

Design and Planning of a Regenerative Eco-District in Meiganga: an Architectural Approach to Sustainable Urban Development

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Abstract: This study explored the integration of regenerative eco-neighborhood principles into urban design and planning in the context of rapid urbanization and the environmental challenges facing the city of Meiganga. As a rapidly growing town, Meiganga is confronted with urban sprawl, natural resource management issues, and the need to improve the quality of the living environment. Aware of the limitations of conventional urban development models, the research addressed the following question: How can a regenerative eco-neighborhood be designed and planned in Meiganga by integrating the principles of sustainable architecture, promoting local resources, and meeting the present and future needs of the population while contributing to the restoration of the area's ecological and urban balance? The main objective of the study was to develop a regenerative eco-neighborhood model adapted to the local context of Meiganga. The methodology combined a literature review, case studies, and field investigations. Comparative and contextual analyses made it possible to identify the architectural, urban, and environmental principles required for the project design. The findings showed that regenerative eco-neighborhoods are based on three fundamental pillars: ecosystem preservation, sustainable resource management, and the improvement of the living environment. These principles guided the proposed design, which integrates bioclimatic spatial planning, active mobility, green spaces, the use of local materials, and sustainable solutions such as rainwater harvesting, solar energy, natural ventilation, and ecological waste management. The impact assessment revealed significant potential for improving residents' quality of life, creating local employment, protecting the environment, and stimulating the local economy. This research demonstrated the feasibility of developing a regenerative eco-neighborhood that reconciles the requirements of sustainable urban development with the realities of Meiganga, thereby opening new perspectives for resilient and context-sensitive urban planning.

Keywords: *Regenerative Eco-District; Meiganga; Bioclimatic Architecture; Sustainable Urban Planning; Territorial Regeneration; Local Materials.*

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I. INTRODUCTION

Urbanization in African cities is rapidly transforming territories, ways of living, and infrastructure needs. In medium-sized Cameroonian cities, this growth is often accompanied by the gradual expansion of the urban fabric, while facilities, networks, and public spaces do not always keep pace. Meiganga illustrates this situation through progressive urban growth, pressure on land, and diversifying needs for housing and services.

Chapter 3 of the thesis made it possible to move from territorial diagnosis to a concrete spatial proposal. The objective of this article is to present, in a concise scientific

format, the results obtained and their interpretation. The article therefore does not reproduce the research methodology as a whole; it focuses on field findings, identified needs, project choices, and the assessment of their performance.

The article follows a structure close to that of the reference provided: presentation of the context and case study, needs analysis, project process, conceptual approach, architectural and sustainable strategies, performance assessment, economic estimate, impacts, and conclusion. This organization directly connects research findings with architectural and urban decisions.

The project studied covers 100,000 m², or 10 hectares. It is conceived as an urban system in which housing, facilities, mobility, agriculture, green spaces, and resource cycles are interdependent. The regenerative logic adopted therefore seeks to go beyond impact reduction alone and place the neighborhood within a dynamic of local resource valorization and territorial improvement.

II. SITE PRESENTATION AND TERRITORIAL ANALYSIS

➤ Territorial Context of Meiganga

The Adamawa Region, Figure 1, constitutes one of Cameroon's major territorial regions. The Mbéré Division, to

which Meiganga belongs, is characterized by savanna landscapes, agro-pastoral activities, and a strategic position in regional trade. The Municipality of Meiganga Figure 2 is therefore a growing urban center whose development requires better integration between urbanization, rural activities, and natural resources.

At the urban scale, Meiganga's urban fabric has a dispersed structure that extends mainly along major road corridors. This organization reflects a close relationship between urban expansion and agricultural or natural areas. It is both a constraint, because of the dispersion of functions, and an opportunity for new planning capable of controlling urban expansion.

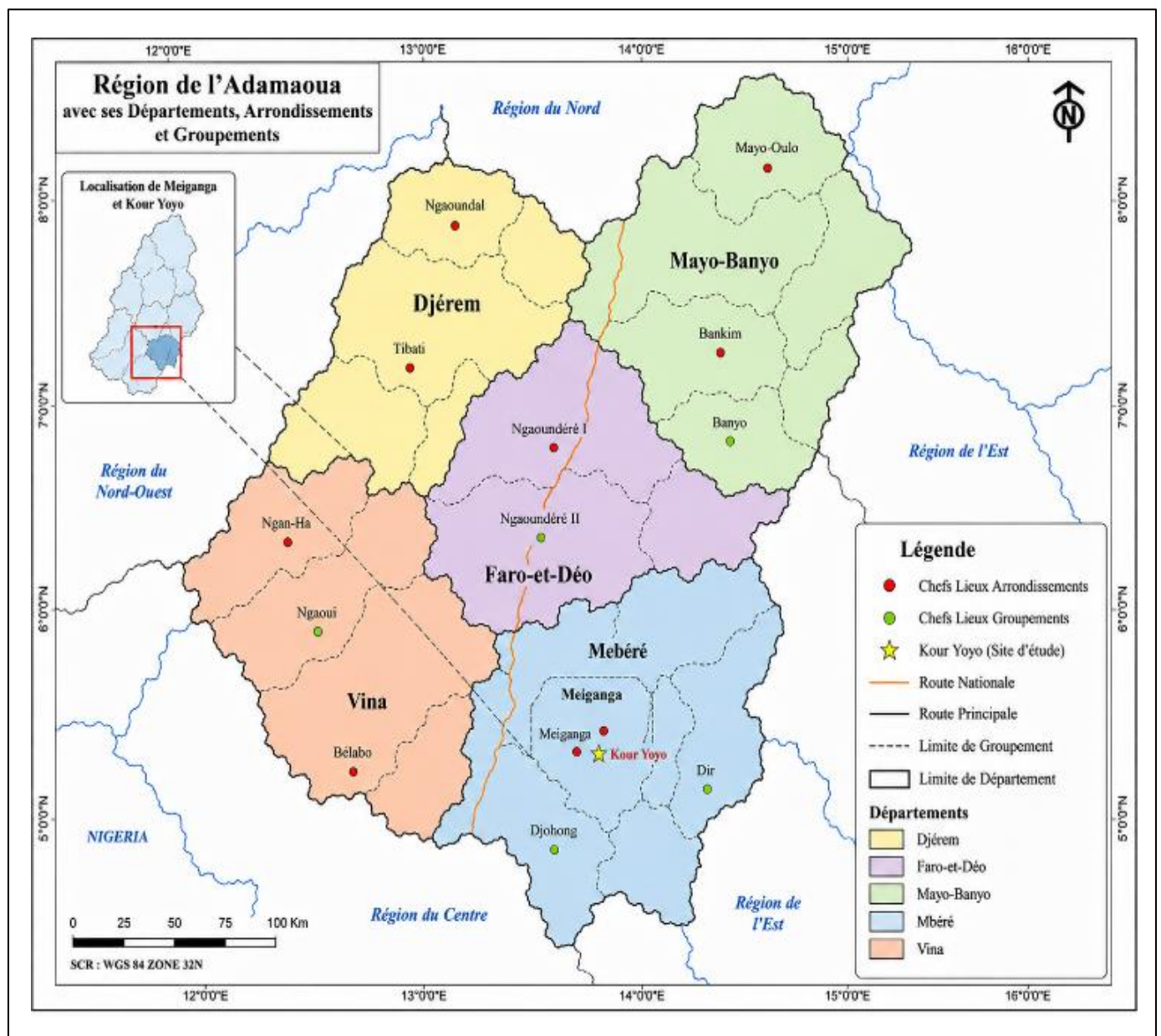


Fig 1 Adamawa Region.

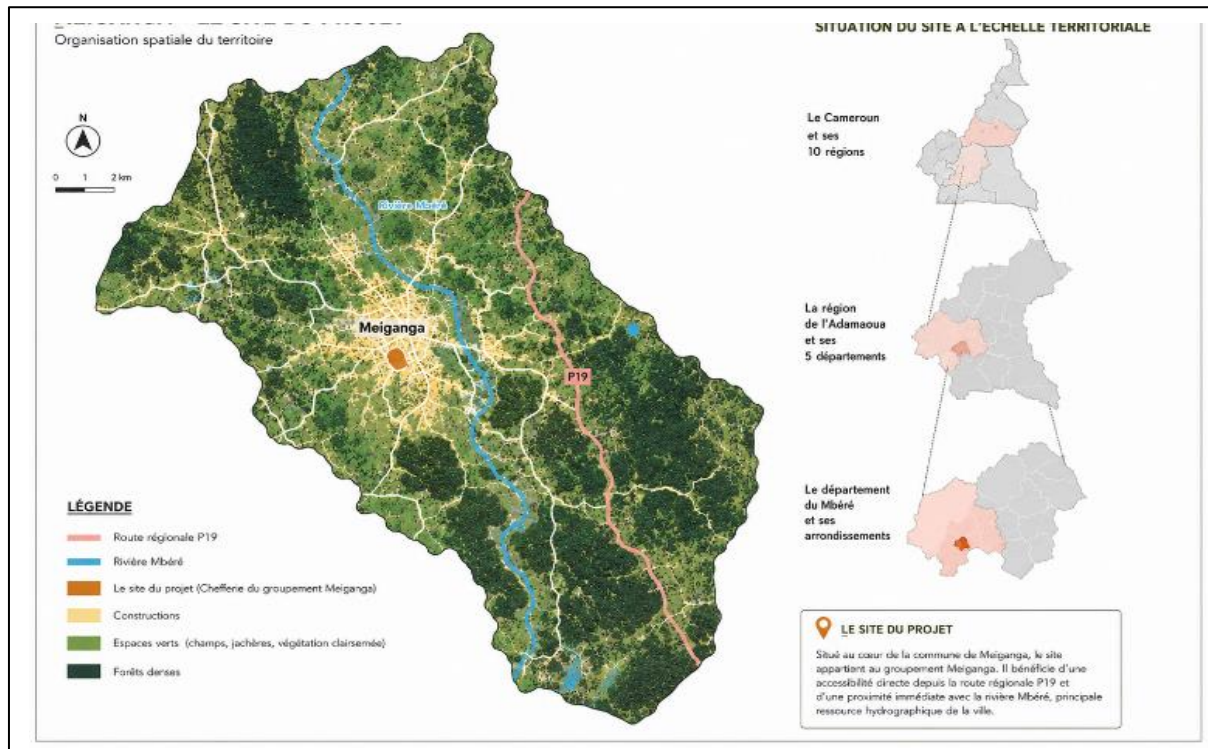


Fig 2 Geographical Location of Meiganga.

