, which were studied in their compositional structure and for their effective contribution to the abovementioned vision. The three settlements are part of the Masterplan's idea to design the development of Kigali as a satellite city. Therefore, the selection of case studies that focus on the descriptive nature of the urban concept ensures that the findings are subjected to a comparative process to examine the relationship between the past and the ongoing situation in Rwanda. At the same time, the second phase was conducted by collecting the retrieved elements from the first phase and combining them with the existing policies to establish a road map for future similar projects that are part of the approved Master Plan.

Findings and Discussion

The extremely rapid rate of urbanisation that the African Continent is experiencing has to be seen as an opportunity for green development because cities are the main engines of economic activities. However, the process of growth in population density, socio-economic inequalities and infrastructure-

related problems are stressing the need for sustainable city planning to result in the efficient running of cities[13].

The perspective of achieving the 11th SDG is leading even the Rwandan development of cities and towns; otherwise, the failure in managing the ongoing rapid urbanisation will resolve inevitably in the continued growth of unplanned, poorly executed, chaotic, and unsustainable cities that may be categorised as "slum cities"[14]. The main drivers of urbanisation in Rwanda can be summarised in the factors listed by Rwanda Environment Management Authority: "Natural growth and migration drive urbanisation in Rwanda. Limited land and poverty in rural areas motivate people, especially youth, to move to cities and towns, attracted by the promise of a better life."[15] In Africa as a whole, there is significant cross-country variation, and in South Africa, Rwanda and Namibia, for example, rural to urban migration accounts for more than half of the country's urban population growth."[16]

Kigali over the Time

The physical growth of Kigali began effectively around fifty years ago after its official proclamation as Capital and had been intensifying since 1994[17]. The urban evolution of the Rwandan Capital must be considered in strict relation to the morphological and topographical countryside features and the sprawl of smaller urban centres. The declared intention was to strengthen the existing polycentric territorial situation and, at the same time, to rationalise the propagation of informal settlements. The traditional settlement pattern with families living isolated for cultivation started to change during the colonial era when the first planned communities were introduced, and urban areas evolved from administrative posts.

In 1907, Kigali was the site residence of the doctor by the name of Richard Kandt, who established the first German post and with an estimated population of 357 people located close to the colonial fort called "Boma" in the Swahili language (see Figure 3). After the short Germans colonisation Kigali passed during the Second World War under Belgian control that considered it a peripheral location, privileging Astrida (today called Huye) as the future capital of the new protectorate made by two countries, Rwanda and Burundi, and located in the southern region. The Independence of Rwanda in the 60s pushed the designation of Kigali as Capital City counting about 6,000 inhabitants. The figure-ground of 1940 reveals a city with a central *castrum* where most public buildings and European dwellings were placed (see Figure 4). In 1970, Kigali showed an increased density for the planned and unplanned areas.

[13]Chrysoulakis, N., de Castro, E.A., & Moors, E.J. (2014). *Understanding urban metabolism: A tool for urban planning*. Routledge.
[14]Davis, M. (2006). *Planet of slums*. Verso.
[15]REMA. (2017). *State of Environment and Outlook Report*. Rwanda Environment Management Authority. https://www.rema.gov.rw/soe/
[16]Bello-Schünemann, J., & Aucoin, C. (2016). African urban futures. *Institute for Security Studies*. 1 (1), 1-34. https://issafrica.org/research/papers/african-urban-futures
[17]Smith, K. H., & Berlanda, T. (2018). *Interpreting Kigali, Rwanda*. The University of Arkansas Press.

Figure 3. *Old postcard of the German "Boma" fortress in Kigali*

Source: https://www.delcampe.net/.

Figure 4. *Kigali's grid structure before the Independence, the so called "Plateau"*

Source: Drawing by Manlio Michieletto.

The Government provided in 1982 the so-called Schéma Directeur d'Architecture at d'Urbanisme (SDAU) that was set up under the vision of 20 years of urban development and based on a prevision of reaching half a million

inhabitants by 1995. Anyway, the tragic events in 1994 determined a drastic and rapid fall in terms of the population, reduced at the end of the same year to around 50,000 inhabitants. On the other hand, the National Institute of Statistics of Rwanda reports that the population has grown sensibly in the last two decades, estimating it at 1.2M inhabitants. The demographic explosion brought to retrace and extend the city's administrative boundaries, planning for the first time the urban development through settlements like the ones in the Gasabo district. The project of a Satellite City developed through new settlements ensures that they fit into the overall goal of the Master Plan, thus controlling the growth of the city and assuring that the town shaped itself in such a way that can be recognised by the citizens recalling the scattered nature of Rwandan built environment.