➤ Geographical and Climatic Characteristics

Meiganga's territory is characterized by undulating plateaus and gentle hills, Figure 3. Average elevations range from approximately 1,000 to 1,200 meters. Valleys and low-lying areas contribute to drainage patterns and influence land use. Ferruginous and sandy-clayey soils on the slopes, together with hydromorphic soils in low-lying areas, reflect pedological diversity that must be considered when locating buildings and agricultural areas.

The climate is tropical Sudanian. The rainy season generally extends from March to October, while the dry season runs from November to February. Average annual temperatures range between 22 °C and 30 °C. Seasonal winds, with dry flows from the northeast during the dry season and more humid winds from the southwest during the rainy season, are essential considerations for building orientation and natural ventilation Figure 4.

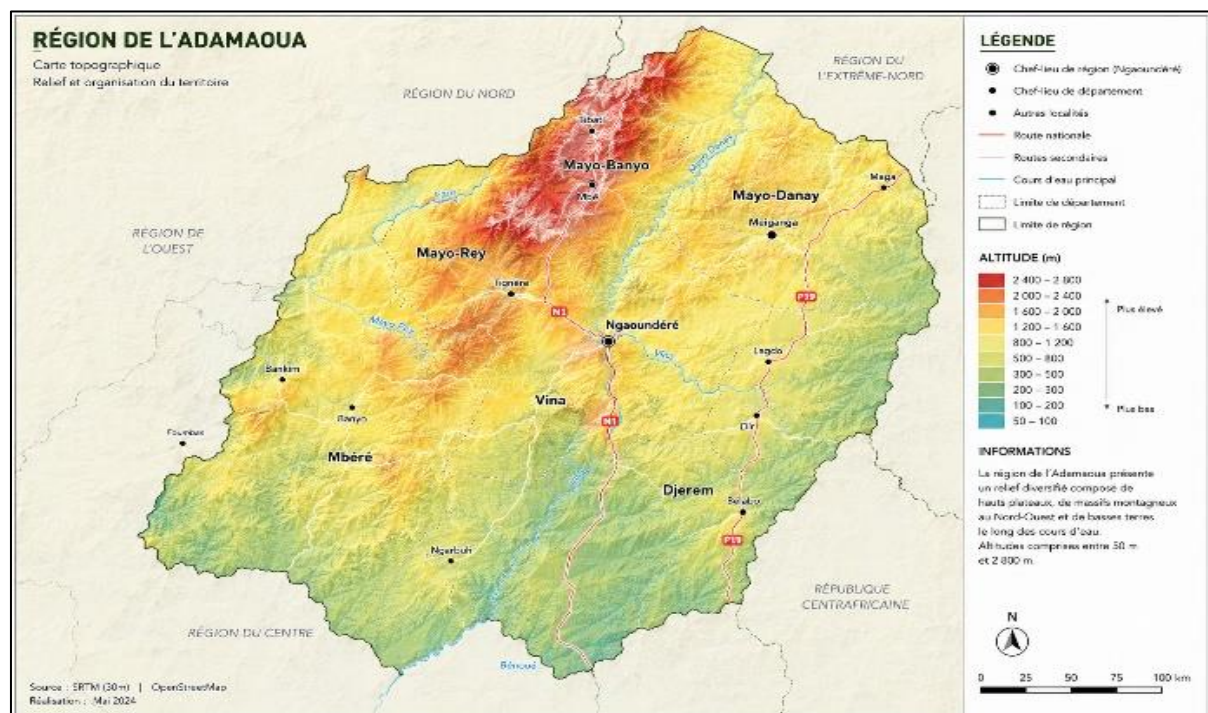


Fig 3 Topographic Map of Meiganga

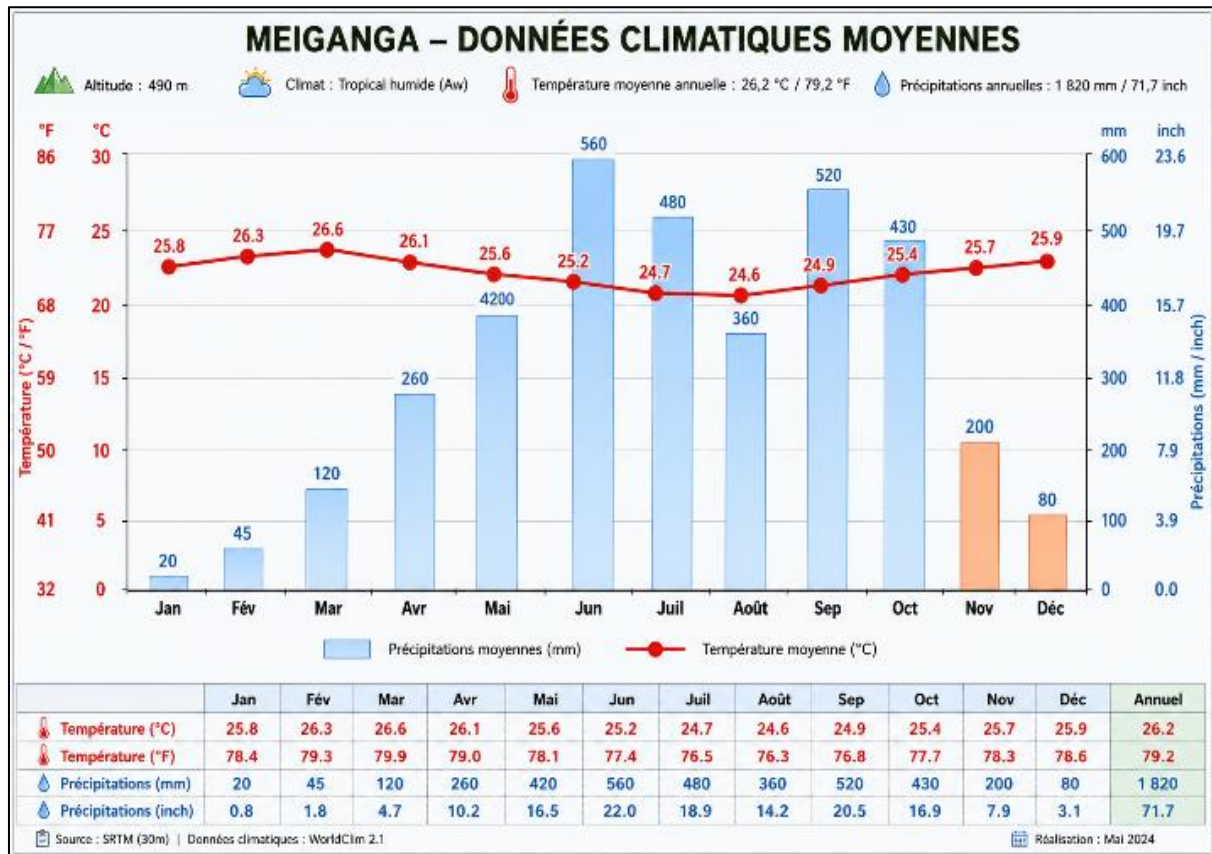


Fig 4 Ombrothermic Diagram of Meiganga.

➤ Territorial Diagnosis

The territorial diagnosis reveals a territory with substantial land reserves, relatively preserved natural areas, favorable solar potential, and local construction resources. These elements constitute the main strengths on which a regenerative eco-district strategy can be based.

Conversely, deficiencies in infrastructure, urban facilities, sanitation networks, and internal access constitute the main constraints. Access may also become more difficult

during the rainy season. The project must therefore address both urban growth and territorial functioning.

➤ Physical and Environmental Condition of the Site

The study site has a gently undulating morphology, with an elevation of approximately 1,020 to 1,080 meters and an average slope of 2–5%. The natural gradient toward the southeast is an important consideration for drainage and the organization of open spaces. Initial vegetation cover is estimated at 50–60% of the area, consisting of wooded savannas and herbaceous formations Figure 5.

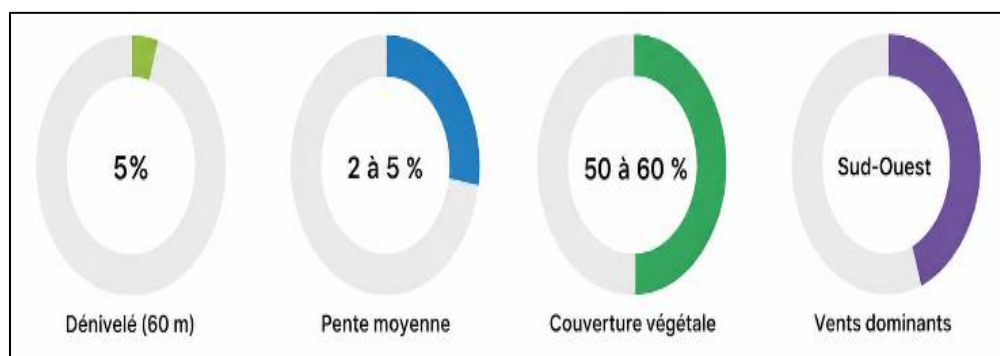


Fig 5 Site Synthesis: Solar Exposure, Topography, Prevailing Winds, and Accessibility.

➤ Site Assessment and SWOT Analysis

The site's current occupation is poorly structured. Buildings mainly consist of scattered dwellings, local shops, and community facilities served by secondary unpaved roads Figure 7. The observed construction techniques combine

stabilized earth bricks, concrete blocks, cement renders, and corrugated metal roofs (Figure 6). Some more recent buildings use reinforced-concrete structures, while vernacular forms retain the use of earth and timber.



Fig 6 Example of Local Construction Observed on the Site.

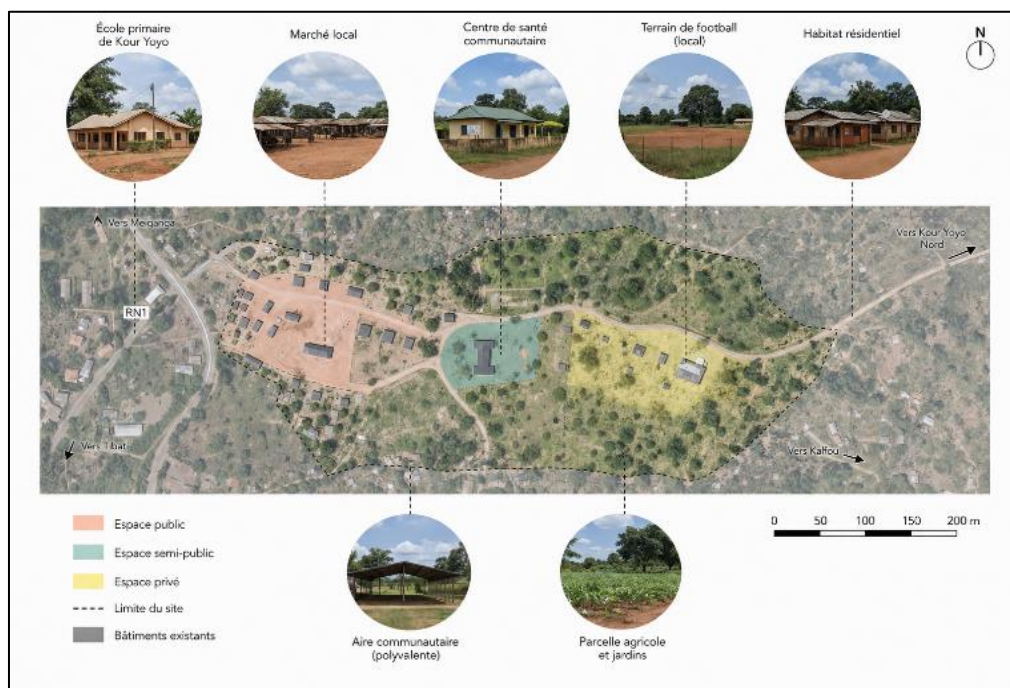


Fig 7 Site Assessment and Existing Land Use.

Table 1 Site SWOT Analysis.

Strengths	Weaknesses	Opportunities	Threats
Large availability of land	Difficult access during the rainy season	Urban growth of Meiganga	Unplanned urbanization
Preserved natural areas	Insufficient potable water supply	Mobilization of local stakeholders	Progressive loss of local know-how
Earth, timber, and other local resources	Low level of facilities	Valorization of local resources	Pressure on resources
Significant solar potential	Variable internal access network	Potential partnerships and funding	Rural exodus and shortage of skilled artisans

➤ Needs Analysis

Surveys, observations, and interviews showed that the site has significant development potential but suffers from insufficient urban organization and facilities. The identified needs therefore concern not only housing, but also economic activities, services, mobility, public spaces, and environmental management.

• Existing Conditions and Needs

Current land use combines dispersed housing, family agricultural plots, and local facilities. This structure reflects an urban area in transition. Interviewed residents and local

stakeholders identify land availability and the presence of green spaces as opportunities, while also pointing to inadequate developed roads, sanitation networks, potable water, and community facilities.

• Required Functions for the Future Neighborhood

The analysis leads to structuring the program around five major functional groups: residential; economic and productive; community and social; environmental; mobility and infrastructure. This organization reflects an intention to move away from a strict separation of uses and bring everyday functions closer together, Figure 8.

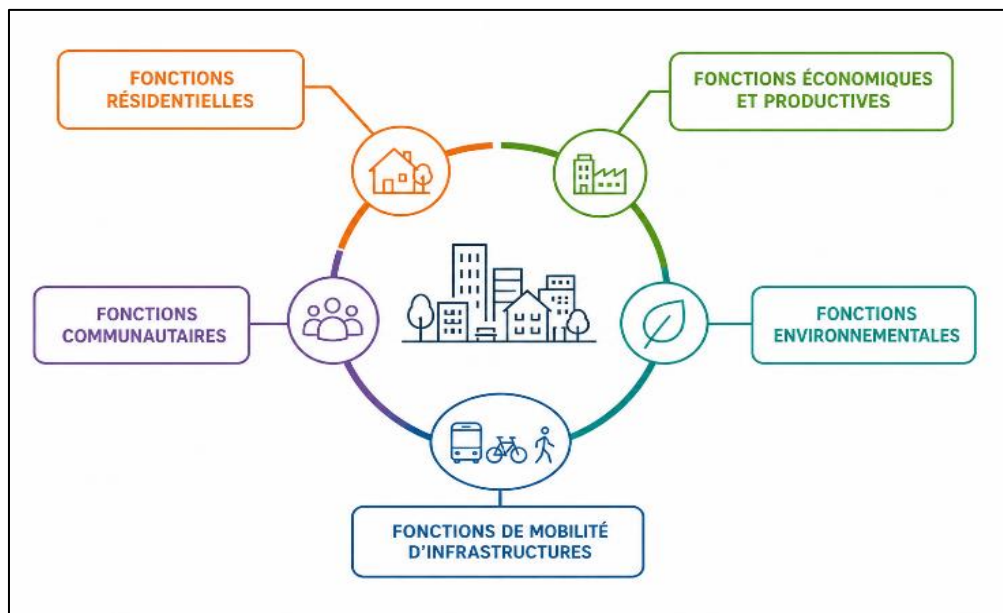


Fig 8 Functions of the Regenerative Neighborhood.

✓ Residential Function

The residential function must provide diversified housing adapted to different household categories and designed according to bioclimatic principles. Individual and collective housing thus constitute two complementary components of the neighborhood.

✓ Economic and Productive Functions

Shops, the market, the supermarket, urban agriculture, and craft activities contribute to the neighborhood's economic autonomy. Their proximity reduces travel and creates local employment opportunities.

✓ Community and Social Functions

The school, hospital, places of worship, and collective spaces strengthen social capital and service proximity. They are distributed to contribute to the neighborhood's centrality.

✓ Environmental Functions

Green spaces, ecological corridors, water-management systems, and waste-recovery facilities are considered infrastructure in their own right. They contribute to microclimate regulation, infiltration, and biodiversity.

✓ Mobility and Infrastructure

Mobility must connect peripheral vehicular access with active travel within the neighborhood. Water, energy, and sanitation networks must be integrated into the spatial system rather than treated as secondary infrastructure.

➤ Territorial Identity and Principles From the Comparative Analysis

The identity of the site rests on three sets of elements: the natural landscape, community spaces, and local construction know-how. Wooded savannas, groves, and agricultural areas form landscape landmarks; the market, community facilities, and sports ground's structure collective life; stabilized earth, timber, and other local materials express a construction identity adapted to the territory.

Comparative analysis of the references highlighted three structuring principles transferable to the Meiganga context: ecological integration, functional and social mix, and climate resilience combined with local autonomy. These principles were used not as formal models to reproduce, but as criteria for contextual adaptation, Figure 9.