Satellite City Model

The famous diagram of the Three Magnets –coined in 1898 by Ebenezer Howard- proposes-exit towards the promise of fresh air and nature, offering sufficient work and a new social life. Built on the idea of a polycentric Social City, the Garden City of Tomorrow was able to host 32,000 people living on 1,000 acres of land and surrounded by a vast green belt. Once it reached the population limit, another satellite would have been initiated a short distance away, remaining all interconnected by a rapid transit system[18]. Howard's idea of the satellite city is put into practice for the first time by Barry Parker and Raymond Unwin in the design of Letchworth and Hampstead. A young German architect, Ernst May 1906, was working with Unwin on the translation of *Town Planning in Practice*, Unwin's work on urban design theories.

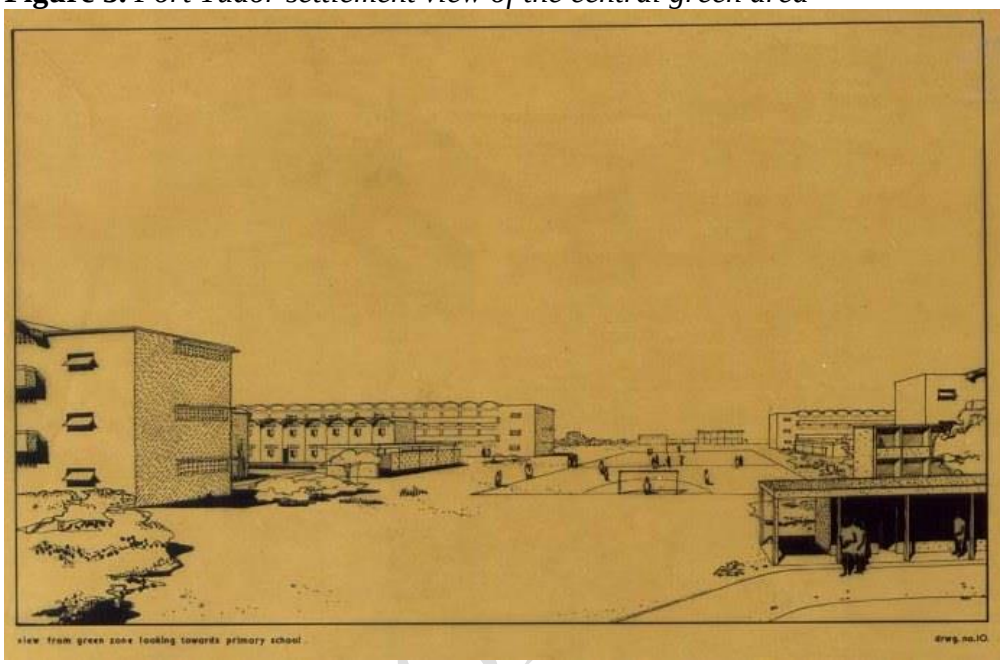
The link between May and the development of the Satellite city in the East African Region is based on his decision to move from Europe before the clash of the second world war by buying a farm in Arusha, Tanzania. Afterwards, May worked for the Uganda Government in the definition of the Kampala Extension Scheme, and in 1945 he signed a contract for the British colonial authorities to conceive a plan for the rapidly growing post-war building market; the program will stand out for its progressive idea to include large settlements for low and middle-income Africans, one of the first in East Africa to do so[19]. The German architect started to design the plan by observing that the existing city was a beautiful garden city. May traced several panels representing the settlements of the overall satellite masterplan. The founding architectural element is the so-called Zielenbau or row house adapted to the tropical context: central axis facing east-west sides; use of local materials; employ of features to enhance the sun protection and the cross ventilation;

[18] Hall, P., (2014). The City of By-Pass Variegated. The Mass Transit Suburb: London, Paris, Berlin, New York, 1900–1940. In Hall, P., *Cities of tomorrow: an intellectual history of urban planning and design since 1880*. Wiley Blackwell.

[19] Gutschow, K.K. (2012). Das Neue Afrika: Ernst May's 1947 Kampala Plan as Cultural Program. In Demissie, F., *Colonial Architecture and Urbanism in Africa: Intertwined and Contested Histories*. Ashgate, 236-268.

flourishing greenery surrounding the dwellings. In 1952, the oil company Shell offered the opportunity to design a settlement in Port Tudor, west of Mombasa in Kenya. Port Tudor was intended as a satellite for workers, characterised by a large standard green zone around which he located different housing typologies (see Figure 5).

Figure 5. *Port Tudor settlement view of the central green area*



Source: Quiring, C., Wolfgang, V., and Cachola Schmal, P., (2011), *Ernst May 1886-1970*. Prestel Gmbh & Co KG.