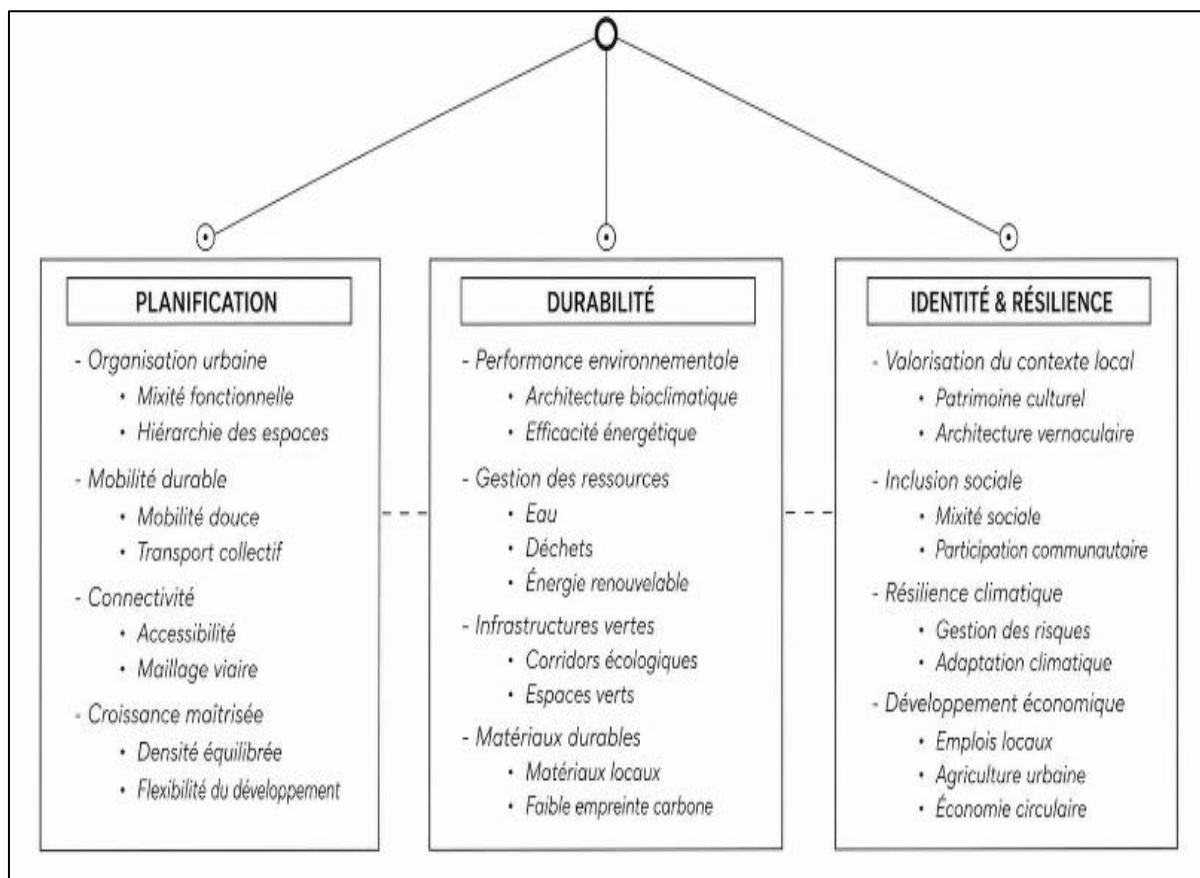


Fig 9 Design Principles of a Regenerative Eco-District. Source: Master's Thesis, author, 2026.

➤ *Présentation Du Projet Et Programme*

The regenerative eco-district project covers an area of 10 hectares, or 100,000 m². It accommodates 115 housing units, divided into 54 collective housing units and 61

individual housing units, in addition to facilities and productive spaces. The spatial organization aims to bring essential functions closer together and limit motorized travel within the neighborhood.

Table 2 Architectural Program.

Component	Description	Reference Area
Collective Housing	54 T2 and T3 apartments in G+2, with patio and natural ventilation	T2: 68 m ² ; T3: 136 m ²
Individual Housing	61 T1 to T4 villas with passive design features	T1: 30 m ² ; T2: 70 m ² ; T3: 100 m ² ; T4: 190 m ²
Church	Place of worship and community gathering	120 m ²
Mosque	Bioclimatic place of worship	120 m ²
School	Primary and nursery school	900 m ²
Hospital	Local healthcare facility	1 000 m ²
Supermarket	Daily supplies	500 m ²
Local Market	Exchange and valorization of local production	800 m ²

• *Urban Program and Subdivision*

The zoning defines the distribution of functions while considering mixed uses, accessibility, sustainable mobility,

and protection of natural areas. Residential plots are organized into blocks and vary in size from 200 to 700 m². This diversity allows several housing typologies and enables density to be adapted to the site structure, Table 3.

Table 3 Different Zones and Their Surface Areas.

LOGEMENT INDIVIDUEL		13 435 m ²
LOGEMENT COLLECTIF		6 675 m ²
PARC MUTUALISE		3 551 m ²
HOPITAL		4 718 m ²
ESPACE VENTE		2 529 m ²
ECOLE		4 632 m ²
ESPACE JEU		2 639 m ²
ESPACE PARTAGE AGRICOL		2 744 m ²
FERME		3 532 m ²
EGLISE		1 280 m ²
MOSQUE		700 m ²

III. CONCEPTUAL APPROACH: THE “SEED OF LIFE”

The “Seed of Life” is the project’s generative concept. It symbolizes birth, growth, interconnection, and regeneration. In the project, this metaphor makes it possible to conceive the neighborhood as an organism composed of interdependent parts: housing, facilities, green spaces, agriculture, networks, and public spaces.

The concept is therefore less a simple formal reference than an organizational principle. The different components of the neighborhood are connected by pathways, landscaped spaces, and environmental systems. Neighborhood growth is conceived as progressive and controlled, while natural areas form a permanent framework, Figure 10.

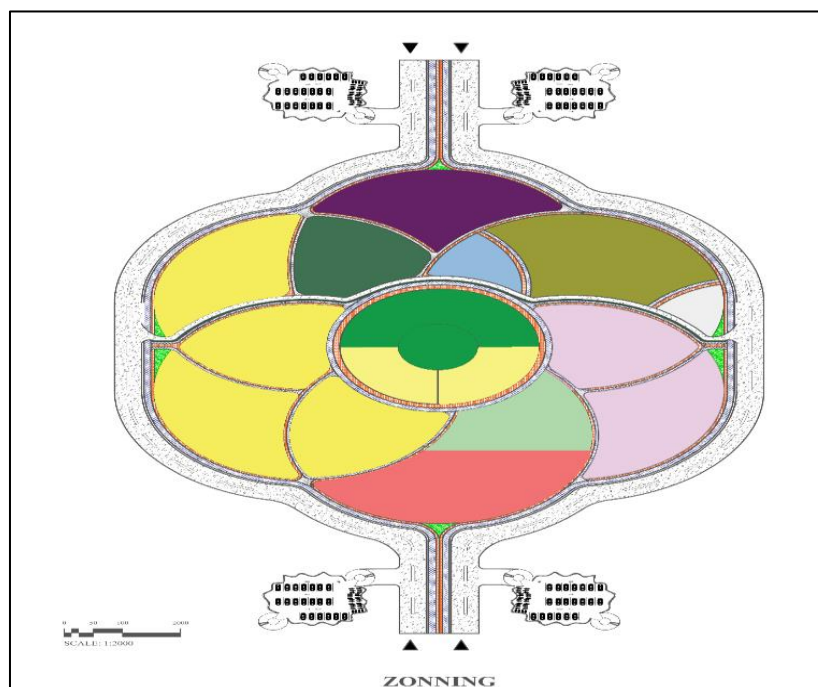


Fig 10 Development of the Architectural Concept: the “Seed of Life”.

➤ *Cameroonian Vernacular Inspiration*

Cameroonian vernacular architecture provides a second level of reference. Simple forms, earth, timber, natural textures, and ventilation principles are reinterpreted through

a contemporary architectural language. This approach combines local identity, climatic comfort, and reduced environmental impact, Figure 11.



Fig 11 Architectural Elements and Vernacular References.

➤ *Architectural and Urban Approach*

• *Spatial Organization*

The spatial organization is based on a hierarchy of residential, commercial, community, recreational, and ecological functions. Structuring public spaces provide

connections between these components. Transitions between public and private spaces are progressively designed to preserve conviviality, safety, and privacy, Figure 12.

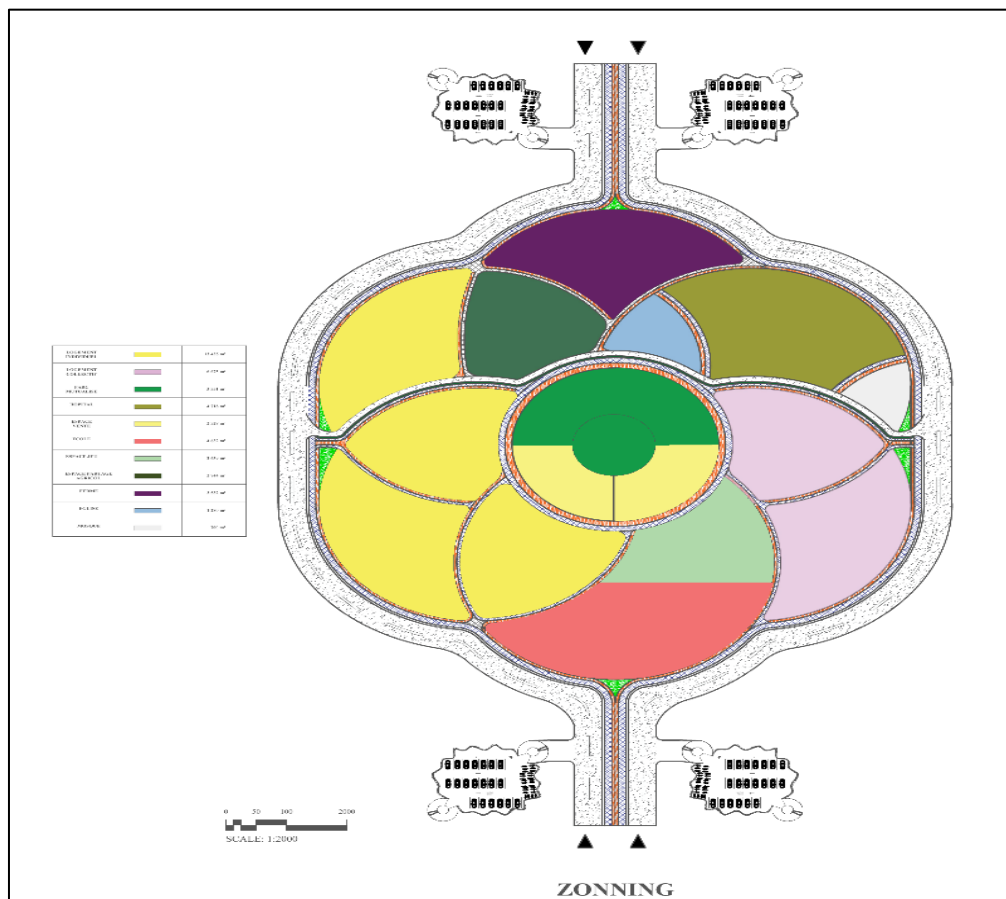


Fig 12 Spatial Organization Du Quartier.

- *Sustainable Mobility*

Mobility, Figure 14 is organized according to a clear hierarchy. At the periphery, a 1.50 m pedestrian path, a 3.00

m cycle lane, and a 1.50 m planted strip accompany a 12.00 m vehicular road. This separation improves safety and allows the neighborhood core to be reserved for active travel Figure 13.

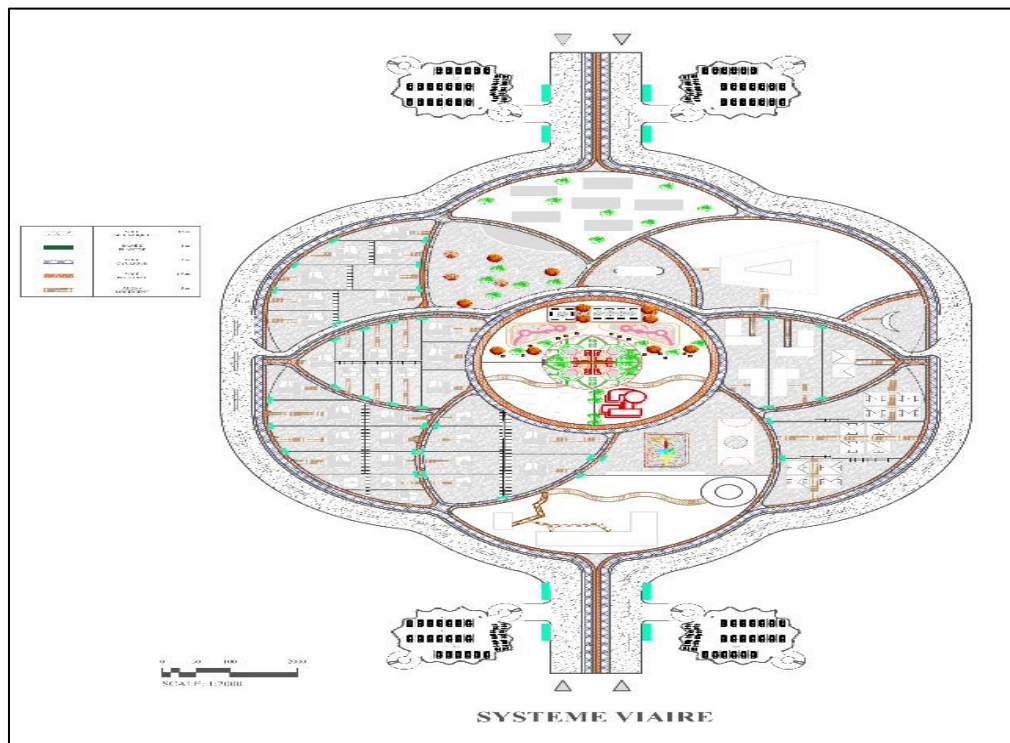


Fig 13 Hierarchical Road Network.

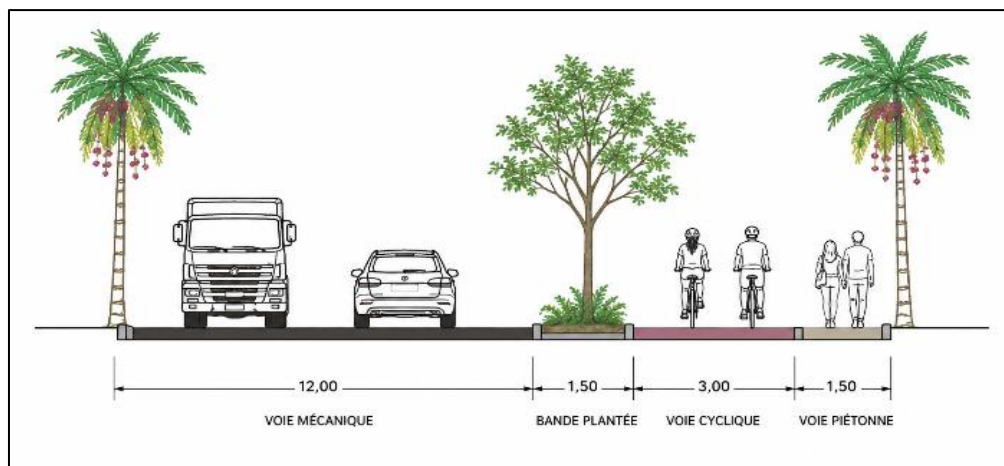


Fig 14 Bypass Road and Separation of Mobility Modes.

- *Mobility Within the Neighborhood*

Within the neighborhood, the pedestrian and cycling network directly connects housing, facilities, green spaces, and economic activities. Pathways are designed to allow users to pass each other and to accommodate people with reduced mobility. This organization promotes walking and cycling as everyday modes of transport, Figure 15.



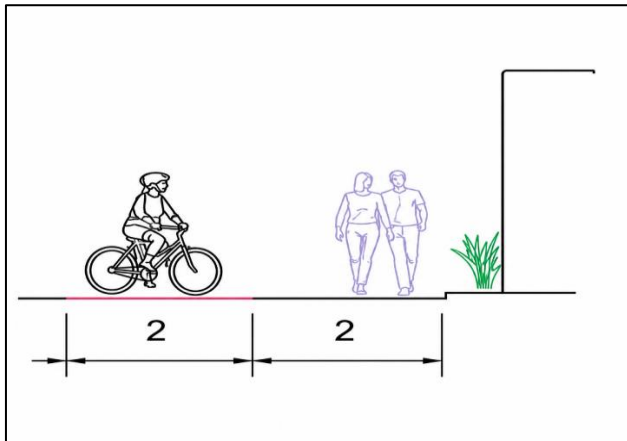


Fig 15 Active Mobility Network Within the Neighborhood.

- *Peripheral Parking*

Automobile parking is concentrated at the ends of the site. The planned total capacity is 144 vehicles. A loop road around the parking areas facilitates maneuvering and access while avoiding excessive car penetration into the neighborhood core. Bicycle parking is also provided near housing and main entrances, Figure 16.



Fig 16 Organization of Peripheral Parking.

- *Ecological System and Sensory Comfort*

Parks, community gardens, ecological corridors, and relaxation areas are distributed throughout the neighborhood. They function both as social spaces and ecological infrastructure. Sensory comfort is enhanced through vegetation, views, natural light, ventilation, and control of noise disturbance.

- *Sustainable Design Strategies*

- *Soil Management and Built Footprint*

The project limits soil sealing in order to retain a significant portion of the site for green, agricultural, and public spaces, Figure 18. This decision maintains permeable surfaces, promotes rainwater infiltration, and preserves ecological continuity, Figure 17.