Analysing these completed projects, the intention of May to introduce some architectural principles typical of the tropics is evident: orientation, wind and ventilation, shading, protection against heat transmission and extensive use of natural lighting. The climatic problem, connected with the composition of the constituent parts of the buildings, gave birth to an identity that must be remembered that simple life forms are the closest to perfection[20]. These features also reveal a green approach or sustainability before sustainability. Around fifty years later, in the same African Region, the City of Kigali is building its urban future following the past traces. Therefore, the rediscovery of Tropical Architecture seems to be the fundamental point to achieving the country's Renaissance towards making cities inclusive, safe, resilient and sustainable.

[20]Dequeker P., Kanene M., (1992). *L'Architecture Tropicale. Théorie et mise en pratique en Afrique tropicale humide*. Centre de Recherches Pédagogiques.

The Three Satellite Settlements

Kigali builds itself and its green future over time. The 21st century has seen the reshaping of the capital city, directing its development through a very peculiar project: the satellite city. The paper focuses on analysing three settlements, Kigali 2020, Kigali Vision and Green City Kigali, that represent the quintessential green urban examples of the Masterplan. All located on the northeast side of the Capital, Kigali 2020 and Kigali Vision are part of the Gacuriro area. Instead, Green City Kigali is a project under realisation on Kinyinya Hill (see Figure 1). In the Satellites, the single cell is articulated in different dwelling types and, jointly with the public facilities, constitutes an entire settlement. The three *Imudugudu* in Kinyarwanda shapes the whole City design. They also seek to address issues related to urban sprawl, poor connectivity, special urban functions, poor allocation of social infrastructure, lack of socioeconomic mix and poor connectivity of movement, infrastructure and ecological networks. These principles ensure that socioeconomic and environmental sustainability is protected and promoted as urban growth occurs through controlled expansion and upgrading/densification of existing and future areas. In addition, enabling a sustainable economy via local production, employment, and consumption is a crucial development area within the Planned City Extension (PCE) principles. All these aspects are strictly connected with the initial assumption of green urban development.

Kigali 2020

Kigali 2020 represents the first compositional element of the satellite city. Located on the Gacuriro hill, the settlement is characterised by the aggregation of 4 different semi-detached housing typologies placed along the contour lines to protect the existing context from invasive site works. The available public facilities – the church and the Schools, build the central green area as the community's main space (see Figure 6). All the edifices are realised using locally produced materials, thus augmenting the environmental protection, such as granite stone for the foundations, fired bricks for masonry, tiled/pitched roof, timber ceiling and other details that guarantee high indoor environmental quality comfort. Moreover, the use of clay increases the thermal mass and, at the same time, decreases energy consumption. The principal elevations of the units follow the north-south orientation while the east-west facades present few and small openings due to the more sun exposure during the day. The typical overhanging roof protects from the north side heat but is not exploited to harvest rainwater, thus reducing the water efficiency. A front and back yard provide each unit with two traditional spaces that enhance the outdoor life and activities. Residents should be able to enjoy the social and economic benefits of urbanisation while minimising ecological footprints (green innovation).

Figure 6. *Figure Captions should be Placed Above the Table*

Source: Photo by Manlio Michieletto.

Kigali Vision

The *Umudugudu* Kigali Vision completes the second phase of the Gacuriro Satellite. It comprises various dwelling typologies: apartment blocks, townhouses and villas (see Figure 7). The 544 units composing the settlement are located in different areas of the hillside, with the highest building at the top and the lowest at the bottom between a narrow green strip that physically connects the east and west parts of the project. Unlike the Kigali 2020 project, where the common facilities located in the middle of the settlement are grouped around a central green cluster, the ones in Kigali Vision are scattered all along the green common area. The whole project is surrounded by a fence, giving it a protected compound nature while rejecting the connection with future urban expansions. The main goal of Kigali Vision is to bid for the modern citizen a modern lifestyle in a safe, quiet and natural environment. Still, despite these premises, its construction reveals some criticality regarding green innovation[21] (Michieletto & Adedayo, 2019). First of all, the design of the houses needs to respect the basic principles of the tropical architecture found in Kigali 2020. The rule of orienting the main facades facing north-south and the shortest east-west dwellings is only sometimes respected and following the slope's contour lines to achieve adequate environmental protection. The

[21]Michieletto, M., Adedayo, O., (2019). African Housing Renaissance: The Case of Gacuriro Valley Satellite Settlements, Kigali, Rwanda. *Urban Planning*, 4 (3), 265-290. http://dx.doi.org/10.17645/up.v4i3.2210

fact of not orienting the buildings correctly affects the indoor environmental quality with an increase in temperature that requires an inevitable increased trend in energy consumption. As seen for Kigali 2020, the Kigali Vision settlement doesn't adopt a harvesting system for rainwater, with the roof not adequately sized to protect the elevations.