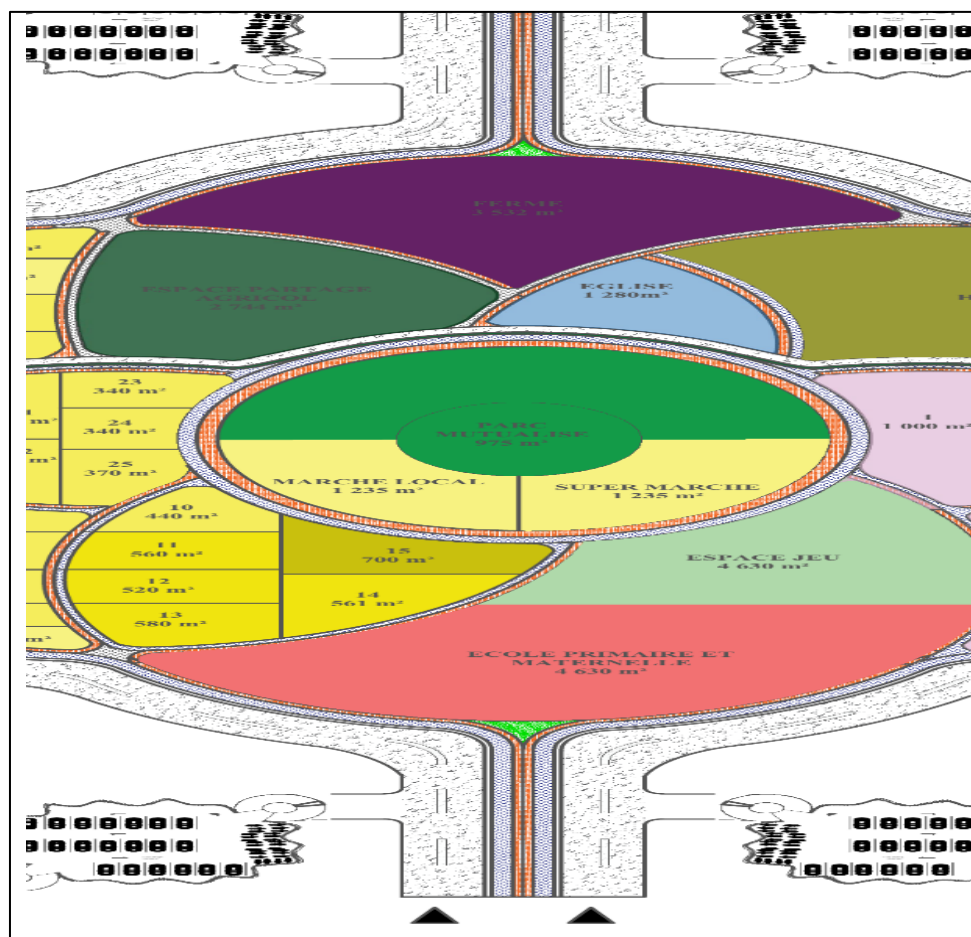


Fig 17 Material and Architectural Expression Mood Board.

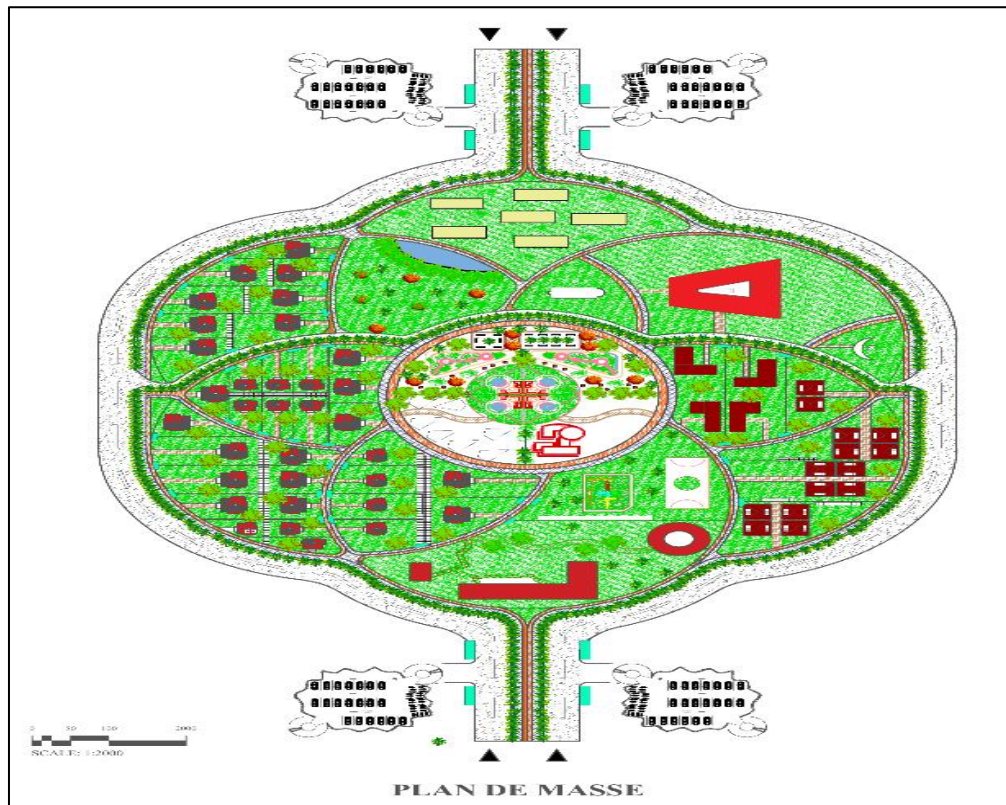


Fig 18 Site Plan and Balance between Built and Open Spaces.

- *Orientation and Site Layout*

Building placement takes into account solar exposure, prevailing winds, and topography. Block morphology is

organized to promote natural ventilation, limit undesirable heat gains, and create shaded areas in outdoor spaces, Figure 19.

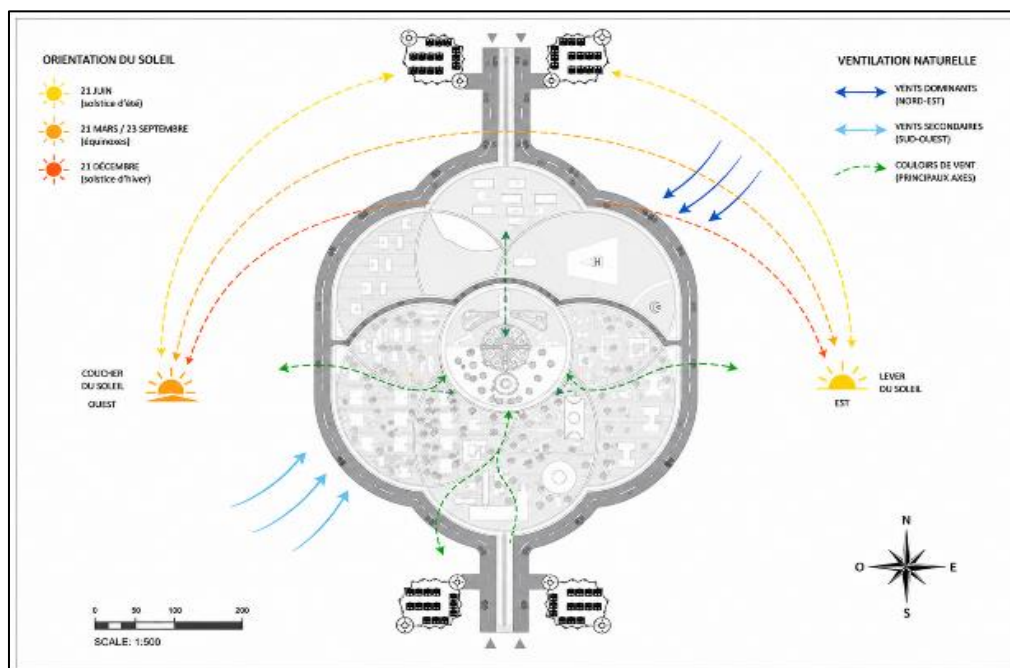


Fig 19 Neighborhood Ventilation and Solar Exposure.

- *Natural Lighting and Ventilation*

Buildings are designed to promote cross-ventilation and natural lighting. Openings, patios, courtyards, sun-shading devices, and landscaped spaces help reduce the need for air

conditioning and artificial lighting. This strategy is particularly relevant in Meiganga's climatic context, where airflows and shading can be used as passive resources, Figure 20.

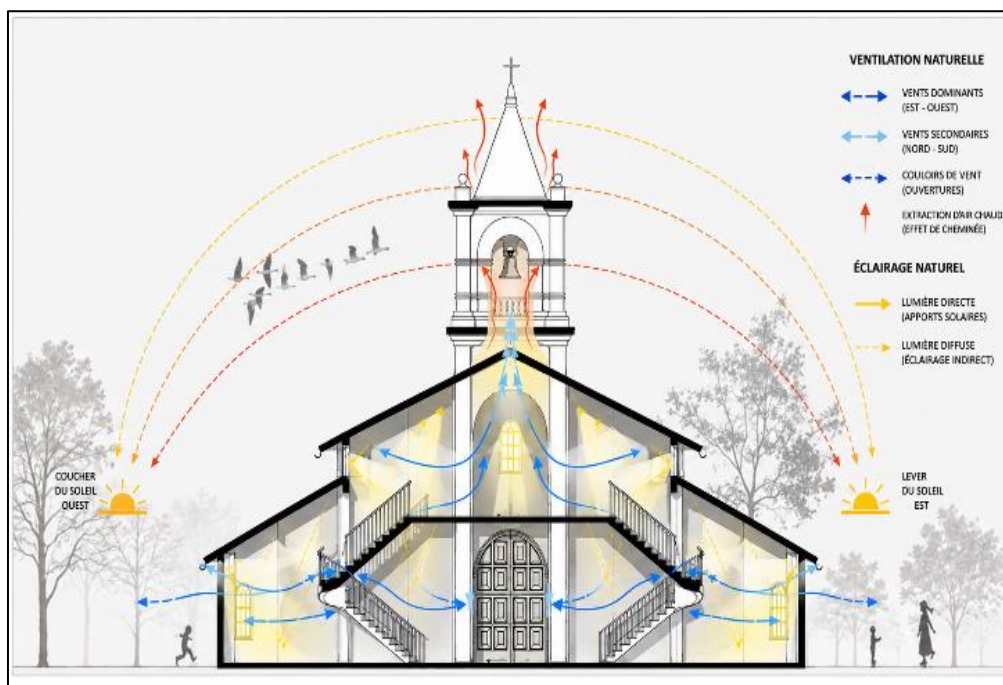


Fig 20 Natural Lighting and Ventilation Dans Un Equipement Du Projet.

- *Local and Sustainable Materials*

Stabilized earth, local stone, timber, bamboo, and other renewable resources are prioritized. Their use reduces transport distances, supports regional know-how, and improves thermal performance. Materials thus become an element of both the environmental strategy and the architectural identity, Figure 21.



Fig 21 Materials Used in the Place of Worship.

➤ *Integration of Regenerative Strategies*

The regenerative design adopted is based on a net-positive contribution logic. The neighborhood should not merely reduce its impacts; it should progressively improve the ecological, productive, and social conditions of the territory. A structuring rule is adopted: the major components of the neighborhood must be multifunctional and contribute to several objectives simultaneously.

- *Positive Energy and Bioclimatic Design*

Buildings combine bioclimatic design and photovoltaic production. The objective is to reduce energy needs, cover

part of consumption, and enable surplus sharing at neighborhood scale. Passive design is the first step, with solar production subsequently complementing remaining needs, Figure 22.



Fig 22 Energy System with Rooftop Photovoltaic Panels.

- *Low-Embodied-Energy Materials*

Raw earth, bamboo, and local stone are integrated into the strategy for reducing impacts associated with material transport and manufacturing. This approach combines environmental performance, the local economy, and architectural identity.

- *Closed-Loop Waste Management*

Organic waste is directed to composting and then returned to soils and urban agriculture. Materials from construction or deconstruction can be reused or recovered. The neighborhood therefore seeks to transform waste into local resources rather than maintain a linear produce–consume–discard system, Figure 23.

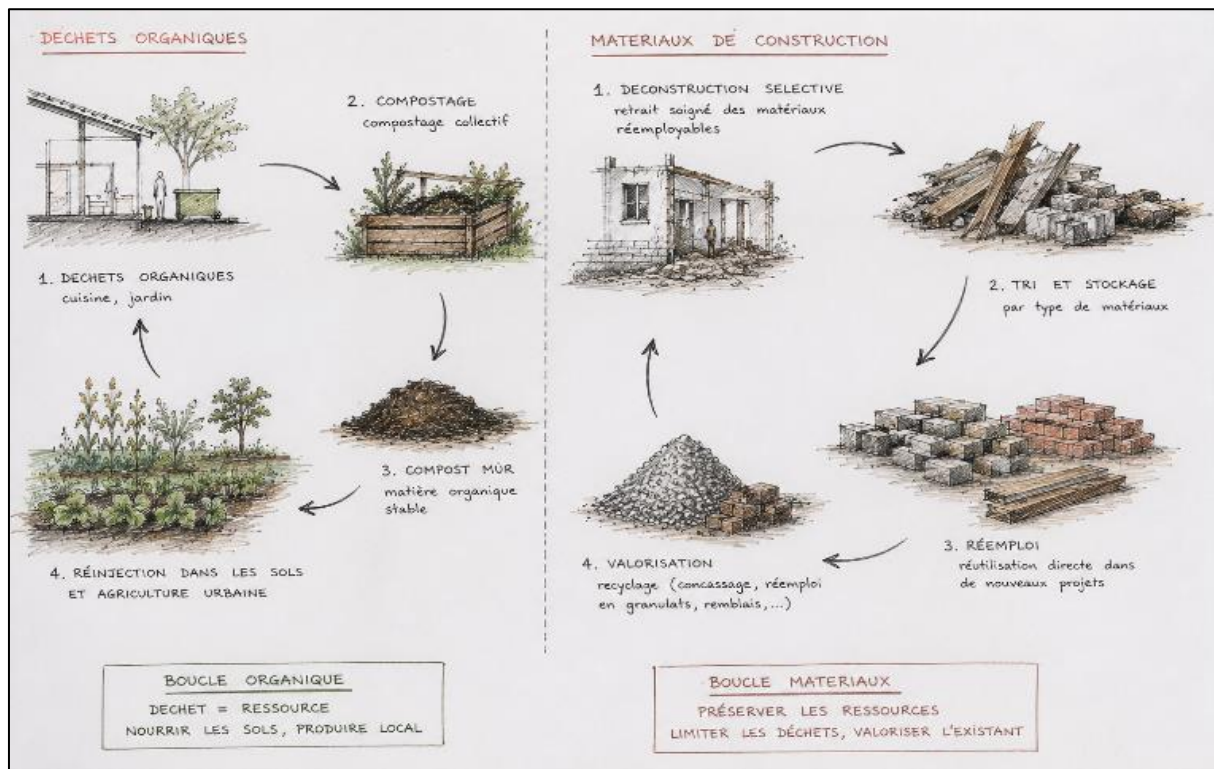


Fig 23 Waste Management and Resource Recovery System.

• Regenerative Water Management

Each plot is considered a regenerative water unit. Rainwater is collected, pre-treated, filtered, stored, and reused for non-potable purposes. Wastewater is directed to natural treatment through phytoremediation before reuse or infiltration. This organization aims to slow the water cycle and promote soil recharge.

Given the seasonal variability of rainfall, rainwater harvesting cannot, however, constitute a permanent source of supply. A supplementary supply from the existing water network is therefore planned to ensure continuity of service, Figure 24.

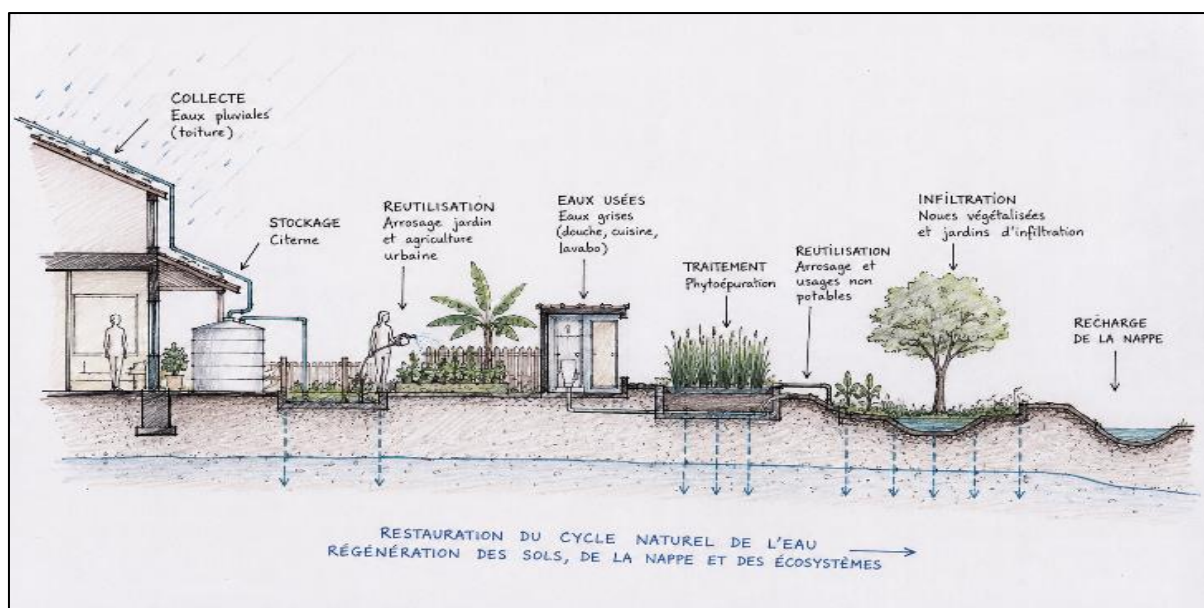


Fig 24 Regenerative Water Management System.

• Biodiversity and Urban Agriculture

Conservation of existing vegetation is complemented by planting local species, creating ecological corridors, and developing multifunctional green spaces. At the housing

scale, 60% of individual plots are reserved for green spaces, including 20% for urban agriculture. For collective housing, 40% of plots are devoted to green spaces, including 10% for urban agriculture, Figure 25.



Fig 25 Shared Park and Ecological Continuity.

IV. PROJECT PERFORMANCE ASSESSMENT

The assessment verifies the consistency between the initial objectives, site constraints, and proposed solutions. It is structured around five criteria: energy, water, mobility, biodiversity, and comfort, Table 4.

Table 4 Performance Assessment Summary.

Criterion	Project Result	Interpretation
Energy	Bioclimatisme + photovoltaïque	Reduced demand and local production potential
Water	Collecte, stockage, réutilisation, infiltration	Improved management of the local hydrological cycle
Mobility	Pedestrian/Cycle Network + Nearby Facilities	Reduced dependence on automobiles
Biodiversity	≈ 40 000 m ² d'espaces verts/agricoles	Maintenance and strengthening of ecological continuity
Comfort	Natural Ventilation + Solar Shading + Vegetation	Improved thermal and sensory comfort

Table 5 Performance Assessment in Relation to the Spaces and Surfaces.