Figure 7. *Signpost of one of the housing typologies in the Kigali Vision settlement*

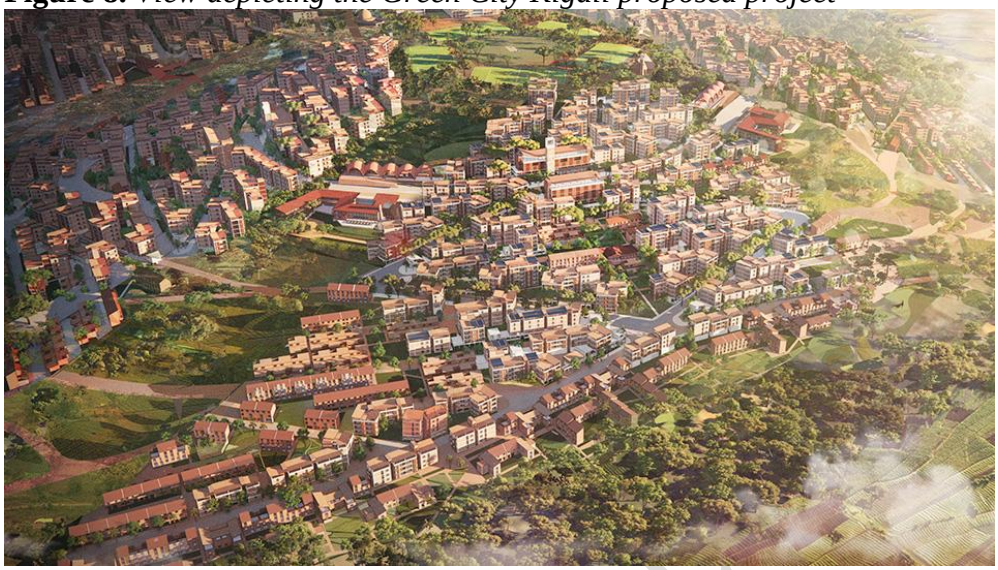
Source: Photo by Manlio Michieletto.

Green City Kigali

Green City Kigali (GCK) is a 600ha project of sustainable community intended to occupy the Kinyinya Hill site (see Figure 1), which will be realised as part of Vision 2050. The Green Vision Kigali project aims to combine social, economic and environmental targets with solid governance to create a liveable and resilient urban community – a shining example of the future sustainable urban community in the East Africa Region. Residents of the updated Kinyinya Hill should enjoy the social and economic benefits of urbanisation while minimising the ecological footprint for environmental protection and optimising green innovation. It will be composed mainly of affordable housing (see Figure 8) linked with climate change adaptation and mitigation measures setting standards for sustainable urban development in Rwanda. The new city will also assist in healthy urban growth, maintaining Kigali's low carbon footprint by using local materials and resources for indoor environmental quality and constructing energy-efficient buildings. Another goal is to promote a sustained and inclusive economic growth cycle for

financial well-being supported by non-vehicular internal and external connectivity.

Figure 8. *View depicting the Green City Kigali proposed project*



Source: https://greencitykigali.org/.

Conclusions

The paper depicted the state of the art regarding the rapid rate of urbanisation that the African continent is experiencing, a phenomenon that, in Rwanda's case, has been tackled following a sustainable and green approach. The achievements envisaged by the 11th SDG and the other related goals focusing on technology, poverty and climate change are engaging the urban agenda and the new Masterplan of Kigali City and the six secondary cities are the foundations for sustainable, inclusive, resilient, and safe urbanisation. The country's vision for 2050 is built on the Green Growth and Climate Resilience Strategy. It is mainly grounded on a developed climate-resilient, low-carbon economy with a strong services sector, low unemployment and poverty levels. All these objectives reflect the orientation given to urban and national development through adopting a precise structure: a polycentric regional plan composed of six secondary cities interconnected with the Capital City, Kigali. Kigali is shaped according to a satellite model already applied in the Region, and green settlements make each satellite. Starting from the assumption that the City builds itself over time, it has been demonstrated that the green future began in the past and is proceeding through a series of architectural interventions: Kigali 2020, Kigali Vision and Green City Kigali. Even though Kigali 2020 reveals more sustainable features than Kigali Vision, the two artefacts represent the Government's commitment to reach the targets of the Agenda 2030. Green City Kigali project collects previous experiences providing guidelines for the following urban developments regarding Housing and Climate Change. New settlements must focus on affordable housing and

how to integrate housing with climate change adaptation and mitigation measures. In conclusion, paraphrasing the words of the Congolese writer Sony Labou Tansi, Kigali will never be New York; each city has its soul, the genius loci that contextualises the global green model to each specific environment.

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