System	Condition / Data	Project	Calculated Result
Water	100 000 m ² ; 1 820 mm/an	Collecte + stockage + infiltration	≈ 182 000 m ³ /an de potentiel pluviométrique brut
Soil	Couverture végétale initiale ≈ 50–60 %	16 895,5 m ² bâtis	16,90 % bâti ; 83,10 % non bâti
Biodiversity	Savanna, Groves, Agriculture	Park + Corridors + Local Species	≈ 40 000 m ² verts/agricoles
Agriculture	Parcelles familiales	Ferme + champs + jardins	20 % individuel ; 10 % collectif
Mobility	Voiries insuffisantes	Piéton 1,50 m + vélo 3,00 m	144 places périphériques

➤ Performance Interpretation

The first significant result concerns the built footprint. With 16.90% of the site built upon, the project retains 83.10% of unbuilt surfaces. This configuration maintains a strong presence of natural soil, green spaces, agricultural areas, and water-management systems.

The second result concerns water potential. Based on average rainfall of 1,820 mm/year and an area of 100,000 m², gross rainfall potential is estimated at approximately 182,000 m³/year. This value represents a theoretical potential before losses, first-flush effects, evaporation, and storage limitations; nevertheless, it supports the relevance of integrated water management.

The third result concerns mobility. The combination of a continuous active-mobility network, local facilities, and

peripheral parking makes it possible to limit automobile travel in the neighborhood core. The strategy does not eliminate cars but changes their role in the spatial organization.

Finally, biodiversity is integrated into the very structure of the neighborhood. The shared park, corridors, gardens, and agricultural areas are not residual spaces; they form continuous ecological and social infrastructure.

➤ Summary Cost Estimate

The economic estimate was prepared using references from the National Order of Architects of Cameroon and the average costs adopted for facilities and housing. The project includes 16,895.5 m² of built floor area, in addition to roads and utilities, parking, external works, studies, and contingencies.

Table 6 Cost Estimate

Component	Total Area (m ²)	Unit Cost	Estimated Amount (FCFA)
Collective Housing	5 508	400 000	2 203 200 000
Individual Housing	5 947,5	300 000	1 784 250 000
Church	120	300 000	36 000 000
Mosque	120	300 000	36 000 000
School	900	300 000	270 000 000
Hospital	1 000	400 000	400 000 000
Supermarket	500	300 000	150 000 000
Local Market	800	200 000	160 000 000
Built Subtotal	16 895,5	—	5 139 450 000

Roads and Utilities + Parking + External Works	—	30 % du bâti	1 541 835 000
Studies and Project Management	—	10 % du bâti	513 945 000
Contingencies	—	5 % du bâti	256 972 500
TOTAL	—	—	7 452 202 500

The overall projected cost of FCFA 7,452,202,500 should be considered an order of magnitude for assessing the project's economic feasibility. It is not a final estimate and will need to be updated during subsequent technical study phases.

V. PROJECT IMPACT ASSESSMENT

➤ Socio-Economic Impact

The expected socio-economic impact is generally positive. The project improves access to housing, facilities, and public spaces. The proximity of the school, hospital, market, shops, and recreational areas reduces the travel required for everyday needs.

Construction, maintenance, and operation of the neighborhood can generate employment in construction, facilities, urban agriculture, commerce, and services. The involvement of local artisans and producers also contributes to skills development and the growth of local value chains.

➤ Environmental Impact

The environmental impact is predominantly positive due to the conservation of green spaces, integrated water management, use of local materials, bioclimatic design, and solar production. Reducing the built footprint preserves a large portion of the natural soil.

➤ Summary of Impacts

Dimension	Main Positive Effects	Points Requiring Attention
Socio-économique	Employment, local services, social cohesion	Management capacity and ownership
Environmental	Biodiversity, water, vegetation, solar energy	Pressure on resources and construction waste
Economic	Commerce, agriculture, land value enhancement	Significant initial investment
Architectural	Local identity, bioclimatic design, local materials	Maintaining construction quality over time

➤ Architectural and Urban Reading of the Project

Reading the project at the urban scale reveals an articulation between built spaces, open spaces, and mobility networks. The overall composition is not based on a juxtaposition of objects, but on spatial continuity in which facilities, housing, agricultural areas, and green spaces participate in a single structure.

This organization gives the neighborhood the capacity to evolve. Open spaces can accommodate collective, productive, or ecological uses according to needs. Peripheral access limits conflicts between motorized traffic and local life, while the active network crosses the neighborhood's main sequences, Figure 26.

Potential negative effects remain: partial transformation of natural and agricultural areas, possible pressure on water and soils if urbanization is poorly managed, and waste generation during construction. These impacts require monitoring mechanisms and rigorous management during implementation and operation.

➤ Economic Impact

The project can stimulate the local economy through the creation of the market, supermarket, farm, and agricultural areas. It also supports the gradual enhancement of land value in the area and improvement of local infrastructure. Productive activities within the neighborhood reduce some of the expenses and travel associated with access to services.

➤ Architectural Impact

Architecturally, the project proposes a synthesis between local construction know-how and contemporary principles of sustainable architecture. Stabilized earth, stone, timber, and bamboo are used both as construction resources and as supports for a contextualized architectural identity.

The project also constitutes a demonstrative model that could inspire other developments in medium-sized Cameroonian cities, provided that the principles are reinterpreted according to the specific characteristics of each territory.



Fig 26 Shared Park and Public Space of the Project.

➤ Architectural Expression and Neighborhood Identity

The architectural expression derives from the combination of the “Seed of Life,” vernacular references, and bioclimatic strategies. Forms and materials are not used merely as identity decoration; they contribute to solar protection, ventilation, thermal inertia, and landscape integration.

The project views also help illustrate the relationship between buildings and public spaces. Vegetation structures perspectives, accompanies pathways, and contributes to the perception of a neighborhood in which the landscape is a fully integrated architectural component Figure 27.



Fig 27 Architectural View of the Regenerative Eco-District Project.



Fig 28 Architectural and Landscape Atmosphere of the Neighborhood.

➤ Integrated System: From Building to Territory

One of the essential characteristics of the project is the relationship between the different design scales. At building scale, bioclimatic design reduces energy needs. At plot scale, vegetation, agriculture, and water management help maintain local cycles. At neighborhood scale, green networks, mobility systems, and facilities connect these systems.

This organization confirms the systemic character of the regenerative approach. The neighborhood is conceived as a set of flows rather than an addition of buildings. Water,

energy, waste, materials, people, and agricultural production are considered flows that can be better managed and, where possible, transformed into resources, Figure 29.



Fig 29 Neighborhood Atmosphere and Relationship Between Built Form, Landscape, and Public Space.



Fig 30 Architectural and Landscape Sequence of the Project.

VI. LIMITATIONS, IMPLEMENTATION CONDITIONS, AND OUTLOOK

The results presented remain primarily design results. Certain performance indicators will need to be verified through additional studies before implementation: precise sizing of hydraulic systems, annual photovoltaic production, energy balance, actual capacity of phytoremediation systems, detailed road-and-utilities costs, and estimation of recoverable waste quantities.

Implementation also requires local governance capable of maintaining common spaces, managing networks, and monitoring environmental systems. Resident ownership is an essential condition for the long-term sustainability of the model.

These limitations do not invalidate the project's relevance; they clarify the conditions required to transform an architectural proposal into an effectively performing urban system. The main future direction is therefore to continue the work through a phase of technical and economic studies to

quantify the stated performance and define a realistic implementation phasing.

VII. CONCLUSION

The main objective of this Article was to design and carry out an assessment of a regenerative eco-district in Meiganga. The diagnosis revealed a territory characterized by progressive urban growth, substantial land availability, significant vegetation cover, local construction resources, and climatic potential favorable to bioclimatic strategies. It also revealed deficiencies in roads, water supply, sanitation, and facilities.

The proposed architectural and urban response is based on a 10-hectare neighborhood accommodating 115 housing units and a set of facilities and productive spaces. The “Seed of Life” concept expresses an organization based on interconnection and controlled growth. Functional mix, active mobility, peripheral parking, agricultural areas, and the shared park form the project’s spatial framework.

The environmental strategies complement this organization through a bioclimatic approach, the use of local materials, photovoltaic production, circular waste management, rainwater harvesting, phytoremediation, and biodiversity conservation. Quantitative results include a built footprint of 16.90%, approximately 40,000 m² of green and agricultural spaces, and a gross rainfall potential of approximately 182,000 m³/year.

The overall estimate of FCFA 7,452,202,500 provides an order of magnitude for the required investment. The expected impacts are generally positive socially, economically, environmentally, and architecturally, although certain potentially negative effects must be monitored and controlled.

Ultimately, the project demonstrates the value of a contextualized regenerative approach to supporting Meiganga’s development. Its main contribution lies in connecting the architectural project with territorial cycles: water, soil, vegetation, energy, agriculture, materials, mobility, and social life. Definitive validation of performance will nevertheless require detailed technical, economic, and environmental studies during the operational phase.

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